GETTING WARMER: THE OPTIMAL DISTANCE FOR MOTIVATING

CLIMATE CHANGE MITIGATION

By

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A thesis submitted to the

Graduate School-New Brunswick

Rutgers, The State University of New Jersey

In partial fulfillment of the requirements

For the degree of

Master of Science

Graduate Program in Psychology

Written under the direction of

Shana Cole, Ph.D.

And approved by

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New Brunswick, New Jersey

October, 2015

ABSTRACT OF THE THESIS

Getting warmer: The optimal distance for motivating climate change mitigation

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This work compared three competing models for the effect of psychological distance on climate change limiting behaviors. The *Proximal Model* suggested that reducing psychological distance could be beneficial for motivating pro-environmental actions. The *Distal Model* supported the notion that increasing distance from climate change could motivate action. And the *Optimal Distance Model* suggested the greatest amount of action should occur at a moderate distance. A manipulation of the temporal distance of climate change failed to produce effects on attitudes, intentions, or behaviors. However, examination of individual difference measures of distance provided support for the *Proximal Model* whereas decreasing the psychological distance between the self and climate change increased pro-environmental intentions. Further, perceiving climate change as near was related to increased concern, efficacy, and responsibility. The current work also establishes concern, efficacy, and responsibility as mediators between psychological distance and pro-environmental intentions. Theoretical implications and directions for future research as discussed.

Acknowledgment

I would first like to thank my wonderful advisor and thesis committee chair, Shana Cole, for all of her help with this study. Her unwavering encouragement, patience, and dedication was invaluable from idea conception to final manuscript. I would also like to express my gratitude to the members of my committee, Jack Aiello and Gretchen Chapman, for their time and expertise. Importantly, I owe a thanks to my incredibly supportive family and friends, although cliché, you really did make this thesis possible. Finally, a thank you to all the research assistants who were involved with this project.

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Introduction

In his 2015 State of the Union address, President Obama emphatically stated, "No challenge—no challenge—poses a greater threat to future generations than climate change….The Pentagon says that climate change poses immediate risks to our national security. We should act like it." The President's charge echoes those of climate change scientists around the world—climate change is real, it is a global threat, and it requires action. A recent poll of American college students found that the majority seem to agree, at least on the first two counts. Over 80% believe that climate change is human-caused, 84% report that it is a serious problem, and 78% indicate that they persistently worry about it (Howansky, Harris, Colins, & Houston, in prep). However, when asked about their behavior, only half of those same students reported performing any action with the intention of limiting climate change. If the majority of individuals agree that climate change is a problem, why then, do they not behave in ways that might help to limit its deleterious effects?

Some researchers suggest that the disconnect between concern about climate change and pro-environmental behavior may be due to climate change being a psychologically distant issue (Spence, Poortinga, & Pidgeon, 2012; Weber, 2010). Individuals think of climate change as something that *might* influence *other* people who are *far away* at *some point* (Milfont, 2010). Perceiving climate change as psychologically distant might contribute to inaction. According to construal level theory, greater psychological distance from an outcome may decrease the motivation to engage in action, as one's immediate actions are less critical for a distant outcome to occur (Trope &

Liberman, 2003). It is possible that decreasing the psychological distance of climate change would increase motivation to reduce its effects.

Alternatively, perceiving climate change as *too* close might contribute to inaction. After the recent United Nations Climate Summit of 2014, news headlines such as "*Leaked U.N. Report: Climate Change Impacts Already 'Inevitable,' May Soon Be 'Irreversible'* (Newsweek)" suggested climate change was imminently near. Previous work demonstrated that fatalism was a barrier to engagement. Participants showed decreased engagement when they felt the problem of climate change had gone too far for human action to reverse the effects (Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007). In this view, it is possible that increasing the psychological distance of climate change would promote action towards mitigation.

The present study compares two competing linear models of the impact of psychological distance on behaviors intended to mitigate climate change: Does *increasing* psychological distance from climate change increase pro-environmental intentions? Alternatively, does *decreasing* distance increase intentions? This work explores these competing predictions and introduces a third, alternative model that suggests a moderate distance is most likely to motivate action.

Psychological Distance

Psychological distance refers to events, locations, or outcomes that are removed from the self in either time, space, social distance, or hypotheticality. This perspective stems from Construal Level Theory (CLT), which postulates psychologically distant outcomes are linked to abstract mental construals (Trope & Liberman, 2010). Construals are mental constructions, distinct from direct experience, which allow us to go beyond

our immediate situation. Psychologically distant events are represented by abstract construals of general features whereas close events are represented by specific details (Trope & Liberman, 2010). For example, a vacation occurring three months from now might be represented in the mind in terms of its general, abstract features (e.g., getting away from it all and enjoying a relaxing time with family). A vacation occurring three days from now, on the other hand, may be represented in the mind in terms of its more specific, concrete features (e.g., packing bags, getting to the airport, and flying in a plane). As distance increases, construals become more abstract resulting in a feedback loop that influences perception, evaluation, and action. Psychological distance can play a powerful role in shaping whether and how individuals act.

Increased Distance Leads to Action

Some research suggests that greater distance may be helpful for prioritizing global concerns and taking action. CLT suggests that attitudes and values – the underlying structures that provide meaning across varying circumstances (Feather, 1995; Rohan, 2000) – guide choices individuals make regarding distant situations. Focusing on a distal situation encourages people to make choices more in line with abstract, core-values as well as make clearer and more confident evaluations (Liberman & Trope, 2008). This claim has been widely supported experimentally. Several studies show that participants are more likely to apply their values when developing behavioral intentions for future events compared to the present (Eyal, Sagristano, Trope, Liberman, & Chaiken, 2009; Giacomantonio, De Dreu, Shalvi, Sligte, & Leder, 2010; Hunt, Kim, Borgida, & Chaiken, 2010). Additional work supports not only the application of values to future intentions, but ideologies (Ledgerwood, Trope, & Chaiken, 2010) and self-definitions (Wakslak,

Nussbaum, Liberman, & Trope, 2008) as well. If an individual values climate change mitigation, this perspective suggests increasing psychological distance should increase behavioral intentions to act in line with those values.

Moreover, when an event is psychologically distant, value-based desirability takes precedence over the feasibility of mitigation (Liberman & Trope, 1998; Liviatan, Trope, & Liberman, 2008; Todorov, Goren, & Trope, 2007). Indeed, individual motivation is a function of both the desirability of an outcome (e.g., the value and importance of an end state) and the feasibility of achieving it (e.g., the ease or difficulty in achieving the end state; Gollwitzer & Moskowitz, 1996). Focusing on the future may lead people to discount daily hindrances to pro-environmental action and instead think about the desirability of the overall outcome. For example, when developing intentions to attend a political rally in the future a lack of transportation may be overshadowed by the desire to pass pro-environmental legislation. Indeed, there is more motivation to act when considering the big picture rather than the details of the present (Gifford, 2011). Thus, psychological distance may lead to increased behaviors by shifting one's focus to the desirability rather than feasibility of action.

Psychological distance may also make future oriented behaviors more mentally accessible. The process of considering future outcomes likely leads to the formation of attitudes about future oriented behaviors, which in turn makes the attitudes more salient (Rabinovich, Morton, & Postmes, 2010). The more salient the attitudes, the more likely they are to result in an equivalent behavior (e.g. Fazio, 1989). In one study, focusing on the future increased the consistency between individuals' reported environmental attitudes and behavioral intentions (Rabinovich et al., 2010). Therefore, a psychologically

distant mindset may increase the consistency between attitudes and behaviors through attitude accessibility.

Finally, if individuals perceive climate change as psychologically proximal, self-regulation strategies may diminish motivation for action by reducing incentives for acting pro-environmentally or regulating fear. The psychological distress associated with goal failure (Carver & Scheier, 1990; Wrosch, Scheier, Miller, Schulz, & Carver, 2003) may motivate individuals previously concerned with mitigating climate change to disengage. Disengagement from unattainable goals is a highly adaptive self-regulation technique which helps individuals avoid pursing hopeless endeavors (Klinger, 1975; Wrosch & Scheier, 2003). Psychological proximity may also result in disengagement due to the dramatic and fear-inducing way the issue of climate change has been represented (O'Neill & Nicholson-Cole, 2009). According to terror management theory, (Goldenberg, Pyszczynski, Greenberg, & Solomon, 2000) individuals may be motivated to disengage from climate change because it is a reminder of their own mortality (Vess & Arndt, 2008). Mortality salience is likely to activate self-regulatory fear controls such as apathy (Lorenzoni et al., 2007). The aversive nature of goal failure and fear are likely to result in self-regulatory strategies such as disengagement and apathy unless there is some distance between the self and climate change.

In sum, greater psychological distance can be beneficial for motivating action in a variety of ways. When dealing with a value-based abstract issue, such as climate change, distance encourages individuals to focus on the desirability of an outcome and form behavioral intentions in line with their beliefs. Additionally, thinking about future outcomes helps align behavior and attitudes by increasing attitude accessibility. Finally,

having a sense of distance between outcome and behavior may incite beneficial self-regulatory strategies, discouraging disengagement and reducing apathy that results from fear. Greater psychological distance from climate change—along temporal, spatial, social, or hypothetical dimensions—may lead to increased behavior intended to limit the effects of climate change.

Decreased Distance Leads to Action

Although theory links greater psychological distance to increased behavior, other research suggests psychological distance may actually lead to inaction. Indeed, construal level theory itself supports a link between increased distance and decreased action. CLT postulates that distance from an outcome diminishes the importance of immediate action (Trope & Liberman, 2010). Distance reduces the extent to which the outcome is directly dependent on one's own action (Trope & Liberman, 2003). Additionally, individuals are more likely to take risks with decisions that are further away (Sagristano, Trope, & Liberman, 2002). Distance may decrease motivation to engage in an action because there is time in the future for individuals to compensate later for their inactions now (Trope & Liberman, 2010). By this logic, *reducing* the psychological distance to an outcome should increase motivation and lead to increased behavior, at least until the possibility of intervention no longer exists.

Reducing psychological distance also makes the outcome more salient and accessible. Milfont (2010) describes climate change as an extremely psychologically distant phenomenon—the term *global* warming itself insinuates abstractness. This abstractness may make it difficult for the public to engage and may boost uncertainty about the topic (Kollmuss & Agyeman, 2010; Poortinga, Spence, Whitmarsh, Capstick,

& Pidgeon, 2011; Weber, 2010). Additionally, it is difficult for individuals to experience that climate change is occurring. The likelihood of noticing a significant adverse effect due to climate change is relatively small for the people in many regions of the world (Weber, 2006). As a result, Americans are not likely to receive enough personal experience to develop alarm, even those whose economic livelihoods depend on weather events. Environmental problems such as deforestation, loss of biodiversity, and ozone depletion are also more geographically dispersed. Therefore, they are less directly observable and more ambiguous, which can result in an apathetic attitude (Dunlap, Liere, Mertig, & Jones, 2000). Research has shown empirically that framing climate change in a more local compared to distant way makes the issue more salient (Lorenzoni & Pidgeon, 2006), the benefits clearer (Rayner & Malone, 1997), and promotes engagement (Lorenzoni et al., 2007).

Reduced distance also leads to successful behavioral outcomes in the self-regulation literature. Goal setting theory (Locke & Latham, 2002), states that psychologically near outcomes result in an increased likelihood of action (Latham & Seijts, 1999). Proximal goals are helpful in that they provide individuals with feedback about whether what is required for goal attainment aligns with their reality (Frese & Zapf, 1994). Abstract goals for distal outcomes have no direct day-to-day cues and therefore have more room for interpretation by the individual (Locke, Chah, Harrison, & Lustgarten, 1989).

In sum, psychological distance can be harmful in just as many ways that it can be beneficial for climate change limiting behaviors. There is time to compensate for a lack of present behavior for outcomes that are psychologically distant, which results in low

motivation for immediate action. Furthermore, distant outcomes have low saliency, which results in more easily accessible behaviors taking precedent. Literature on an array of self-regulatory processes also suggests that psychological distance can lead to a decrease in motivations to act pro-environmentally.

Existing Work on Climate Change and Psychological Distance

There has been limited work directly exploring the association between climate change and psychological distance. Perhaps the most compelling research found a significant negative relationship between various measures of perceived psychological distance (e.g., temporal, spatial) and preparedness to reduce energy output (Spence & Pidgeon, 2012). The further away climate change was believed to be the less willing people were to reduce energy output. Thus, this study seems to provide preliminary support for the notion that decreased distance results in higher motivation to mitigate climate change. However, the results are correlational, so causal links between the psychological distance of climate change and behavioral intentions cannot be supported. Alternatively, additional research in the field of climate change showed that framing climate change in a spatially distant way increased the perceived severity of the issue (Spence & Pidgeon, 2010), supporting the notion that increased distance may lead to increased action. Thus, conclusions about the relationship between distance and climate change behaviors are both tenuous and conflicting in the psychological literature.

Competing Predictions

Both theory and empirical work suggest competing predictions for how psychological distance may be related to climate change limiting behaviors. Some research suggests distance might lead to increased pro-environmental behaviors. I will

refer to this as the *Distal Model.* Other work suggests proximity should lead to higher

instances of pro-environmental action. I will refer to this as the *Proximal Model.*

A third model in which the greatest degree of pro-environmental action occurs

when climate change is perceived as a *moderate* distance away—not too close and not

too far—will also be considered in the present work. I will refer to this model as the

Optimal Distance Model. The present research compares these three models to seek

support for the causal role that psychological distance plays in guiding climate change

limiting behaviors.

The Influence of Distance on Attitudes and Beliefs about Climate Change

While the primary goal of this research is to examine the effect of psychological

distance on behavior, as a secondary aim this work will also seek to highlight potential

mechanisms driving the effect. I will explore how distance affects individuals' attitudes

and beliefs about climate change. Specifically, I will explore whether distance influences

feelings of concern, efficacy, and personal responsibility, which in turn influence

people's likelihood of forming pro-environmental intentions.

Psychological distance has been related to concern and intentions across a variety

of domains, including climate change (Arctic Climate Impact Assessment, 2004;

Leiserowitz & Broad, 2008; Spence et al., 2012; Weber, 2010). Generally, those who

have experienced climate change as psychologically near (e.g., individuals in Alaska)

report both higher concern and increased willingness to take action (Arctic Climate

Impact Assessment, 2004; Leiserowitz & Broad, 2008). More specifically, concern

mediates the relationship between psychological distance and preparedness to reduce

personal energy output (Spence et al., 2012). Other work, however, has failed to show the

connection between distance and concern about climate change (Whitmarsh, 2009). The present research will examine concern as a potential mediator between psychological distance and pro-environmental intentions.

Another important variable that has been linked to psychological distance is personal efficacy, or the degree to which an individual feels that they can influence a particular outcome. According to Goal Setting Theory, reduced distance often leads to increased efficacy (Latham & Seijts, 1999). Efficacy is an important predictor of environmental intentions and has been identified as a major barrier to climate change engagement (Kellstedt, Zahran, & Vedlitz, 2008; Lorenzoni et al., 2007). As noted by one participant, "I have a sense of helplessness when I hear the fact and think what can I do? And all I can do is very small" (Lorenzoni et al., 2007, p. 450). Efficacy also functions as a mediator for the relationship between concern and pro-environmental intentions (Howansky et al., in prep). I will examine the possible mediating role of efficacy for the relationship between distance and intentions.

Finally, feeling responsible for mitigating climate change may also act as a mediator between distance and intentions. Even those who feel concerned and efficacious about climate change tend shift blame and deny personal responsibility, which results in decreased engagement in pro-environmental intentions and behaviors (Blake, 1999; Lorenzoni et al., 2007; Stoll-Kleemann, O'Riordan, & Jaeger, 2001). Construal level theory postulates that distance reduces personal responsibility for an outcome because distance diminishes the extent to which the outcome is directly dependent on one's own behavior (Trope & Liberman, 2003). I will assess responsibility as a mediator between psychological distance and behavioral intentions.

The Present Research

The current study compares competing models that suggest alternative roles of psychological distance in predicting climate change limiting behaviors. Some previous research supports the *Distal Model*, suggesting that an outcome must be, to some degree, distant from the present to induce behaviors that align with values and to limit the perception of a fruitless goal pursuit. However, other work has found that viewing an outcome as too distant can result in low motivation for immediately initiating action and a low mental accessibility of the outcome, supporting the *Proximal Model*. Finally, it is possible that the role of psychological distance in promoting climate change limiting behaviors functions under the *Optimal Distance Model*, which suggests that there may be an optimal distance at which climate change is proximal enough to motivate action but distal enough to not be perceived as irreversible.

To explore the role of psychological distance in motivating pro-environmental behavioral intentions, I will manipulate the perceived temporal distance of climate change. Participants will learn that climate change is happening in the present, the semi-distant future, or the distant future. My primary hypothesis is that participants in the *semi-distant* condition will report the greatest pro-environmental intentions relative to individuals in the *present* and *distant* conditions. Secondary analyses will further explore the mechanisms driving the effect of psychological distance on climate change limiting behaviors.

Pre-Test

I first conducted a thorough pre-test to ensure that distance stimuli were credible and effectively manipulated psychological distance. In exchange for monetary

compensation, ($0.50) 94 American Amazon Mechanical Turk workers participated in an online study. The survey contained three attention check questions regarding the manipulation. Seventeen participants (18.1% of the sample) answered two or more attention checks incorrectly. Their data was excluded from analyses resulting in a final sample of 77 participants (48.1% women, M_{age} = 40.51, SD = 13.92). Exclusions did not vary by experimental condition, $X^2(94)$ = 0.43, p = .81.

Participants read a target article about the impacts of climate change. The article discussed the effects of climate change on weather, sea levels, and artic landmass. To manipulate psychological distance, participants were randomly assigned to one of three experimental conditions. In the *present condition* (n = 29), participants learned that the effects of climate change are happening right now. In the *semi-distant condition* (n = 23), they learned that the impacts are expected to occur in 15 years. In the *distant condition* (n = 25), participants read that the effects of climate change will occur in 50 years[1]. Aside from the date of the anticipated effects, all other article content remained the same.

Participants learned that they would be completing a study regarding evaluations of news articles. They learned that they should read the articles carefully, as there would be a memory quiz later in the survey. Next, they read their randomly assigned target article and answered three attention check items about the article. Following the attention check, participants indicated their perceived distance of climate change effects on a scale ranging from 1 (*immediate*) to 100 (*very far in the future*). Next, the reported how

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[1] Previous research suggests that individuals perceive 15 to 20 years in the future as distant (Tonn, Hemrick, & Conrad, 2006) while 50 years into the future is perceived as nearly completely hypothetical (Lorenzoni et al., 2007; Sjöberg, 2006).

credible they believed the article to be on a scale ranging from 1 (*not at all*) to 5 (*extremely*). Finally, they indicated the degree to which the article was believable from 1 (*unbelievable*) to 5 (*believable*).

Pre-test participants' perceptions of the distance of climate change significantly varied across articles, $F(2, 70) = 7.02$, $p = .002$. Participants in the *present condition* ($M = 20.74$, $SD = 29.25$) perceived climate change to be closer than those in the *semi-distant condition* ($M = 37.18$, $SD = 29.36$; $p = .16$) and significantly closer than those in the *distant* condition ($M = 53.33$, $SD = 34.30$; $p = .001$). Participants in the *semi-distant condition* reported that climate change felt closer compared to those in the *distant* condition ($p = .19$).

I then examined the credibility and believability of the pre-test articles. Overall, participants found the articles somewhat credible ($M = 3.64$, $SD = 1.13$). Articles were matched on credibility, $F(2, 74) = 0.47$, $p = .71$. Additionally, participants reported that the articles were somewhat believable ($M = 4.07$, $SD = 1.20$) and believability did not vary across article, $F(2, 72) = 1.23$, $p = .30$.

Results from the pre-test indicate that varying the anticipated date of climate change effects in articles serves as a functional manipulation of the temporal distance of climate change. Further, pre-tested articles successfully manipulated the psychological distance of climate change without altering the credibility or believability of the manipulation.

Study Methods

In exchange for monetary compensation, ($1.00) 289 American Amazon Mechanical Turk workers participated in an online study. The survey contained two

general attention check questions and one key attention check question regarding the manipulation. Thirty participants (10.4% of the sample) either incorrectly answered both general questions or incorrectly answered the key attention check question. Their data were excluded from analyses, resulting in a final sample of 259 participants (64% women, M_{age} = 39.6, SD = 12.71). Exclusions did not vary by experimental condition, $X^2(289) = 2.16$, $p = .34$.

Participants learned that they would be completing a study involving evaluations of news articles. They learned that they should read the articles carefully, as there would be a memory quiz later in the survey. All participants first read a short filler article about the opening of an opera and answered memory questions about this article.

Next, participants read a target article, pre-tested above, about the impacts of climate change. Participants were randomly assigned to one of three experimental conditions, the *present condition* ($n = 77$), the *semi-distant condition* ($n = 95$), or the *distant condition* ($n = 87$).

After reading the article, participants completed a short memory quiz containing three attention check questions, including a key question about the date the effects of climate change were expected to occur. Following the attention check, participants answered several questions about their attitudes and opinions about climate change. First, they indicated the perceived distance of climate change effects on a scale ranging from 1 (*immediate*) to 100 (*very far in the future*). Participants then specified how extreme they believe the effects of climate change to be on a 1 (*not at all*) to 100 (*catastrophic*) scale. Next, they selected how irreversible they believe the effects of climate change to be on a 1 (*not at all*) to 100 (*completely*) scale. Participants also indicated their attitudes toward

climate change using a seven-item Climate Change Concern Scale (Howansky et al., in prep; α = .97) that includes statements about the sources and consequences of climate change (e.g. *Climate change poses a growing risk to human health and safety*). Next, participants reported their feelings of personal and group efficacy via an eight-item scale asking about their beliefs about human control over climate change (e.g., *I believe my/people's choices affect climate change*). Finally, participants indicated the degree to which they felt that they and others (e.g., governments, scientists) were responsible for "fixing" climate change on a 1 (*not at all responsible*) to 5 (*extremely responsible*) scale.

Next, participants answered questions about their intentions to act pro-environmentally. Participants reported their intention to engage in 12 climate change-limiting behaviors (e.g. restrict gasoline, avoid eco-unfriendly products, α = .91) in the coming weeks and months. They indicated their responses on 10-point slider scale from 1 (*never*) to 10 (*always*).

As a measure of actual behavior, participants then had the opportunity to take real-time action in support of their beliefs by writing a letter to their Congressperson. They first read a brief description of the Keystone XL Pipeline Act, an act that would approve expansion of the current Keystone Pipeline. The Keystone Pipeline is a network of pipelines that carries crude oil, natural gas, and refined petroleum products across North America. Participants read three pro-pipeline discussion points (e.g., *The pipeline would create 42,000 temporary jobs over its two-year construction period and contribute about $3.4 billion to the American economy*). Next, they read three anti-pipeline discussion points (e.g., *Keystone XL's emissions would be equivalent to adding more than 5.6 million new cars to the U.S. roads and could reduce U.S. GDP by up to 2% in*

the next century due to environmental impacts). Participants then wrote a letter to their Congressperson expressing their opinion on the bill. Participants had the opportunity to actually submit their letters if they so chose. They were directed to a URL where they could find their Congressperson and send them an email.

As a measure of information seeking about climate change, participants had an opportunity to read one final news article. They could choose one of four articles to read. The first was an article regarding specific steps to take to help mitigate climate change (*10 Ways You Can Help Prevent Climate Change*). The second was an informational article about the effects of climate change (*10 Important Effects of Climate Change*). The third was a skeptical argument against climate change (*10 Skeptical Arguments Refuting Climate Change*). The fourth was an article on a different global concern, terrorism (*10 Dangerous Terrorist Organizations Worldwide*). Participants chose one of the four articles to read, and the survey recorded the duration of time they spent reading the article.

Finally, participants completed demographic information such as age, gender, and race. They also indicated the degree to which they were 1 (*very conservative*) to 7 (*very liberal*) across five political domains (e.g. social issues, economic issues). These items were averaged to create an ideology variable ($\alpha = .96$) where high scores correspond to being more liberal. Finally, open-ended questions probed participants for suspicion about experimental manipulations. At the conclusion of the study, participants were debriefed and thanked for their time.

Results

Effects of the Distance Manipulation

*Manipulation check***.**   To explore whether the psychological distance manipulation effectively shifted participants' perceptions of how far away the effects of climate change were, I conduced a one-way ANOVA predicting the perceived distance of climate change from distance condition. There was a significant difference in the perception of the distance of climate depending on experimental condition, $F(2, 254) = 20.60$, $p < .001$. A Tukey post hoc comparison suggested that participants who read the *present* article perceived climate change to be significantly closer ($M = 16.96$, $SD = 3.19$) than those who read the *semi-distant* article ($M = 31.53$, $SD = 2.85$; $p = .002$), who in turn perceived climate change to be significantly closer than those who read the *distant* article ($M = 45.07$, $SD = 3.00$; $p < .001$). The experimental manipulation effectively shifted people's perceptions of how far away the effects of climate change feel.

Attitudes and beliefs about climate change. I next explored whether the psychological distance manipulation affected participants' beliefs about the irreversibility or extremity of climate change, their concern about the effects of climate change, or their feelings of efficacy or responsibility for fixing climate change. There were no significant differences on any of these measures, p's > .21. In other words, the distance manipulation did not seem to influence participants' attitudes and beliefs about climate change.

*Pro-environmental intentions***.** I then explored the effect of the psychological distance manipulation on participants' intentions to engage in climate change limiting behavior in the upcoming weeks and months. I ran an ANOVA to test the effect of the psychological distance manipulation on intentions to act pro-environmentally in the coming weeks and months. There were no differences in behavioral intentions across conditions, $F(2, 239) = 1.76$, $p = .18$. Contrasts indicate that while intentions of

participants in the *distant* condition did not differ from those in the *semi-distant* or *present* ($p = .15$), participants in the present condition formed marginally lower intentions ($p = .08$) than those in the *semi-distant* or *distant* conditions. The psychological distance manipulation did not affect people's intentions to engage in pro-environmental behaviors.

Pro-environmental action. Next, I explored the effect of psychological distance on real time action by analyzing participants' letters to their Congressperson. Eleven participants (4.2% of sample) either left the letter space blank or indicated that they did not wish to write a letter; 248 letters were included in subsequent analyses.

On average, participants spent approximately 230.70 seconds writing their letter ($SD = 192.66$) and the average letter contained 83.08 words ($SD = 55.61$). Two independent research assistants, blind to hypothesis and experimental condition, read the letters. They evaluated the letters for persuasiveness and passionate language on scales from 1 (*not very*) to 7 (*extremely*). Raters' persuasiveness ratings were averaged to create a persuasiveness variable ($M = 2.98$, $SD = 1.29$), $r(247) = .76$, $p < .001$. The same protocol was followed for ratings of letter passion ($M = 2.91$, $SD = 1.43$), $r(247) = .75$, $p < .001$. Coders also noted the stance of the letter, either pro or anti-pipeline ($\kappa = .91$, $p < .001$). Ten participants (4.0%) were excluded from stance analyses due to disagreement between the raters ($n = 238$). Most participants (65.5%) were against the pipeline. A minority of participants (2.1%) reported being neutral on the bill. The distance manipulation did not influence whether participants wrote a letter in favor of or opposed to the pipeline, $X^2(234) = 2.43$, $p = .30$.

I examined the effect of the distance manipulation and letter stance on the time participants' spent writing their letter via a 2 (letter stance: pro-pipeline, anti-pipeline) x 3

(distance: present, semi-distant, distant) ANOVA[2]. There was no main effect of distance condition on the time participants spent writing their letters, $F(2, 231) = 0.56$, $p = 57$. Participants' stance on the issue did not influence how long they spent writing the letter, $F(1, 231) = 1.50$, $p = .22$. There was no interaction between condition and stance, $F(2, 231) = 0.47$, $p = .63$.

I used the same 2 (stance) x 3 (distance) ANOVA to examine the effect of the distance manipulation and letter stance on how many words participants included in their letters. Word count of the letters did not differ by experimental condition, $F(2, 231) = 0.37$, $p = .69$. There was a significant main effect of letter stance, $F(1, 231) = 4.29$, $p = .04$. Participants who were anti-pipeline wrote significantly longer letters ($M = 84.77$, $SD = 52.10$) than those who were pro-pipeline ($M = 71.08$, $SD = 39.98$). There was no interaction between condition and stance, $F(2, 231) = 0.27$, $p = .76$. Experimental condition did not influence real-time action.

A then ran a 2 (stance) x 3 (distance) ANOVA predicting the persuasiveness of participants' letters to their congressperson. There was no main effect of distance condition on letter persuasiveness, $F(2, 231) = 0.37$, $p = .69$. There was a main effect of letter stance on persuasiveness, $F(1, 231) = 9.33$, $p = .003$. Participants against the pipeline ($M = 3.19$, $SD = 1.29$) wrote significantly more persuasive letters than those who were for the pipeline ($M = 2.68$, $SD = 1.10$). There was no interaction between condition and letter stance, $F(2, 231) = 0.18$, $p = .83$.

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[2] Only pro-pipeline and anti-pipeline letters were included in subsequent analyses. Five participants reported being neutral on the bill and were excluded from analyses.

Next, I ran a 2 (stance) x 3 (distance) ANOVA predicting the passion of participants' letters. Condition did not affect the passion of the composed letters, $F(2, 231) = 0.17$, $p = .84$. There was a significant main effect of letter stance, $F(1, 231) = 17.81$, $p < .001$. Letters against the pipeline were significantly more passionate ($M = 3.19$, $SD = 1.43$) than letters for the pipeline ($M = 2.43$, $SD = 1.17$). There was no interaction between condition and stance, $F(2, 231) = 0.26$, $p = .77$.

Information seeking. Finally, I examined the role of distance condition on seeking information about climate change. Most participants chose to read the article about preventing climate change (39.8%) or terrorism (28.6%), while a smaller percentage of participants chose to read about climate change effects (16.6%) or skepticism (15.1%). I performed a chi-squared test to determine if distance condition influenced the article participants chose to read. Distance condition did not affect subsequent article choice, $X^2(259) = 5.88$, $p = .44$. Experimental condition did not motivate participants to seek or avoid information about climate change.

Although the psychological distance manipulation successfully resulted in differences in perceptions of distance, the manipulation did not produce in any downstream consequences for attitudes, intentions, or behaviors.

Distance as an Individual Difference

I next considered the role of individual differences in perceptions of distance on subsequent attitudes and intentions using participants' self-reports of how far away the effects of climate change feel.

Attitudes and beliefs about climate change. I first explored whether participants' beliefs about the psychological distance of climate change were related to their beliefs

about the irreversibility or extremity of climate change, their concern about the effects of climate change, or their feelings of efficacy or responsibility for fixing climate change. There was no relationship between distance perceptions and the perceived irreversibility of climate change effects, $r(254) = .07$, $p = .25$. However, there was a significant negative relationship between reported distance of climate change and: extremity of climate change effects ($r(255) = -.23$, $p < .001$), concern about the effects of climate change ($r(255) = -.46$, $p < .001$), individual ($r(254) = -.37$, $p < .001$) and group ($r(255) = -.37$, $p < .001$) efficacy, and personal ($r(257) = -.32$, $p < .001$) and other $r(254) = -.35$, $p < .001$) responsibility for fixing climate change. The closer climate change felt the more extreme the effects were perceived to be, the more concerned individuals were about the effects, the more efficacious they felt, and the more personal and group responsibility they identified.

Pro-environmental intentions. I then examined the relationship between distance perceptions and pro-environmental intentions. There was a negative relationship between individual differences in how far away climate change felt and behavioral intentions, $r(239) = -.31$, $p < .001$. The closer participants believed climate change effects to be, the more they intended to act pro-environmentally

Pro-environmental behaviors. I next sought to determine the relationship between distance and behavior. There was no relationship between distance and time spent writing a letter to congress, the length of the letter, nor the passion of the letters, p's > .22. There was a marginal relationship between distance and persuasiveness of the letters, $r(235) = -.13$, $p = .05$, suggesting that the closer participants' perceived climate change to be, the more persuasive their letters to Congress.

Mediators of the relationship between psychological distance and intentions. To further explore the relationship between perceived distance and behavior, I tested mediation models to see whether psychological distance affected people's, concern, efficacy, and responsibility which in turn influenced their likelihood of engaging in pro-environmental behaviors. I used the PROCESS macro for SPSS (Hayes, 2013), which takes 5000 samples from the original data set to generate a bootstrap-based bias-corrected and accelerated 95% confidence interval for the indirect effects.

I first examined concern as a mediator between distance and pro-environmental intentions (Figure 1). This mediation was significant, {-.02, -.01}, suggesting that the closer climate change felt, the more concerned individuals became, which resulted in an increased intention to behave pro-environmentally.

I then combined individual and group efficacy to examine general efficacy as a mediator ($\alpha = .90$) of the relationship between distance and intentions (Figure 2). The confidence interval for the indirect effect suggested a significant mediation, {-.02, -.01}[3]. As an individual felt climate change to be closer, they became more efficacious, which then increased pro-environmental intentions.

Finally, I combined personal and group measures of responsibility to examine general responsibility for fixing climate change as a mediator ($\alpha = .94$) for the relationship between distance and intentions (Figure 3). The confidence interval for the indirect effect suggested a significant mediation, {-.02, -.01}. When climate change felt

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[3] The reverse mediation model with distance as a mediator between concern and pro-environmental intentions is non-significant, {-.03, .21}. Further, the reverse model for efficacy, with distance as a mediator between efficacy and intentions is also non-significant {.04, - .01}. This provides preliminary support for the causal role of distance on intentions through concern and perceived efficacy.

near, individuals felt that they and others were more responsible for fixing it, which motivated intention formation.

Discussion

The aim of this work was to compare three competing models of the effect of psychological distance on climate change limiting behaviors. The *Proximal Model* suggested that reducing psychological distance could be beneficial for motivating pro-environmental actions. The *Distal Model* supported the notion that increasing distance from climate change could motivate action. And the *Optimal Distance Model* suggested the greatest amount of action should occur at a moderate distance, a distance at which climate change is proximal enough to motivate action but distal enough to not be perceived as irreversible.

In the present study, the manipulation of psychological distance did not produce measurable effects on pro-environmental attitudes, intentions, or behaviors. While the manipulation was successful in creating differences between the distance means, there was quite a lot of variability within each condition. Individuals likely began this study with a strong preconceived perception of the distance of climate change and one manipulation may not have been strong enough to create downstream behavioral consequences. It is recommended that future work record baseline measures of distance to understand the degree to which distance perceptions can be shifted. Further, this work only focused on shifting the perceived temporal distance of climate change. Psychological distance is a multi-faceted construct including not only temporal distance, but other dimensions as well (e.g. social, special; Trope & Liberman, 2010). Future work

examining the causal role of distance could more accurately test its effect on behavior by including a multi-faceted manipulation of several, if not all, dimensions of distance.

Although the experimental manipulation did not produce effects on attitudes or behaviors, individual differences in psychological distance played a role in predicting such outcomes. Individuals who perceived climate change as closer felt that the effects of climate change were more extreme. Additionally, perceiving climate change as near was related to increased concern, efficacy, and responsibility. Further, the closer participants perceived climate change to be, the more pro-environmental intentions they formed and the more persuasive their environmental letters to Congress. This study ultimately found support for the *Proximal Model*, suggesting that psychological proximity to climate change promotes pro-environmental action.

Theoretical Implications

The results of this study join other research findings that support the notion that psychological proximity leads action. Indeed, Construal Level Theory generally supports the *Proximal Model* of distance on motivation. Prior work has established that with greater distance comes decreased importance of immediate action (Trope & Liberman, 2010) as well as reduced dependence of the outcome on one's own behavior (Trope & Liberman, 2003). Further, an array of self-regulatory literature suggests that concreteness and proximity are important components of successful goal pursuit (Latham & Seijts, 1999; Locke & Latham, 2002). Moreover, the threat response literature suggests that proximal threats are more likely to result in action than distal threats (Pichon, De Gelder, & Grèzes, 2012). As a threat nears, cardiac responses accelerate (Fanselow, 1994) and brain activity switches to areas of the mid-brain associated with action (Mobbs et al.,

2007). Because climate change is typically perceived as a threat (Feygina, Jost, & Goldsmith, 2010; Gifford, 2011), perceiving it as proximal may be functional in motivating action to mitigate the threat.

In addition, the findings of this study replicate and extend the limited work regarding the relationship between psychological distance and climate change. Prior work showed that as distance decreased across sub-sets of psychological distance (e.g., temporal, social, geographic, etc.) pro-environmental intentions increased (Spence et al., 2012). Like this previous study, the current work is not able to conclusively establish a causal link as it relied on correlational relationships between perceptions of distance and action. However, the current work does expand this relationship by including actual behavioral actions and a variety of intentions rather than simply intentions on a single behavior.

Additionally, little prior research has been conducted on mediators between psychological distance and behavior (Spence et al., 2012). The current work not only replicates the important mediating role of concern on the relationship between distance and behavioral intentions, but also expands previous work in this field by establishing efficacy and responsibility as mediators of this relationship as well. The present research expands the previous literature by examining actual behaviors rather than simply intentions and establishes important mediators for the relationship between distance and behavior.

Directions for Future Work

Future work should continue to consider the causal role that distance plays on pro-environmental motivation as well as potential moderators of this effect. Message

framing may be one such moderator. Public messages generally involve either a gain (i.e. highlighting the positive consequences of engaging in a behavior) or a loss (i.e. highlighting the negative consequences of not engaging in a behavior) framework (Block & Keller, 1995; Shiv, Edell, & Payne, 1997). There is evidence to suggest that gain and loss frames are effective for motivating action under different circumstances (Maheswaran & Meyers-Levy, 1990; Meyerowitz & Chaiken, 1987; Tversky & Kahneman, 1981). For example, loss frames are more persuasive than gain frames in situations where the individual is highly invested (Maheswaran & Meyers-Levy, 1990).

Researchers have shown a strong interplay between message frame and construal level across domains such as exam preparation (Pennington & Roese, 2003), health risks (Chandran & Menon, 2004) and recycling behaviors (White, MacDonnell, & Dahl, 2011). Pairing a loss frame message with a concrete construal and a gain frame message with an abstract construal produces enhanced behavior. White and colleagues (2011) showed this causal effect through the manipulation of both message framing and construal level. Because construal level and psychological distance function in a strongly related feedback loop (Trope & Liberman, 2010), it is likely that loss/gain framing would serve as a moderator of the role of psychological distance on behaviors as well. Pairing a loss message with proximal mindset and gain frame message with a distal mindset is likely to increase pro-environmental behaviors. The current work employed only a loss message framework. Future research should consider the interplay between manipulated psychological distance and message framing on behavior.

Another possible avenue for future research is the consideration of the past on behaviors. Construal Level Theory considers temporal distance as not only moving into

the distant future, but the past as well (Trope & Liberman, 2003). Research shows that people experience more intense affect when contemplating the future compared to events that occurred in the past (D'Argembeau & Van der Linen, 2004; Van Boven & Ashworth, 2007). The affective response generated from thinking about an event provides information to the individual about the value of what they are contemplating (Bechara & Damasio, 2005; Gilbert & Wilson, 2014; Schwartz, 1990); therefore, the same event imagined in the future may be valued more than if it was considered as occurring in the past (Caruso, Gilbert, & Wilson, 2008).

Perceiving an event as having occurred in the past may influence behavior differently due to an increasingly apathetic attitude in line with the *what the hell effect* (Cochran & Tesser, 1996). This effect, typically described in dieting and self-control literature, occurs after restrained eaters slightly indulge. Rather than continuing goal pursuit, individuals experiencing the *what the hell effect* then significantly overindulge due to a loss of incentive for continued restraint (Polivy, Herman, Younger, & Erskine, 1979; Spencer & Fremouw, 1979). A similar effect may be found when perceiving climate change as having already been caused. It is possible that perceiving climate change in the present may motivate behavior not only compared to the future (as shown in this work), but also more so than considering climate change effects as having begun in the past. If this is the case, the relationship between distance and pro-environmental behavior may be quadratic rather than linear.

Further, individuals vary in dispositional time perspectives and researchers have linked these individual differences to diverse facets of human behavior (Zimbardo & Boyd, 1999; Zimbardo, Keough, & Boyd, 1997). In the environmental literature,

individuals with a future oriented mindset were more likely to use public transportation (Joireman, Van Lange, & Van Vugt, 2004) and partake in water conservation practices (Corral-Verdugo, Fraijo-Sing, & Pinheiro, 2006). Considering the relationship between individual differences in time perspective and the perceived distance of climate change is an interesting future research opportunity.

The current work focused solely on the relationship between temporal distance and behavior. Some research suggests that the distance of a stimulus in one dimension of distance may affect perceived distance on other dimensions (Pronin, Olivola, & Kennedy, 2008; Stephan, Liberman, & Trope, 2010; Trope & Liberman, 2010; Williams & Bargh, 2008). Future research should also consider the how supporting and conflicting information between distance dimensions influences behavior. For example, examining the behavioral impacts of receiving information that climate change will directly impact your town (spatially proximal) but not for 50 years (temporally distal). Considering the effects of manipulating distance across some dimensions while holding others constant is a fruitful future research direction.

Actionable Implications

Global issues are in their very nature distant and abstract. While this work suggests decreasing distance can increase pro-environmental intentions, it is likely this phenomenon would replicate across many different types of collective action. Considerations of psychological distance should be made when designing communication or intervention programs for any global issue (e.g., poverty, racism, political activism). Educators and activists can incorporate proximal language into intervention strategies. For example, activists seeking to increase collective action against poverty on a college

campus could motivate action by highlighting the similarities between students at the university and those experiencing poverty (social distance). Or by emphasizing the number of individuals experiencing poverty in the town the school is located (spatial distance). It is likely that decreasing psychological distance across dimensions would successfully motivate action across a variety of domains.

In regards to climate change, this work suggests reducing psychological distance may be an effective intervention strategy. Scientists and activists should tailor pro-environmental interventions to decrease distance. Rather than considering climate change as abstract and distal, reducing psychological distance encourages individuals to consider climate change closer to one's self. This can be accomplished by directly focusing on increasing proximity. For example, outreach to individuals living in a floodplain could focus on their spatial proximity to climate change affects. Further, interventions could highlight concrete experiences (*e.g.* educating individuals in China about air quality).

Concluding Remarks

Scientific research in the last decade has determined that the Earth's temperature is rising and that human activity is a major contributor to these changes (Weber & Stern, 2011). Although the vast majority (98%) of the scientific community agrees with these claims, some studies find that less than half of the general public believes that climate change is due to human influence (Leviston & Walker, 2012; Weber & Stern, 2011). At first glance, these finding suggest that promoting acceptance of climate change as a result of human activity would increase pro-environmental behavior. However, the route from acceptance to action appears to be much more complex (Gifford, 2011). The present findings suggest psychological distance plays an important role in determining action. If

individuals continue to think of climate change as something that *might* influence *other* people who are *far away* at *some point* (Milfont, 2010), they may not be motivated to act to help limit the eventual catastrophic effects of climate change. Indeed, this mindset must be changed to generate behavior.

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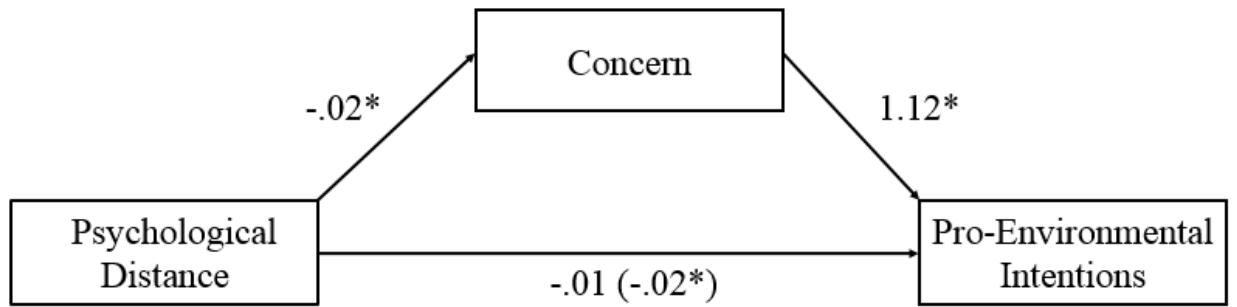
Figure 1. Unstandardized regression coefficients for the relationship betweeen

psychological distance and pro-environmental intentions as mediated by concern about

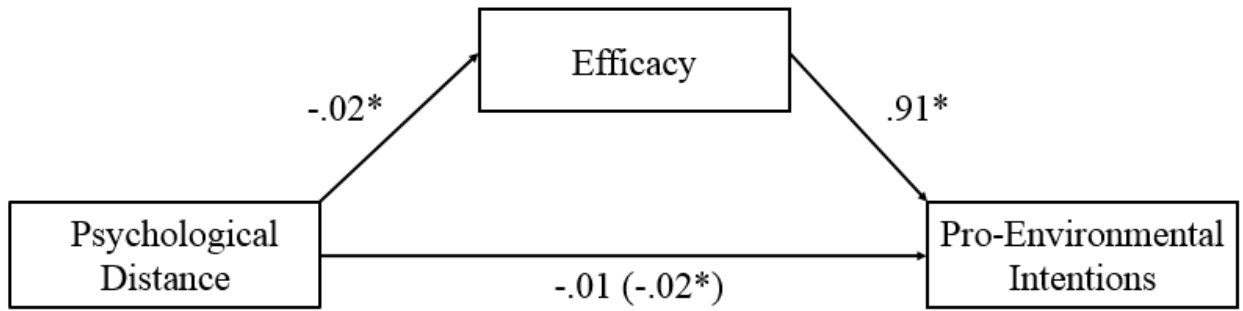climate change. The total effect is represented in parentheses. *p < .05.

Figure 2. Unstandardized regression coefficients for the relationship betweeen psychological distance and pro-environmental intentions as mediated by personal and group efficacy. The total effect is represented in parentheses. *p < .05.
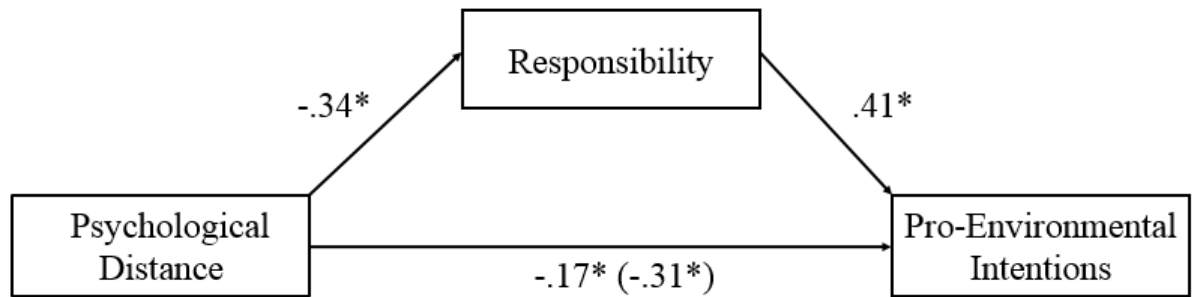
Figure 3. Unstandardized regression coefficients for the relationship betweeen psychological distance and pro-environmental intentions as mediated by responsibility for fixing climate change. The total effect is represented in parentheses. *p* < .05.