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Bridging Psychological Distance in Construal of Climate Change Consequences Through Intergenerational Dialogue

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Abstract

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Dissertation Submitted in Partial Fulfillment

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Abstract

As climate and environmental scientists work to address the practical challenges presented by global climate change, researchers examining environmental attitudes have obtained inconsistent outcomes in efforts to increase awareness and engagement with the topic to increase support for proenvironmental policies. Using construal level theory as the central framework, the purpose of this study was to examine whether construal level of long-term consequences of climate change (the dependent variable), assessed indirectly using the Environmental Attitudes Inventory scale, can be reduced by priming an individual to think of a temporally distal but socially proximal target (specifically, a genetic descendant) while engaging in a structured writing task. This task manipulated social and temporal dimensions of psychological distance as independent variables. A 2 x 2 analysis of variance was conducted using data collected from 130 online participants (older than 18 years and U.S. citizens eligible to vote) recruited using promoted posts on social media but did not find statistically significant support for the hypotheses. Low internal consistency estimates for the overall scale and multiple subscales were considered among other confounding factors. These findings suggest new approaches to conducting similar research in the future, which may provide insight and promote positive social change on how to engage individuals in meaningful consideration of how present choices about environmental policy support will affect future generations.

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Dedication

For my family, especially my parents, your support has meant everything to me. This pursuit has kept me away from you all more than any of us would have liked, but you have never questioned the value of this task to which I have set myself. Your love and encouragement are a blessing. For my best friend, Boy Boy, you cannot possibly know how much I love you. You have been a stalwart companion that has stayed by my side through every dark moment – and every joyous one, too - I have faced for the last ten years. I hope we have many more joy-filled years together.

For the next generation of our family that I love today (and for those I will come to know and love in the future), this was for you. Of itself, this work is not enough to roll back the harms that we who came before you have left at your feet as burdens for you to bear. But I hope you will at least see the value in sharing what knowledge I may have acquired on my journey. We do not live apart from anyone; we are all part of one community, one world. I am doing my best to show you that a candle loses nothing by lighting another candle. Please remember to share your light with the world.

"There, peeping among the cloud-wrack above a dark tor high up in the mountains, Sam saw a white star twinkle for a while. The beauty of it smote his heart, as he looked up out of the forsaken land, and hope returned to him. For like a shaft, clear and cold, the thought pierced him that in the end the Shadow was only a small and passing thing: there was light and high beauty for ever beyond its reach."

J.R.R. Tolkien, *The Return of the King*

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       I owe a great many thanks to my committee Chair, Dr. Jay Dill, whose encouragement from as far back as my second term in the program (four years ago) stoked my interest in the social cognitive aspects of attitude formation and maintenance. His guidance and support gave me the confidence to pursue my path without fear that I would stumble or get stuck somewhere along the way; that is just what the process looks like sometimes. And often all it takes is a good conversation to shake loose a solution. I owe Dr. Susan Marcus as much a share in the credit for keeping my procedures soundly grounded in the scientific method. Her genuine excitement when I first told her what I proposed to study assured me that I was doing something worthwhile. And her detailed feedback helped me take my work to the next level at every step along the way. That both of my first choices for content and methodology experts said "yes" to joining my committee let me know I was not going to fail. Thank you both very much for your time, effort, support, advice, knowledge, wisdom, and professionalism!

       I would also like to express my most sincere appreciation to James Stevenson for his work on the MyGradResearch.com website, which performed admirably in the service of this study. I could not have done this without you, my friend!

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Chapter 1: Introduction to the Study

Introduction

As the global community struggles to cope with the increasingly worsening

consequences of global climate change, climate scientists have repeated dire warnings

that drastic action must be taken to combat the source of the problem by altering human

behavior to support proenvironmental outcomes (Bradshaw et al., 2021; Ripple et al.,

2017; 2020). Social psychologists have explored a wide variety of approaches to

influencing environmental attitudes and behaviors, including manipulations of messaging

(Fox et al., 2020; van der Linden et al., 2019), using visualization of both climate-related

data (van der Linden et al., 2014) and climate-related imagery (Duan et al., 2017;

Leviston et al., 2014), promoting altruism-related positive affect (Hartmann et al., 2017),

and by leveraging group identity and self-categorization (Carfora et al., 2017; Jia et al.,

2017; Reese, 2016).

One area of study in environmental attitudes and behaviors that has shown

significant promise in uncovering more adaptive approaches to communicating the

urgency for action in combating climate change has been research using psychological

distancing (PD) models, which suggest that individuals tend to perceive distance to

evaluation objects along one or more of several dimensions (Liberman et al., 2007).

Within PD models, construal level theory (CLT) has been used in studies across a variety

of attitudes and behaviors. The central premise of CLT is that PD correlates to the

construal level of the evaluation object, where greater distance typically results in a

higher level, more abstract perception, whereas reduced distance results in a lower level,

more concrete perception (Trope & Liberman, 2010). A more detailed exploration of construal level and PD will be discussed in Chapter 2.

In this chapter, I introduce PD and CLT as a framework in which to understand how barriers to improving proenvironmental attitudes and behaviors may be overcome. In this chapter, I provide an overview of the current study, including the background and problem statement, purpose of the study, research questions and hypotheses, theoretical framework, nature of the study, definitions of variables, assumptions, limitations, and delimitations. Finally, I address the significance of the problem and the potential social change implications for this study.

Background and Problem Statement

Ninety-seven percent of climate science research studies conclude that climate change is a phenomenon caused by humans that is negatively affecting the environment (Benestad et al., 2016; Ripple et al., 2017; van der Linden et al., 2015), yet many Americans remain skeptical of the extent to which humans have contributed to the development of increasingly extreme weather phenomena that critically affect ecosystems and wildlife (McCrea et al., 2016; National Aeronautics and Space Administration, 2019). This represents a significant barrier to the enacting of proenvironmental policies designed to halt and reverse the effects of global climate change (Dunlap, 2013; Jacques & Knox, 2016). The lack of support is suggested to be partly due to the inability of individuals to construe (i.e., develop a perception of an evaluation object) the consequences of climate change concretely with specific detail (i.e,

low-level construal; see Kim et al., 2013; O'Connor & Keil, 2017; Trope & Liberman, 2010).

Construal level has been suggested as a primary factor in much of the literature examining the relationship between environmental attitudes and perceptions of future consequences of climate change. Researchers have attempted to lower construal level primarily by manipulating PD either spatially (i.e., "localizing" the perception of climate change effects to a specific geographic area, per Schuldt et al., 2018; Brügger et al., 2016), temporally (in which the subject is reframing the perception of time, per Jones et al., 2017), or hypothetically (as in considering the likeliness or unlikeliness of a consequence; see Leviston et al., 2014). However, few studies have explored the possibility of reducing construal level by manipulating perceptions of social PD in conjunction with temporal distance (i.e., associating the long-term consequences of climate change with the implications they will have on a family member), wherein the participants are primed to consider the future consequences of climate change as they specifically affect their descendants.

Supporting this notion, kin selection theories suggest that human behavior is guided in part by an inherent drive to ensure the survival of offspring and genetic kin (Hamilton, 1964; West et al., 2002). Although kin selection has been tested extensively in nonhuman species and less so in direct experiments involving human participants (primarily due to operationalization constraints; Burton-Chellew & Dunbar, 2015), more recent support for the premise has been found in literature examining economic theories

of altruistic behavior, which considers kin relatedness within the broader context of

social closeness (Hackman et al., 2017).

Similarly, studies using intergroup relations, social identity, and self-categorization theories have conceptualized the lack of current support for proenvironmental policy as an expression of temporal intergroup bias (Meleady & Crisp, 2017), wherein inaction is viewed as a form of prejudice toward future generations. The cost of action at present is weighed against the moral cost and long-term consequences of failing to act (Markowitz & Shariff, 2012; Zaval et al., 2015).

The lack of studies using a dual-distance bridging approach along social and temporal dimensions presents a worthwhile gap in the literature that could be explored using a research framework centered on CLT and supported by other social psychological theoretical models, including kin selection/social closeness, altruism and helping, intergroup relations, social identity theory, and self-categorization theory.

Purpose of the Study

The purpose of this study was to examine whether construal level of long-term consequences of climate change could be reduced by priming an individual to think of a temporally distal but socially proximal target (specifically, a genetic descendant) through engagement in a structured writing task. My intent was to study whether this would alter construal level such that individuals in that conditional group would shower higher scores of environmental attitude. The study was an experimental, quantitative design, comparing postactivity measures of environmental attitude using the environmental attitudes

inventory (EAI; Milfont & Duckitt, 2010a) to indirectly evaluate construal level change as a consequence of PD manipulations.

Research Questions and Hypotheses

In this study, I examined how manipulations of PD influence construal level, as evidenced indirectly through measurement of environmental attitude scores. There are three research questions that guided this study, which are presented with their associated hypotheses:

RQ1: Is there a significant difference in construal level (as measured by mean environmental attitude scores) between individuals writing to a target who is near versus far in social PD?

$H_0$1: There is no difference in construal level between social PD condition groups.

$H_1$1: There is a difference in construal level between social PD condition groups.

RQ2: Is there a significant difference in construal level (as measured by mean environmental attitude scores) between individuals writing to a target who is near versus far in temporal PD?

$H_0$2: There is no difference in construal level between temporal PD condition groups.

$H_1$2: There is a difference in construal level between temporal PD condition groups.

RQ3: Is there a significant interaction of manipulations of social and temporal PD when the target is socially proximal and temporally distal?

$H_0 3$: There is no interaction effect of manipulating social and temporal PD.

$H_1 3$: There is an interaction of manipulating social and temporal PD such that individuals in the socially proximal, temporally distal condition had higher mean scores of EA than those in other conditions.

Theoretical Framework for the Study

The primary theoretical framework used in this study was CLT, which is a model of PD that suggests individuals will perceive an evaluation object either at a high- or low-level depending on the extent of the PD between the perceiver and object along one or more dimensions (Trope & Liberman, 2010). Thus, construal is an aspect of attitude. The dimensions of PD include (a) temporal, which is based on the perception of time between two objects of evaluation, typically a cause and an effect; (b) spatial, which considers literal physical distance between two objects; (c) social, or the distance perceived between two individuals in relation (i.e., stranger versus friend versus family member); and (d) probability, which considers how likely or unlikely something is to occur (Liberman et al., 2007). Because high-level construal correlates to the perception of greater PD, any attempt to reduce the distance should see a corresponding reduction in construal level (e.g., Jones et al., 2017; Schuldt et al., 2018).

CLT and PD models have been used in a wide array of attitude-behavior research, because they provide an adaptive framework for examining how individuals make

decisions. In many instances, PD is examined in relation to what is known as "temporal discounting," wherein an individual may be more likely to make a decision that has a more appealing short-term benefit even when the long-term benefit of a different decision would be objectively more valuable when achieved (Kim et al., 2013). This temporal discounting behavior is a result of being unable to construe long-term (i.e., temporally distal) consequences at a low-level, in concrete detail. Thus, I attempted to examine how that PD may be bridged to reduce high-level, abstract construal of climate change consequences to a more detailed low-level construal.

Additional theoretical models identified as supporting theories included kin selection theory; helping and altruism theories; and intergroup relations, social categorization, self-categorization, and social identity theories.

Kin selection theory was first proposed by Hamilton (1964) as he attempted to examine decision making from a biological standpoint. Kin selection theory contains several different models, but most suggest that a large part of human behavior derives from biologically-based drives to ensure survival of genetic offspring or other genetic kin. More recent work has examined conditions under which this theory may not hold, particularly when a large number of genetic kin inhabit the same area, leading to competition for resources and diminished cooperation and altruism (West et al., 2002). Kin selection may be leveraged to reduce social PD if the participant is primed to think about the long-term effects of current environmental attitudes and how the accompanying support for or opposition to proenvironmental policy may affect a genetic descendant,

even indirectly. Bridging social PD this way may bypass the influence of temporal PD to reduce construal level.

Intergroup relations theories suggest that individuals naturally perceive themselves and others as being part of ingroups and outgroups that result in favorable behavior toward those seen as similar or prejudicial behavior toward those seen as "other" (Brewer & Kramer, 1985; Perdue et al., 1990). This is in line with social identity, social categorization, and self-categorization theories, which collectively posit that individuals derive a clear sense of self by the manner in which they categorize their own place in their social structures, through group memberships, organizational identities, shared values, and other perceived shared traits or qualities that help them in crafting their own identity (Tajfel et al., 1971). Importantly, such processes can be leveraged to create overarching group identities that can include individuals who would otherwise be perceived as members of outgroups, leading to better relations with the individuals contained in the larger collective ingroup (Brewer, 2000).

For the purpose of the present research, I used CLT to identify the variables to be manipulated in the study: social PD (relative vs. stranger) and temporal distance (now vs. in the future). I also used CLT to interpret the results, with the dependent variable assessed indirectly by environmental attitude score.

Nature of the Study

This was a 2x2 experimental quantitative study. Experimental research provides the ability to statistically evaluate the effects of an intervention, which is necessary within the framework of CLT due to the use of indirect measures of psychological phenomena

(Trope & Liberman, 2010). Most research using CLT is quantitative, which has proven to be a strong indicator that the theoretical model has value for understanding in part the relationship between attitudes and decision-making behavior based on perceptions of short- versus long-term consequences.

More specifically, CLT-based designs allow researchers to quantify the effects of an intervention on temporal discounting behavior (Dickens & DeSteno, 2016), in which an individual may be more likely to choose an option that is less rewarding in the short term over an option that will be more rewarding in the long-run, due to the inability to make adequate comparisons between consequences that exist further apart in a perceived span of time (Kim et al., 2013).

In the present research design, the dependent variable of interest was construal level, which was measured indirectly using the participant scores of environmental attitude (EA) as assessed by the use of a survey containing the 24-item brief version of the EAI (Milfont & Duckitt, 2010a). This version had acceptable alpha coefficients, construct validity, temporal stability, and cross-cultural validity (Ajdukovic et al., 2019; Milfont & Duckitt, 2010b) and contains 7-point Likert-style items, including serveral that are reverse-coded. I assessed scores upon completion of a targeted writing activity.

The independent variables of interest were:

- Social PD of writing target, a nominal variable defined by two conditional levels: (a) near (family member) and (b) far (a stranger).

- Temporal PD of writing target, a nominal variable defined by two conditional levels: (a) near (alive now) and (b) far (alive 200 years from now).

I used primary sources of data, obtained directly from respondents on a web-based survey platform that was developed ad hoc for this study. The research website, MyGradResearch.com, served as a participant hub, allowing them to securely access this study at multiple points in time (if necessary) for asynchronous participation. Data collected included:

1. Self-reported demographic data used to qualify participants for the study:

   a. Year of birth (age).

   b. U.S. citizenship (are you a U.S. citizen?).

2. Environmental attitude measurement postintervention, using the EAI (Milfont & Duckitt, 2010a).

3. Participant writing responses, based on conditionally assigned intervention instructions.

Because the dependent variable of interest was construal level as measured indirectly with environmental attitude score a two-way or factorial analysis of variance (ANOVA) was appropriate for assessing statistical significance of differences in mean environmental attitude scores. Factorial ANOVA is used when there are two or more independent variables and one continuous dependent variable (Warner, 2013).

Participants writing about climate change to socially proximal targets were predicted to show a higher mean EA score due to construal level reduction of long-term climate change consequences. Moreover, those who were concurrently in a temporally distal condition group were predicted to show the highest mean scores of EA due to simultaneous bridging of temporal PD.

Definitions

The following terms are defined as they relate to this study. Although they may have other definitions, that is not how they were intended to be understood within the context of this research.

Altruism: Engaging in prosocial behavior, typically not for personal gain but as a moral imperative (Kurzban et al., 2015).

Bridging: To either increase or decrease perceptions of PD in order to influence construal level of an object (Trope & Liberman, 2010).

Climate change: This term references the shifts in the natural global ecosystem that have anthropogenic (i.e., human-made) causes, including but not limited to global warming, trapped greenhouse gas emissions, rising sea levels, mass extinction events, destructive super-weather phenomena, and coastal erosion (Ripple et al., 2017). This is also referred to as *global climate change*.

Construal level: This refers to how an individual perceives an object, either has more abstract and generalized (i.e., high-level) or concrete and detailed (i.e., low-level). High-level construal is typically associated with greater PD, whereas low-level is associated with reduced PD (Trope & Liberman, 2010).

Distal: To be farther along a dimension of PD (Liberman et al., 2007).

Environmental attitude(*s*)(*EA*): This is a multidimensional collection of expressed or held beliefs about the natural world and the relationship that humans (generally, or as individuals) have with it. For the last 4 decades, environmental attitudes have been measured using numerous instruments that have been created, adapted, and abandoned as

new data are collected and the understanding of the structure of these attitudes has

evolved (Kaiser et al., 2018). In this study, I measured environmental attitude using the

EAI, which is described more fully in Chapter 3 (Milfont & Duckitt, 2010a, 2010b).

Evaluation object: Anything that can be perceived by an individual, in the form of

another person, an actual object, a hypothetical outcome of a behavior, an attitude, a

group, an entity, or any other type of construct (Liberman et al., 2007). In the context of

PD, it references whatever is being considered by the individual (e.g., climate change

consequences).

Intergroup relations: A broad category of theories within social psychology that

suggest individuals assume attitudes and engage in behaviors based on the perception of

ingroup and outgroup membership by themselves and others (Brewer & Kramer, 1985).

Kin selection: This theory generally suggests that individuals are predisposed to

help genetically related others to ensure the survival of related descendants (Hamilton,

1964).

Probabilistic psychological distance: One dimension of PD, referring to the

perception of greater or lesser likelihood of something occurring. It is also known as

hypothetical PD (Liberman et al., 2007).

Proximal: To be near along a dimension of PD (Liberman et al., 2007).

Proximising: To make something appear near in PD (Brügger et al., 2016).

Psychological distance/distancing (*PD*): This is the perception on the part of an

observer of proximity or distance along one or more dimensions between themselves (or

their point of reference) and an object of evaluation. The terms *distance* and *distancing* may at times be used interchangeably throughout (Liberman et al., 2007).

Self-categorization: Defining one's group memberships to establish a sense of place within a social context (Turner, 1985).

Social identity: The portion of one's sense of self defined by their relationships to others, including group memberships (Tajfel, 1978).

Social psychological distance: One dimension of PD, referring to the perception of familiarity or dissimilarity between the perceiver and the target (Liberman et al., 2007).

Spatial psychological distance: One dimension of PD, referring to the perception of literal physical distance between the perceiver and a target (Liberman et al., 2007).

Temporal discounting: A phenomenon in which an individual will perceive an objectively more valuable object or outcome as less desirable than an objectively less valuable one due to it appearing or existing further away in time (Kim et al., 2013).

Temporal psychological distance: One dimension of PD, referring to the perception of nearness or farness in time between the perceiver and the target (Liberman et al., 2007).

Assumptions

A significant assumption required by this study was that, given random assignment to conditional groups, the mean preintervention score on environmental attitude would be normally distributed. Although it might have provided a more sensitive measurement of whether the manipulations had the influence on construal level that was

hypothesized, conducting a pretest, posttest design would have introduced potential threats to internal validity. Specifically, participants might have attempted to recall their earlier answers when retaking the EA measurement (Creswell & Creswell, 2018).

Scope and Delimitations

Because I intended this study to explore the question of whether social PD could be manipulated to bridge temporal distance and lessen its impact on construal level, I did not include other manipulations of PD (e.g., hypothetical and spatial) in this study's design. This may present an opportunity for future research in this area because other studies have found that perception of distance along one dimension of PD typically results in similar perception of distance along the others (Fiedler et al., 2012; Liberman et al., 2007; Maglio et al., 2013).

The research questions stem from a social problem that, although not being unique to the United States, has been identified as a significant issue in this country: lack of proenvironmental policy support (McCrea et al., 2016). Thus, I deemed it necessary to exclude non-U.S. citizens from the sample frame to ensure that the results could potentially be generalized to the adult, voting-eligible U.S. population. Additionally, participants younger than18 years were not included, because they are also ineligible to vote in the United States.

Limitations

There were several limitations to the research design. The most prominent concern was of social desirability bias influencing participants' responses, because environmental issues have become a polarizing topic in the United States during the last

30 years and some individuals might have been compelled to provide responses to the

postactivity measure of EA that reflected their ideologies (Liao, 2016; Schwarz, 1999).

However, in their development and testing of the EAI, Milfont and Duckitt (2010b) did

include methods to evaluate social desirability correlations with the 12 dimensions of EA

assessed by their instrument. In Study 1, they reported that only three of the scales, all

within the preservation dimensions, had statistically significant but weak ($r < .30$)

correlations.

Moreover, although deception in social psychology research is not uncommon,

with this study's design including only a posttest measure rather than both a pretest and

posttest, it was unnecessary to attempt to hide the dependent variable from participants. A

randomized assignment to conditional groups should have provided a normalized

distribution of potential influencing factors like political ideology so that the mean score

for each group could be considered valid (Creswell & Creswell, 2018; Groves et al.,

2009).

The lack of a pretest in the study design was a second limitation. Although the

results could be evaluated more sensitively with a factorial ANCOVA used to control for

pre-existing levels of EA (Warner, 2013), it was not necessary to evaluate whether there

was an effect of the manipulations as hypothesized. A prepost design would also create

concerns for internal validity, such as the possibility of different interpretations within-

subjects on their retaking the measure after the writing activity or attempting to recall

their earlier responses to replicate them. Use of an expanded design with additional

control groups could have helped statistically account for such factors, but that was beyond the scope of the current study.

A third limitation of the study was the use of a Likert-type instrument as the indirect measurement of the DV. This limitation was two-fold. First, Likert-type instruments are subject to individual interpretation of the difference between points on the scale by participants (Groves et al., 2009). This was partially accounted for with randomized assignment to conditional groups, with the assumption that a sufficient number of participants in each group would provide normalized distribution of responses. However, use of the EA measure as an indirect assessment of construal level manipulation relies on existing research in the domain of PD, which I will discuss more fully in Chapter 2. This research suggests that there is no way to directly measure construal level without the instrument itself influencing construal level (Bar-Anan et al., 2006). Use of indirect measures, however, has been prevalent throughout the history of social psychology and many prominent theoretical models rely on such methods (e.g., the implicit association test; see Greenwald et al., 1998)

Significance

As Brügger et al. (2016) noted, of the studies that have attempted to proximise, or make nearer in psychological perception, climate change and its consequences, none resulted in the positive effect on support for combating climate change that they hypothesized. If the theorized barrier to engagement with climate change is indeed greater temporal distance between the present and the point at which the perceived consequences of climate change will occur, then manipulating social PD in combination

with temporal PD should provide a stronger bridge between the present and the perceived future and lead to a reduced construal level, indirectly evidenced by an increase in environmental attitude.

I attempted to address the identified gap in the literature by using manipulations of social and temporal PD together to reduce construal level. This project is unique because no research into this topic using a CLT or PD framework has attempted to achieve an interaction of these two dimensions based on the supporting theory-driven assumption that manipulations of social distance can bypass the influence of temporal distance on construal level (McDonald, Chai, & Newell, 2015).

The results of this study suggest new approaches to engaging individuals in perceiving the human consequences of climate change, with the insights providing new routes to reduction of construal level and PD. Climate change presents one of the gravest threats to humanity's survival and has been co-opted by politicians as a partisan issue, despite being something that affects all humans regardless of race, ethnicity, gender, country of origin, or political ideology and party affiliation. Identifying a new way to increase environmental attitudes, and consequently proenvironmental policy support, could be a major step in returning the debate over climate change to the realm of scientific discourse based on empirical facts.

Summary

In this chapter, I have introduced the lack of public support for proenvironmental policies to combat climate change as a significant social issue that requires new research to explore means of changing how individuals perceive the long-term consequences of

climate change. Thus, construal level is identified as a dependent variable that may be influenced through manipulations of PD using a study design based on a CLT framework. Supporting theories of kin selection and group-based identity support the supposition that manipulating the social dimension of PD may bridge the temporal dimension, altering construal level in a way that participants show a higher score of environmental attitudes.

In Chapter 2, I will discuss the literature on climate change and environmental attitudes as a well-established area of research in the social sciences. I will also provide a background for CLT (as well as the history of PD more generally) to support its selection as the central theoretical framework for this study. Additionally, I will provide support for the specific research questions addressed by my study through identification of supporting theories about kinship and social identity. Last, I will explain the gaps in the research and how I attempted to address them.

Chapter 2: Literature Review

Introduction

A significant and substantive body of work documents the dangerous consequences posed by global climate change, from extreme changes in weather patterns (Climate Council, 2018) to the increased probability of mass extinction events due to habitat loss (Barnosky et al., 2011; National Aeronautics and Space Administration, 2019), with a disproportionate affect on poorer, less-developed regions, both in the United States and around the world (Aldern, 2015). Climate change has already resulted in the need for millions to migrate from their homes (Francis, 2020), an approach that is an adaptive response to the crisis, but that can result in destabilizing communities and threatening cohesion of cultures (Serdeczny et al., 2017). Beyond the technical challenge of addressing the physical toll of climate change, mental health professionals are not yet equipped to deal with the emotional toll of such crises-induced responses (Parsons, 2019).

In addition to increased mass migrations of populations, climate change-related weather pattern shifts can lead to greater transmission of diseases, compounding the prospect of more frequent epidemics and global pandemics (Ma et al., 2019; Rees et al., 2019), a significant concern as a result of the novel coronavirus pandemic (i.e., COVID-19). That these phenomena are already happening but are not often included in the general conversation about climate change suggests that such chaos is becoming normalized in what Sardar (2015) termed a new era of *postnormal times* (PNT), wherein

an increase in ignorance and uncertainty about topics of vital concern to humanity leave those conversations mired in contradiction.

Therefore, many scientists, activists, and policy makers have concluded that sufficient evidence indicates that the changes in global climate represent one of the greatest threats to the continued existence of humanity (Butler, 2018; Kareiva & Carranza, 2018; Ripple et al., 2017; Spratt & Dunlop, 2018). There is nearly unanimous consensus among the scientific community with 97% of studies concluding that climate change is both a real phenomenon and a product of anthropogenic origin (Cook et al., 2016; Goldberg et al., 2019; van der Linden et al., 2014, 2015). Moreover, climate scientists have been unable to replicate the findings of the 3% of studies that did not reach those same conclusions (Benestad et al., 2016).

However, scientists have not met with great success in their efforts to communicate to the public both the extent of the consensus and the consequences of inaction (Dong et al., 2018; Hine et al., 2016). Despite such broad agreement about the climate crisis on the part of climate scientists, the general public and political leaders in the United States have not enacted large-scale, concerted efforts to combat climate change (Dietz et al., 2007; Leiserowitz et al., 2014). Individual localities have taken their own steps to address the effects of climate change, but many of these have centered on adaptation rather than mitigation (Koski & Siulagi, 2016).

Social factors compound the challenges in establishing a clear understanding of the scientific concensus. The perception of lower consensus among users of social media

and in other digital community spaces leads many individuals to believe the threat is either not real or less dangerous than scientists have stated (Lewandowsky et al., 2019).

To an extent, politics and political ideology play a part in the ineffectiveness of climate messaging. Political conservatism is significantly correlated with lower levels of belief in the existence of a climate crisis (Hornsey et al., 2016; Hu et al., 2017), an underestimation of the consensus within the scientific community (van der Linden et al., 2014), an underestimation of the risks posed by disruptive human behaviors linked to climate change (Clarke & Evensen, 2019), and lower levels of concern for the environment (Cruz, 2017). Additionally, there has been a concerted effort during the last 50 years on the part of several industries and political communities to provide misleading information to the public (Dunlap, 2013; Dunlap & Jacques, 2013; Jacques & Knox, 2016), with the result being the enacting of less-stringent environmental protection policies. Moreover, a rise in populist mentalities on both the political left and right has resulted in a polarization of the climate change debate that has made meaningful public discussion of the topic harder to achieve (Geiger et al., 2017; Huber et al., 2020).

Social identity explanations for public disengagement with the climate crisis is one avenue that social sciences researchers have explored. Whether as a public display of morals and values (Wolsko et al., 2016), as an indicator of "environmentalist" identification (Brick & Lai, 2018; Carfora et al., 2017; Lacasse, 2016; Schmitt et al., 2019) or as a means of defining, labeling, and controlling in-group and out-group members (Meleady & Crisp, 2017; Stanley & Wilson, 2019; Wolsko, 2017), the attitudes and beliefs about environmental policy are woven into social identity.

There are affective and emotional correlates of environmental attitudes (Coelho et al., 2017; Wang et al., 2018). For example, the learned helplessness model may explain the lack of action that appears in studies of the relationship between attitudes and behaviors with environmental issues (Landry et al., 2018). Similarly, worldview and beliefs about one's ability to effect change serve as influences on environmental attitudes and behaviors (Soliman & Wilson, 2017), as does the broader culture in which an individual lives (Tam & Chan, 2018, 2017).

In the domain of social cognition, findings from studies of perceptual processes evaluating proenvironmental behavior along a variety of cost-benefit dimensions have shown that lay individuals weigh those concerns differently than do the more scientifically literate (Truelove & Gillis, 2018). Among the perception studies, CLT is an area of research that has shown considerable promise and high adaptiveness in studies of the connections between attitudes, decision making, and behavioral planning (Liberman & Trope, 1998; Trope & Liberman, 2010).

This review will begin with an introduction to the central theoretical framework for this study, exploring CLT and the broader theories of PD, including temporal discounting. The review will include assessments of the numerous topics in which CLT and PD models have been effective at examining decision making and behavior planning. Additionally, I will discuss supporting theories that may provide additional insights, including kin selection and inclusive fitness (Hamilton, 1964), social identity theory (Tajfel, 1978), self-categorization theory (Turner, 1985), and intergroup bias (Meleady & Crisp, 2017; Perdue et al., 1990). The review will conclude by detailing the gap identified

in the literature, presenting a viable opportunity to address the gap with a study that uses CLT as the primary theoretical framework.

Literature Search Strategy

The literature review began with searches of the Walden University library databases, starting with a broad search using the central Thoreau database followed by more targeted searches of the psychology as well as public policy and administration databases. With the computer-based searches, I intended to find articles relating to climate change, PD, construal level, environmental attitudes, and environmental policy, including identifying research studies that examined environmental attitudes and proenvironmental behavior within the framework of social cognitive theories about the link between attitudes and behavior.

The initial parameters for the searches limited the results to articles published between 2015 and 2020 to focus on current research, but the searches were expanded to include studies published between 1990 and 2020 for more comprehensive coverage. Although environmental attitudes have been the subject of study since as early the 1970s, as have PD models, beginning in the 1990s, both areas saw refinements to their respective core theoretical models in conjunction with a rise in the political polarization of the topic of climate change. This led to more overlap in these areas of study and a closer alignment with the current political circumstances and policy implications that influence environmental attitudes and support for proenvironmental policies designed to combat climate change. Thus, I deemed useful work published prior to the 1990s but did not deem it necessary to clearly define the scope of the body of the knowledge.

In searching for supporting theories, I found many seminal works that detailed the origins of models for social identity, self-categorization, and intergroup behaviors. Due to the age of those original publications, I conducted database searches for the theories themselves to find updated meta-analyses and articles that reflected the integration of those theories into studies of environmental attitudes and climate change.

For studies relating to kin selection, however, the relative value of the studies conducted after the 1960s and early 1970s was minimal due to a shift from a psychological emphasis in the topic to an anthropological one. Therefore, I expanded the search to include literature on helping, altruism, and cooperation, resulting in an immediate return of results that included those with overlap between PD (along social dimensions) and what would previously have qualified as "kin selection" concepts. This will be qualified more fully in the section on kin selection.

I conducted the review using the Walden library tertiary databases, including PsycINFO, PsycARTICLES, ProQuest Central, PsycTESTS, Health and Psychosocial Instruments (HaPI), SAGE Journals, Political Science Complete, and Google Scholar. I accessed additional databases through membership in several divisions of the American Psychological Association, including Division 3 (Society for Experimental Psychology and Cognitive Science), Division 8 (Society for Personality and Social Psychology), and Division 34 (Society for Environmental, Population and Conservation Psychology).

A search of the subject term *psychological distance* in the Walden Thoreau database returns 841 results in peer-reviewed scholarly research articles published between 2015 and 2020. I conducted searches using Boolean operators for variations and

combinations of keywords that included: *psychological distance, kin selection, inclusive fitness, environmental attitude, environmental behavior, proenvironmental, climate change, helping, altruism, cooperation, policy support, construal level (theory), public policy, social distance, temporal distance, temporal discounting, social identity (theory), self-categorization (theory), intergroup relations, intergroup bias, decision-making,* and *behavior planning.* Additionally, I supplemented all combinations with searches for *review* and *meta-analysis* terms.

While the combined phrase *psychological distance* returned 841 results, separating them as separate Boolean parameters expanded the results to 1,237. Adding the additional term *environment** to include variations such as *environment, environments,* and *environmental* reduced the results to 141 items. Among these, three of the first ten results related to climate change. However, the top results varied widely in topic and I deemed the use of the combined phrase *psychological distanc** more appropriate for identifying research of value to this study. Thus, a new search of the combined terms *psychological distanc** and *environment** resulted in 111 peer-reviewed scholarly journal articles between 2015 and 2020, of which 17 of the first 20 results were related to climate change or environmental attitude.

I repeated these variations and those of the additional terms previously noted in each database, to greater or less effect depending on the database. While the combined terms *psychological distanc** and *environment** returned 111 results in the Thoreau database, it returned none in the PsycINFO database, for example. Using those terms to search Political Science Complete, PsycARTICLES, and PsycTESTS, however, returned

18 results, all but five of which were related to climate change or environmental attitude. Further, the same terms used in the database for the Personality and Social Psychology Bulletin, one of several publications from APA's Division 8, returned 82 results between 2015 and 2020.

Perhaps the most useful approach to identifying appropriate literature, however, came from the use of the Elsevier database, which hosted several of the articles identified using the Walden library databases. When downloading articles from the Elsevier database in PDF format, the site will then provide up to six recommended articles based on the topic of the one downloaded. This "similar match" technique provided a substantial body of literature that was, for the most part, included in many of the other searches, but which were more easily identified as being relevant due to the targeted recommendation by the Elsevier database itself.

I identified additional articles by reading the literature itself and noting citations and references to specific studies of value as well as recurring authors. For example, van der Linden is referenced frequently in literature related to consensus on climate change (e.g., van der Linden et al., 2014, 2015), whilst Trope and Liberman show up frequently in works related to CLT due to their coauthorship of the theoretical model (e.g., Bar-Anan et al., 2006; Kalkstein et al., 2016; Liberman & Trope, 1998; Liberman et al., 2002, 2007; Maglio et al., 2013; Mentovich et al., 2016; Trope & Liberman, 2003, 2010; Trope et al., 2007).

Theoretical Foundation: Psychological Distancing Models

The History of Psychological Distancing

The origin of distancing as a distinct concept in the field of psychology can be found in the child development work of Sigel (1970), who envisioned the concept as describing how a child's understanding of the world evolved when observing the scale of objects changing as a result of taking off in an airplane (e.g., large houses and buildings becoming smaller). The theoretical foundations of the modern concept of psychological distance[1] (PD) can be seen in many different constructs, many of which individually predate the formalized theory itself.

Specifically, Sigel cites Piaget's (1954) work on cognitive development as an influence in the development of this theory (Sigel & McGillicuddy-De Lisi, 2003). This can further be seen in the studies conducted by Sigel and Cocking as part of their tenure in the Educational Testing Service (ETS) at Princeton in the 1970's, which suggested that distancing was a generic behavior of humans but was individually influenced by the developmental environment and experiences of each person (Sigel & Cocking, 1977).

This extended into the non-developmental work in other areas of psychology that would eventually be seen through the lens of PD. For example, Weick (1984) described how the perceived scale of many of the challenges faced by society exceeded the

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[1] The terms "psychological distance" and "psychological distancing" may be used interchangeably to describe the theory. For the purposes of present work, use of the former denotes the actual construct of distance while the latter indicates an action or behavior resulting from or resulting in such perception of distance.

bounded rationality that limits individuals from believing that such problems can be overcome. Weick also noted that breaking down larger problems into smaller, more easily achieved objectives facilitated support for programs to address large social issues – a strategy of "small wins."

Modern studies in PD consider what perceptions are impacted by temporal and probabilistic measures of PD. For example, Meleady and Crisp (2017) described how social categorization interventions can reduce temporal intergroup bias (i.e., the perception of future generations as an outgroup). Chen and He (2016) showed that priming individual perceptions of probability to reduce probabilistic distance influenced financial decision-making by similarly reducing probabilistic discounting behaviors.

The best approach to understanding PD, therefore, requires an explanation of the dimensions that make it up.

Dimensions of Psychological Distancing

PD theory proposes that individual perception of evaluation objects (e.g., people, consequences, constructs, things, etc.) is influenced by the joint perception of some measure of distance between the perceiver and such objects. This occurs along one or more dimensions: *social*, *temporal*, *spatial*, and *probabilistic*. Objects that are near along one or more dimensions are considered *proximal*; objects that are distant are considered *distal* (Liberman et al., 2007).

Moreover, there tends to be a positive correlation between the different dimensions, such that an object that is considered distal spatially, for example, will typically be viewed as temporally distal or socially distal, too – and vice versa. This

correlation has been tested repeatedly and has held as a significant finding in the literature (Fiedler et al., 2012; Maglio et al., 2013).

Social Psychological Distance.

The dimension of social distance represents the perception of similarity or dissimilarity between the observer and another person or entity, including family, strangers, or even organizational entities like clubs or corporations (Stephan et al., 2011). Social PD can influence many aspects of behavior, from event planning (e.g., Maglio et al., 2013, gave the example of determining who is too socially distal to invite to a wedding) to altruism and generosity (e.g., Jones and Rachlin, 2006, consider how much a person would sacrifice to give something to someone else, which changed depending on how socially close the person was to the participant).

Temporal Psychological Distance.

Temporal distance is one of the most studied dimensions of PD, particularly in relation to behavior prediction. However, it has also been shown to have benefit and practical value in therapeutic settings (Bruehlman-Senecal et al., 2016). Temporal PD is the way that individuals perceive the temporal distance between their present moment (or the "current" point of comparison, which could be another moment in time) and a target moment (Caruso et al., 2013).

Temporal PD is also the dimension that is most closely linked to the development of construal theory, as behavior planning hinges significantly on how detailed is the construal of behavioral consequences – a well-correlated byproduct of the perceived distance in time to such consequences (Liberman & Trope, 1998; Stephan et al., 2011).

Spatial Psychological Distance.

The most literal of the dimensions is spatial PD, which concerns how near or far in literal physical distance an evaluation object is by comparison to the current reference point (Henderson et al., 2011). While the literalness of the dimension may seem to make its impact relatively obvious, changes in technological capability – especially with regard to the internet and communications – has created an interesting area of study for researchers interested in the effects of PD and how such changes have influenced the awareness and perceptions of both the larger world around humans and our place in it.

For example, early research on spatial PD occurred in the infancy of the internet, and so Latané et al. (1995) found that those who were perceived as being physically distant were considered less persuasive. However, more recent work has shown that social presence in digital spaces can serve to reduce the impact that the perception of physical distance has on learners in online environments, specifically the sense of loneliness and isolation (Kim et al., 2016; Phirangee & Malec, 2017; Richardson et al., 2017; Weidlich & Bastiaens, 2017).

Probabilistic Psychological Distance.

Considering how likely something is to be or to occur is the dimension of probabilistic PD (Trope & Liberman, 2010). The relation of objective probability and subjective individual weighting is central to Kahneman and Tversky's (1979) Prospect Theory, wherein they suggested that individuals may overestimate small probabilities and underestimate large ones. Probabilistic PD has been explored significantly in the domain of decision-making and behavior planning and prediction due to the link between how

unlikely individuals may consider some consequences to be and how that perception

impacts which course of action they choose to take (Chen & Guibing, 2016; Wakslak et

al., 2006).

Additional Dimensions.

While the vast majority of PD-relevant literature addresses the construct within

the confines of the four aforementioned dimensions, that is not to exclude the possibility

that there are other dimensions that also influence individual behavior. Fiedler (2007)

proposed several such additional dimensions that may be significant to consumer

decision-making, including *informational distance*, or the extent to which an individual is

knowledgeable about something; *experiential distance*, the amount of information

available and whether it has been gathered first-hand, second-hand, and so forth; and

affective distance, or the "warm" (near) versus "cold" (far) manner in which information

is presented to the individual.

Construal Level Theory

Among the most significant contributions to PD studies was the integration of

construal levels into the models, correlating distance with level of detail in the perception

of evaluation objects. CLT suggests that individuals will, as a consequence of PD,

construe (i.e., perceive) evaluation objects at either a high or low level (Bar-Anan et al.,

2006; Trope & Liberman, 2010; Trope et al., 2007). Since its formal introduction in the

late 1990s, CLT has been referenced in almost all literature relating to PD and is

considered to be a model that rivals prospect theory in studies of choice and decision-

making (Trautmann & van de Kuilen, 2012).

High-level Construal

The relationship between the two levels of construal is best conceptualized as a sliding scale, wherein at higher levels details of a representation or evaluation object are more abstract and less structured. High-level construal is considered to be more schematic, a generalization without context (Trope et al., 2007). Often (though not always), high-level construal is correlated to greater or increased PD, as distal objects along all four dimensions are considered to be less prone to detailed representation. This finding has been tested repeatedly in the literature (Soderberg et al., 2015).

Low-level Construal

By comparison, low-level construal of evaluation objects is more concrete and detailed and is often taken in the context of a given situation (Trope et al., 2007). While both levels of construal impact decision-making distinctly based on situational contexts and the types of decisions being made, achieving low-level construal is often found to decrease temporal discounting behavior (Read et al., 2005; Zauberman et al., 2009). For example, Kim et al. (2013) found that manipulating the detail with which future rewards were perceived resulted in a similar construal level as present rewards and led to better evaluation of the relative value of both.

Additional research into temporal discounting has shown there may be a dispositional component of *time orientation*, or the extent to which one frames their decisions based on present versus future consequences (Strathman et al., 1994). To that end, present-oriented individuals will be more likely to consider immediate benefits, where future-oriented individuals would think in terms of long-term outcomes. Nan and

Qin (2019) used episodic future thinking (EFT) to manipulate time orientation and decrease discounting in the reception of anti-smoking health messages geared towards smokers. This suggests that critical messaging can be made more effective by manipulating the way it is received and construed.

One significant contribution to the understanding of the CLT-PD link is Yan et al.'s (2016) study that found that thinking of proximal events more strongly depended on visual processing, while distal events were more associated with verbal processing. This follows similar work by Amit et al. (2009) that showed faster response time to psycholigically proximal events when presented as images rather than words.

Diverse Applications of the CLT Model

CLT has been useful in many domains of psychology and the social sciences, including both practical and theoretical research areas such as consumer behavior (Irmak et al., 2013; So et al., 2019; Yan & Sengupta, 2011), data security (Kaleta et al., 2019), cognition (Calderon et al., 2019), conflict management (Mukherjee & Upadhyay, 2019), drought and resource use policy (Craig et al., 2019).

Among examples of this, So et al. (2019) crafted a study with a CLT-based framework to examine guest loyalty in room-sharing hospitality services using secondary data obtained from a peer-to-peer accomodation platform in China. The authors found that while increased social distance decreased loyalty in repeat purchases, decreased spatial distance increased loyalty. Importantly to the present study, the authors also found that perceptions of spatial distance significantly moderated the negative effect of the

perceived social distance. This suggests that the interaction of two different dimensions of PD can influence construal and decision-making behaviors.

CLT has also been applied in studies of environmental attitudes and behaviors. It is this category that will be addressed more fully in the Literature Review section, as the relevant studies in both CLT and PD are examined.

Theoretical Foundation: Supporting Theories

While PD models provide an adaptive framework for my study, other social psychological and social sciences theories can bolster the justification for the research design. These include kin selection, helping and altruism theories; social identity theory; social categorization theory; and theories of intergroup relations.

Kin Selection, Altruism, and Helping Theories

Among the theories supporting PD and CLT are models that include and extend from Hamilton's (1964) work explaining cooperation among individuals, notably kin selection, helping, and altruism theories. Research in this realm has evolved considerably from Hamilton's initial proposal that the ability of an individual to identify genetically-linked relatives contributes to a bias that favors helpful behavior towards them (Smith, 2014). Moreover, such theories have been incorporated into other areas of behavioral study (e.g., anthropology, evolutionary biology, sociobiology, etc.) and have resulted in the accumulation of a considerable body of empirical evidence to support their predictive value at identifying factors that determine when cooperative behavior may be encouraged (Burton-Chellew & Dunbar, 2015).

In 1964, William Hamilton proposed a model for inclusive fitness that came to be known as Hamilton's rule, an inequality that predicts helpful behavior as a function of kin selection, or the genetic relatedness of two or more individuals. The formula was expressed as $b \times r > c$, where b is the net fitness benefit to the beneficiary, r is the coefficient of relatedness between the beneficiary and the donor, and c is the cost to the donor. So long as b multiplied by r is greater than c, one should see helpful behaviors occur (Smith, 2014).

This formulation of the theory is useful as it does indicate that the costs to the helpful individual (c) can provide a constraint on such altruistic behaviors. For example, constraints on resource availability in a given area and the saturation of related individuals may result in less cooperation and increased competition among them (West et al., 2002). Similarly, it is notable that the measure of relatedness (r) can impact the probability of altruistic behaviors occurring, suggesting that social PD is a viable psychological variable that could be manipulated as an expression of the relatedness coefficient – a notion supported by Extended Inclusive Fitness Theory (EIFT) models that have evaluated altruism and helping behaviors in both genetically related and unrelated individuals, incorporating additional factors such as cultural and economic influences (Jaffe, 2016).

The present study incorporates the concept of kin selection, broadly including research relating to altruism and helping behavior, due to its central premise: individuals should be predisposed to engage in behaviors that are beneficial to the survival and

continued reproductive success of their genetic offspring or closest genetic relatives

(Kurzban et al., 2015; Rusch, 2018).

Intergroup Relations, Self-Categorization, and Social Identity Theories

Social psychologists have developed numerous theories that explain how

individuals' attitudes and behaviors are shaped by their social connections, including the

perception of ingroups and outgroups, how they categorize themselves among social

groups, and how those categorizations contribute to their sense of self and personal

identity. These theories contribute broadly to this study's framework by supporting social

distancing perceptions as a motivator of attitudes and catalyst for behavior.

Rather than being a singular theory, intergroup relations comprises several models

that all include as a central premise the notion that much of human behavior, including

individual behavior, is a consequence of the perception of ingroups and outgroups

(Tajfel, 1978). While social psychology generally includes the notion that social factors

influence behavior, intergroup relations theories specifically address how group

membership influences the sense of identity and way individuals categorize themselves

(Abrams & Hogg, 1998; Hogg & Hains, 1996).

Categorization as a schematic process is well established in the social cognition

literature and thus will not be covered here in its entirety due to the immensity of that

task. Within the domain of intergroup relations specifically, self-categorization theory

builds on models of schematic processing to suggest that individuals will build a

structural understanding of their own sense of self and how they fit into the world around

them (including social structures) based on how they categorize themselves (Tajfel et al., 1971; Turner, 1985).

Social identity theory posits that one's sense of identity is derived at least in part by how one defines their social relationships: group memberships, what company employs them, for which party they vote in elections, etc. (Tajfel & Turner, 1986). This social identity can be a barrier to cooperation in many instances, where the perception of threat to one's ingroup or to one's self due to one's expressed social identity may lead individuals to become hostile towards perceived outgroups and outgroup members or to show preference to ingroup members (Perdue et al., 1990).

In the Literature Review section, examples of how self-categorization and social identity influence intergroup relations to hinder climate change messaging and momentum for proenvironmental support will be discussed in the context of the present study.

Literature Review

A significant difficulty cited by some climate scientists has been the inability of the lay public to fully grasp the long-term consequences of failing to act on the issue of climate change (Dunlap, 2013; Newell et al., 2014). A core presupposition has been that most people are not able to construe the substantive details of what life in a climate crisis will be like for humanity (Rickard et al., 2016; Schuldt et al., 2018; Singh et al., 2017). Thus, construal level and PD theories may be useful in understanding how environmental attitudes are formed, maintained, and changed in relation to the growing threat of the climate change crisis.

Proximising, or reducing perceived PD to make an evaluation object appear nearer, has been studied extensively by researchers looking to improve public engagement with the topic of climate change. This work has resulted in mixed findings regarding the effectiveness of such manipulations.

Jones et al. (2017) used framing videos to manipulate PD along all four dimensions, then assessed concern for climate change and intention to engage in mitigation behaviors. As expected, reduced PD was associated with expressions of greater concern and intention to mitigate. However, the manipulations failed to influence perceptions of temporal distance, which other research has shown is correlated with personal experience of climate change impacts (Reser et al., 2014).

McDonald et al. (2015) examined whether framing climate change as psychologically proximal would increase individuals' engagement with the reality of the challenge, specifically exploring whether personal experience of the phenomena associated with climate change had the potential to influence individuals' beliefs that climate change was real, man-made, and a threat. Their conclusion was that simply reducing distance was not of benefit in every scenario tested, and success was impacted by both the values and ideologies of the audience as well as the nuance with which the message is delivered.

Similarly, Chu and Yang (2018) sought to reduce PD as a way to facilitate support of climate policy in Americans. They found that making the impact of climate change appear more proximal reduced polarization on the basis of ideology but failed to substantially influence worldview, particularly among those who held their beliefs

strongly. Likewise, Brügger et al. (2016) met with limited success attempting to manipulate PD in consideration of risk and fear in the decision to support climate change policy, noting that the impact that PD has on the topic is likely far more complicated than initially assumed – reinforcing earlier inconsistent success with proximization (Brügger et al., 2015).

As McDonald et al. (2015) noted in their review, citing a study by Van Boven et al. (2010), manipulating PD to make the consequences of climate change seem psychologically closer can be a double-edged sword if the emotional response of the individual is too intense; such feelings can prompt greater concern or may simply lead to further denial.

More successful attempts to influence proenvironmental behavior and intention have sought to manipulate temporal distance and construal level to impact discounting behaviors. Early work in temporal discounting typically looked at delayed gratification to determine what conditions led individuals to choose lesser short-term rewards over better long-term ones (Green et al., 1994). In recent studies, temporal discounting is explored as choosing short-term rewards in spite of long-term dangers (Chen & He, 2016; Jones & Rachlin, 2006; Read et al., 2005; Zauberman et al., 2009).

Notably, Kim et al. (2013) looked at the bidirectional relationship of PD to examine whether manipulations that did not just reduce construal level but created similar PD between two outcomes would reduce temporal discounting behaviors. Indeed, they found that the effect worked in both directions, where participants made objectively

better choices both when long-term outcomes were made more concrete and when short-term outcomes were made more abstract.

Meleady and Crisp (2017) conducted a novel study that did not directly cite CLT or PD concepts, but which explored inaction to address climate change as a result of temporally-influence intergroup bias. While not using the formal distancing framework, their manipulations to reduce the bias through social categorization successfully led to an increase in choice of sustainable products over unsustainable ones. This could be seen as a reduction in both temporal distance and social distance as a consequence of the recategorization and is of great interest to the present study.

Moreover, the technique used in the first experiment of this study had the participants think of and list commonalities between themselves and a target group – in this instance, future generations (i.e., the "temporal outgroup"). The second experiment confirmed that the changes in proenvironmental intention were correlated to changes in perception of the outgroup.

Loy and Spence (2020) combined the techniques of proximising climate change and increasing the salience of a common global identity in a study that attempted to manipulate social and spatial PD in subjects. In their study, they communicated news about climate change effects along spatial dimensions via text message, either localizing it for participants or making the reported effects appear in a distant location. They also provided a visual (video) that showed an individual in a variety of global contexts or one that did not. While proximising the news correlated with a somewhat great reporting of a higher perceived relevance of the information, the global identity manipulation

moderated the extent to which participants perceived the information as less relevant at greater distances. This suggests that creating a salient sense of common identity with those who are or will be impacted most by climate change effects may help to improve environmental attitudes by reducing PD.

Indeed, Reese (2016) posits this as a means of motivating environmental action, suggesting that social identity, self-categorization, and common ingroup identity (Gaertner & Dovidio, 2000) theories all lend credibility to the hypothesis that the creation of a common human identity could break through social barriers to efforts to combat climate change. While not expressely tested in that paper, the author did cite prior research (e.g., Reese & Kohlmann, 2015; Reysen & Katzarska-Miller, 2013) that correlated increased environmental concerns to greater perceptions and salience of identity as a member of the global community.

In addition to mitigating the impact of climate change through large-scale policy implementation, local policies and behaviors must be undertaken to help communities adapt to the impact that climate change has already had or will have in the future. Singh et al. (2017) found that the perception of distance between individuals and the impacts of climate change gave the false impression that it was not having local impact or having greater impact on people elsewhere.

Consequently, following the findings of prior studies that showed similar effects (Zwickle & Wilson, 2013), the individuals were more likely to discount the risk associated with inaction. Singh et al. (2017) concluded that effective communication to promote adaptation policies, therefore, requires a combination of messaging components,

including an emphasis on the reality of how close to home the impacts of climate change already are or will be.

Methodologically, Fox et al. (2020) were able to increase the perception of environmental risk by using interactive games to minimize the sense of both temporal and spatial distance to pollution, which in turn led to increased proenvironmental behavior. Success in manipulating PD with activities that engage individuals with risk perceptions suggests that other activities that decrease PD could also improve proenvironmental attitudes and behaviors.

Kin selection in human-relevant studies has been more frequently directly cited or indirectly referenced in research that explores altruism, cooperation, and helping behaviors (Czárán & Aanen, 2016; Kurzban et al., 2015). Examples of this include food sharing among hunter-gatherer societies (Hackman et al., 2017; Nowak, 2012), willingness to fight and self-sacrifice (Madsen et al., 2007; Rusch, 2014; Tornero et al., 2018), aggression and relatiation (Gesselman & Webster, 2012; Webster et al., 2012), and group size effects (Powers & Lehmann, 2017).

Tornero et al. (2018) presented an interesting test of the core premises of kin selection by using twins to evaluate willingness to fight and self-sacrifice for the other half of their pairing. They found a greater willingness among monozygotic twins (i.e., those sharing most of their genome) than dizygotic (those with only about half shared genome) to self-sacrifice, but no significant difference in willingness to fight. The self-sacrifice choice could be perceived as a passive behavior, where willingness to fight

could be perceived as an active behavior, indicating that the cost-benefit evaluation of Hamilton's original formula could have influenced participants' responses.

Predictably, altruism and helping literature relating to climate change is in abundance, as climate scientists and social scientists have good reason to suspect that there is a correlation between prosocial behaviors and proenvironmental ones. Indeed, research does support the relationship between the two. 'Warm glow,' or the good feeling that results from altruistic behavior (Isen, 1970), has been shown to result from proenvironmental behavior (Dunn et al., 2008; Menges et al., 2005). Additionally, warm glow mediates the impact of altruism on proenvironmental behavior, with a greater association between warm glow and proenvironmental intentions than with the altruistic traits of the participants (Hartmann et al., 2017). Jia et al. (2017) similarly found that moral values that included a concern for others and a sense of self-awareness about the impact of one's actions was correlated to a higher measure of environmental involvement.

When altruism is explored as operationalized morality, wherein environmental concerns are reframed as moral imperatives (e.g., preserving the rights of other species), the strongest predictor of proenvironmental attitudes and behaviors was moral identity that included self-transcendent beliefs such as concern for non-human species, environmental awareness, and personal disgust for the environmentally irresponsible (Jia et al., 2017).

Proenvironmental behavior most often requires sacrificing personal gains for the greater good of society or community (considered among the highest measures of

cooperation, per Reese, 2016) and – similar to morality studies - social dilemma studies have shown that self-transcendent beliefs are associated with greater pro-enviornmental attitudes and behaviors (Reese & Kohlmann, 2015; Rosemann et al., 2016). Moreover, when using a design that allowed for exclusive and conflicting tests of selfish behavior, cooperation with a perceived in-group, and proenvironmental behavior, in-group behavior was most utilized except when there were conflicts – in which instances, selfish behavior took precedence (Klein et al., 2017, 2019).

Cross-cultural studies into proenvironmental behavior and environmental concern have shown inconsistencies in the connection between the two, where high levels of concern do not necessarily result in greater proenvironmental behavior in some societies (Tam & Chan, 2017). However, increased generalized trust (i.e., an overall attitude of trust towards generalized others) may act to reduce the impact that suspicions of freeloading may have on individuals who are less inclined to act proenvironmentally despite espousing proenvironmental attitudes (Tam & Chan, 2018).

Identity and self-perception also serve as strong motivators for proenvironmental behaviors. Zaval et al. (2015) found that individuals could be motivated to engage in more proenvironmental behavior when prompted to consider how their legacy would be impacted by not doing so. Similarly, Schneider et al. (2017) showed that when individuals were primed to consider the pride they would feel after making proenvironmental decisions their subsequent behaviors were more likely to be more environmentally sound.

Summary

In this chapter, I reviewed the literature on climate change inaction, barriers to successful proenvironmental messaging, and the theoretical foundations of CLT and PD for this study. I have established that climate change presents a significant threat to humanity and society and that one of the greatest challenges to combating climate change is a lack of concern, awareness, or motivation to engage in the enactment of proenvironmental policies.

Further, I have discussed the theoretical foundation for this study's design, based on a CLT/PD framework. These theories, as well as supporting theories of kin selection, altruism/helping, intergroup relations, self-categorization, and social identity, have been examined both in their application more widely in social psychology and specifically in relation to research on environmental attitudes and perceptions of climate change.

The greatest limitation of the studies of PD, construal level, helping, altruism, and cooperation in proenvironmental attitudes and behavior has been that none have combined the theoretical models to dig deeper into the complex motivations for increased engagement with the reality of the threat presented by inaction on climate change. Multiple authors acknowledge in their works that manipulating PD and construal of climate change consequences is a challenge (Brügger et al., 2016; Chu & Yang, 2018; Duan et al., 2017), but few propose combinations of more than just other dimensions of PD. This presents a significant gap in the literature that may be addressed in part with a study that includes manipulations of social and temporal PD to influence construal level of the long-term consequences of climate change.

In the present study it is hypothesized, based on the existing literature reviewed in this chapter, that using a writing activity that primes an individual to consider social closeness due to relatedness of the participant to the target of the activity may result in participants showing greater measured environmental attitudes if the manipulation of social PD results in low-level construal of the long-term outcomes.

Chapter 3 will discuss in detail the methodology of the research design. This includes a discussion of why this study design was chosen, justification for the design, descriptions of the population and sample that was studied, an explanation of the instrumentation, the procedures for data collection and analysis, and the ethical considerations that were taken into account to protect participants.

Chapter 3: Research Method

Introduction

The purpose of this study was to examine whether construal level of long-term

consequences of climate change can be reduced by priming an individual to think of a

temporally distal but socially proximal target (specifically, a genetic descendant) while

engaged in a structured writing task.

In this chapter, I describe the methodology that I used in this study of the effect of

manipulations of PD on construal level of climate change consequences, and my

justification for the choice of methodological approach. The method for studying whether

writing to socially distal targets affects construal level of climate change consequences is

described, as will the method for studying whether writing to temporally distal targets

affects construal level of climate change consequences. Additionally, the methodology

for identifying the effect of the interaction of those manipulations on climate change

consequence construal is described. In this chapter, I explain the rationale and research

design of the study, the population and sample, instrumentation, materials, procedures for

data collection and analysis, and steps taken to ensure that participants are protected

ethically.

Research Questions and Hypotheses

I used a quantitative research design for this study, which examines three research

questions and their associated null and alternate hypotheses:

RQ1: Is there a significant difference in construal level (as measured by mean environmental attitude scores) between individuals writing to a target who is near versus far in social PD?

$H_0$1: There is no difference in construal level between social PD condition groups.

$H_1$1: There is a difference in construal level between social PD condition groups.

RQ2: Is there a significant difference in construal level (as measured by mean environmental attitude scores) between individuals writing to a target who is near versus far in temporal PD?

$H_0$2: There is no difference in construal level between temporal PD condition groups.

$H_1$2: There is a difference in construal level between temporal PD condition groups.

RQ3: Is there a significant interaction of manipulations of social and temporal PD when the target is socially proximal and temporally distal?

$H_0$3: There is no interaction effect of manipulating social and temporal PD.

$H_1$3: There is an interaction of manipulating social and temporal PD such that individuals in the socially proximal, temporally distal condition had higher mean EA scores than those in other conditions.

Research Design and Rationale

In this study, I considered both social and temporal dimensions of PD and construal level, and how manipulations of PD may influence construal level of climate change consequences. The theory in this research was that perceptions of greater temporal distance between the present reference point and the long-term consequences of climate change result in temporal discounting in the form of reduced proenvironmental attitudes and intentions, a consequence of being unable to see the specific challenges that will be faced by future generations (i.e., a higher, more abstract construal level).

As the altruism literature shows individuals are willing to make sacrifices and fight for closely related others (Rusch, 2014; Tornero et al., 2018), modern application of kin selection and intergroup relations theories suggest that if social PD can be manipulated to reduce construal level of climate change consequences, it could bypass and reduce the influence of the perception of greater temporal PD, observed as a greater measured environmental attitude.

IVs under consideration in this study included social PD of target (family member or stranger) and the temporal PD of target (alive now or alive 200 years from now). The DV in this study was construal level, measured indirectly through the participant scores of EA), as assessed using a survey containing the 24-item brief version of the EAI (Milfont & Duckitt, 2010a).

The purpose of this study was to evaluate the effect of manipulations of two separate dimensions of PD on construal of climate change consequences. Therefore, the research design I selected was a 2x2 experimental quantitative study with a factorial

ANOVA analysis, using random research participants online across the United States to provide greater generalizability. To avoid false rejection of the null hypothesis (Type 1 error) or false retention of the null hypothesis (Type 2 error), I determined statistical power of the test based on the instrument and sample population.

The selection of this design was consistent with prior research in the domain of PD and CLT-based research, wherein a measurable construct like environmental attitude is used to assess construal changes which are not themselves directly observable. Moreover, the similarities in the design choice to other climate change related CLT/PD research suggested the study will advance knowledge in this domain by building on existing research. Additionally, because the social problem that provides the source for the research questions and the hypotheses tested is an issue in which attitudes must be changed for meaningful social change to occur, an intervention-based study design was necessary.

Methodology

I conducted this study online using a proprietary platform, with the specific purpose of surveying participants and collecting writing samples. The site, MyGradResearch.com, served as a participant hub, allowing participants to provide their submission in a single visit without needing to provide personally identifying information.

Population

As I was interested in measuring construal change among individuals who would be eligible to vote in support or opposition to environmental policies designed to combat

climate change, the target population was voting-eligible adults across the United States. This population would be defined as being citizens older than 18 years. The current estimate of population size with these parameters, as of July 2019, was 255,200,373 (Department of Commerce, 2020).

Sampling and Sampling Procedures

The breadth of the target population allowed for the use of multiple sampling approaches, many of which were convenience-based: inviting participants from Walden University's student research participation pool, distributing invitations via mailing lists for several APA divisions (e.g., Divisions 1, 8, and 34), requesting participants on social media platforms, and using Amazon's Mechanical Turk service. Snowball sampling was also encouraged, in which participants could share a link to the study with additional participants. Due to the large sampling frame, truly random sampling was unlikely to be easily achieved. As such, the ability to generalize to the full population was limited.

Although the target population size qualified many potential participants, it also created a distinct sampling frame that excluded many individuals from participating. Non-citizens of the United States and individuals younger than 18 years were excluded from the study.

I determined the target sample size of 128 participants using GPower 3 (Faul et al., 2009), anticipating an alpha level of 0.05 and a medium effect size (0.25) and power level (0.80). Due to the possibility of attrition, I invited more participants than was suggested to participate in data collection.

Procedures for Recruitment, Participation, and Data Collection

Using the sampling methods described, I invited participants to join the study on the MyGradResearch.com website. MyGradResearch.com was built by James Stevenson, an experienced web designer and web engineer. He signed a nondisclosure agreement to ensure that data privacy would be maintained. The website used encryption for all data collection and retention and the data were downloaded from the secured servers hosting the site only by individuals with administrator-level access.

Upon visiting the site, participants were first presented with two questions, asking their year of birth and whether they are U.S. citizens. This was to qualify them for the study; answers that indicated the individual was younger than 18 years or not a U.S. citizen presented a notification that they were not eligible to participate. Individuals older than 18 years and who indicated they were U.S. citizens were presented with the informed consent information and acknowledged their willingness to participate. In place of any other identifying information, participants were assigned a unique identification number that was the only way of identifying them during data collection and analysis. The responses to the qualifying questions and their acknowledgement of the informed consent disclosure were also saved to their deidentified profile.

After completing the registration, participants were randomly assigned to one of the four conditional groups. Assignment continued randomly among the four groups until any group hit ten participants, at which point new recruits were randomly assigned to one of the three remaining groups, continuing in this fashion until each group had ten participants. Once each group had ten participants, new recruits were again randomly

assigned to one of the four groups, repeating until the required total number of participants had been exceeded. This process was sufficiently randomized to allow for immediate participation and approximately normalized distribution.

Participants were provided a condition-based writing prompt (see Appendix C) and wrote directly into the field or could cut-and-paste from another application. The instructions indicated that they should not use any personally identifying information in their submission to avoid compromising their anonymity. The conditional groups differed by the target of the writing exercise. Each group wrote a 300-word letter to an individual about a topic related to climate change (see Appendix C for the specific prompts). The targets were: (a) a family member alive today (socially and temporally proximal), (b) a family member alive 200 years from now (socially proximal, temporally distal), (c) a stranger alive today (socially distal, temporally proximal), and (d) a stranger alive 200 years from now (socially and temporally distal). They were asked to provide submissions of no less than 300 words in order to submit and advance to the next step.

Upon completion of the writing activity, the participant was given a manipulation check, to ensure that the prompt in fact influenced their perception of PD. They then completed the 24-item brief version of the EAI as a posttest measure of environmental attitude (Milfont & Duckitt, 2010a). They provided responses to two items on each of the 12 dimensions using Likert-type scales. The manipulation check and EAI will both be described more fully in the section on Instrumentation.

Upon completion of the posttest measure, by a thank you page provided information about how to request a copy of the study's findings upon its completion. This concluded their participation in the study.

Instrumentation and Operationalization of Constructs

In this research the measurement instrument included a self-reported Likert-type questionnaire with statements from the brief version of the Environmental Attitudes Inventory (EAI) (Milfont & Duckitt, 2010a), ranging from 1 (strongly disagree) to 7 (strongly agree).

Participants were asked to electronically complete a 24-item measure of environmental attitude after the conditional writing activity. The writing activity prompt topics were the same for all four conditional groups, but the targets of the writing assignments were different based on social and temporal PD. Writing submissions of at least 300 words and relevant to the prompt were required.

Environmental Attitudes Inventory

For decades, researchers have consistently used only a few instruments to measure environmental attitudes, most notably the New Environmental Paradigm (NEP) Scale (Dunlap & Van Liere, 1978; Dunlap et al., 2000). Other scales and tests have been created ad hoc or have been modified from the more well-known measures. However, as the understanding of what shapes environmental attitudes and behaviors evolved, the need for a more complex measurement instrument led Milfont and Duckitt (2004) to re-evaluate how EA is evaluated. This led to their creation of the Environmental Attitudes

Inventory (EAI) (Milfont & Duckitt, 2010a), a Likert-type questionnaire that has three versions: a full, 120-item version; a short, 72-item version; and a brief, 24-item version.

The EAI has been tested extensively by the authors in order to establish its structural stability, validity, reliability, and sensitivity to the cross-cultural differences (Milfont & Duckitt, 2010b). For the 120- and 72-item versions, Milfont and Duckitt reported alpha coefficients ranging from .72 to .89 for each of the twelve dimensions, with mean inter-item correlations from .22 to .46. Two of the three studies reported in their paper were internet-based, which supported its use in such an environment in the present study. The third study examined test-retest reliability with coefficients from .62 to .90 for the short form of the instrument, and showed structural stability for the core EA dimensions with coefficients for those ranging from .92 to .96.

The validity and reliability of the instrument was confirmed and the EAI's value was affirmed in the work of Sutton and Gyuris (2015), who tested the ability to reliably reduce the 72-item short version to a 37-item version. In their study, the mean Cronbach's alpha for the original 72-item version was .84. When reducing the short version of the instrument, which had six items per scale, to 37 items (three per scale, with one having four items; overall mean alpha = .77), they found that the balance, dimensionality, reliability, and validity of the modified version was reasonably similar to the 72-item version. The authors cited the reversed pairs used in the 24-item brief version as the reason for not simply using that existing instrument, noting that reversed pairs, while providing strong correlated measures, may seem redundant or repetitive to participants.

Ajdukovic et al. (2019) provided confirmation of the structural stability of the 24-item brief version at assessing the 12 dimensions of environmental attitude defined in the instrument. The authors noted that no prior work had directly tested the 24-item version's structural stability, despite its adoption by several other researchers. In their study, which extended the work of Milfont and Duckitt (2010b), the overall mean alpha was .83 (the range across the 12 scales was from .56 to .88). The confirmatory factor analyses showed a goodness of fit between the items and the subdimensions they were intended to measure, as well as between the subdimensions and the higher-order dimensions of EA.

Milfont and Duckitt (2010a) gave permission on the published instrument to allow for its reproduction and use (with appropriate citation and credit) in non-commercial research and education purposes without the need for written permission, and limited to controlled distribution to participants and researchers.

Participants were shown the 24 statements making up the brief version of the EAI upon completion of the writing activity. The statements consisted of two from each of the 12 dimensions examined by the EAI, with several items being reverse-coded. Participants provided answers using seven-point Likert-type radio buttons, ranging from 1 (strongly disagree) to 7 (strongly agree). An example statement is provided here:

I really like going on trips into the countryside, for example to forests or fields.

1 (Strongly Disagree) 2   3   4   5   6   7 (Strongly Agree)

A reverse-coded example statement would be:

I think spending time in nature is boring.

1 (Strongly Disagree) 2   3   4   5   6   7 (Strongly Agree)

As this was a Likert-type instrument, I tallied participant scores and then averaged them for one overall EA score. I compared mean EA scores for conditional groups and a higher mean score for EA indicated that construal level had been lowered.

Manipulation Check

After completing the writing prompt, the manipulation check asked participants two questions with Likert-type responses to assess the effectiveness of the activity to manipulate the two dimensions of PD:

1. *How close do you feel to the person to whom you wrote?*

1 (Very close)   2   3   4   5   6   7 (Not at all close)

2. *How far in time from you does the person to whom you wrote exist?*

1 (Not very far)   2   3   4   5   6   7 (Very far)

These manipulation questions were similar to those used by Maglio et al. (2013) when evaluating PD manipulations in their study. Lower scores reflected reduced PD while higher scores reflected greater PD.

<div align="center">**Data Analysis**</div>

To conduct the factorial ANOVA, I used IBM's SPSS software and examined the data prior to their use in any analysis. First, the data were exported as an Excel spreadsheet from the MyGradResearch.com administrative panel. These data were saved locally to my computer, which was password-protected and only accessible by me.

To ensure that participants engaged in the writing activity as instructed, screening required that all writing submissions be validated as meeting the criteria of at least being

related to the topic that was given. I further screened the data as part of the factorial ANOVA procedure.

Before the data could be used in hypothesis tests, I cleaned them so that the variables of interest were usable. This meant calculating the total EA score for each participant (numerical values of each item in the scale totaled and averaged) using SPSS.

To conduct a factorial ANOVA, several assumptions must be met: There is a continuous DV (the mean score for EA), two categorical IVs with at least two groups per variable, and there are independent observations. Data-specific assumptions include that there are no significant outliers, approximately normal distribution of the dependent variable, and there should be a homogeneity of variances.

To meet these assumptions, as part of the analysis, I ran a univariate test, outputting descriptive statistics, estimates of effect size, and homogeneity tests. The results will be discussed in greater detail in Chapter 4. To detect outliers, I used the Explore procedure in SPSS to produce boxplots. Two outliers were identified as greater than 1.5 box-lengths from the edge of the box. As the test is robust and the data were not otherwise unusual, I included these outliers in the results. I then assessed normal distribution using the Shapiro-Wilk test of normality. For each conditional group, a Sig. score over 0.05 indicated the assumption of normality had not been violated.

Levene's Test of Quality of Error Variances assessed homogeneity of variances. A non-statistically significant score on this measure (i.e., $p > 0.05$) indicated equal population variances.

I conducted a simple main effects analysis to assess support for Hypotheses 1 and 2. Analyzing the output of this included looking for significance ($p < 0.05$) in the Univariate Tests and optionally included Pairwise Comparisons. I assessed the statistical significance of the interaction effect using temporal distance and social distance as the fixed variables to provide support for Hypothesis 3. The p-value of the interaction on the Tests of Between-Subjects Effects results indicated significance or non-significance of this interaction with a score of less than 0.05.

Threats to Validity

As described in Chapter 1, there were several limitations to the study that included a lack of combined pre and posttest measures to account for existing levels of environmental attitudes. This should have been adequately addressed with randomization of assignment to conditional groups and a sufficient number of participants to assume normalized distribution.

<div align="center">

Ethical Procedures

</div>

All research participants acknowledged reading and agreeing to the informed consent information, which noted that their participation in the study was voluntary and that they could withdraw at any time without adverse action and with no risk to the participant for participating. There were no material rewards or incentives provided for participating in the study. Anonymity was assured as no personally identifying information other than year of birth and US citizenship status were collected. All data will be kept in my possession on a password-protected computer storage device for five years upon completion of the study, after which the data will be destroyed.

Walden University requires IRB approval for dissertation studies. This study's approval number, provided by the IRB, was 10-01-20-0728632.

The risk to participants was considered minimal: potential stress from considering climate change consequences during the writing activity and social desirability bias during the survey. The anonymity of the participants provided some measure of protection, as did the notation on the informed consent form that the participant was free to withdraw from the study at any time without adverse action and with no risk to them.

Summary

This chapter described the methods for conducting a quantitative study on the effect of manipulating PD on construal level of climate change consequences. The rationale for the study design was provided, including the selection of a measurement instrument, the population frame and sampling techniques, and data collection procedure. Data analysis methods were discussed, including criteria for reporting the findings. Lastly, ethical procedures were outlined that ensure protection of participants.

Chapter 4: Results

Introduction

The purpose of this study was to examine whether construal level of long-term

consequences of climate change can be reduced by priming an individual to think of a

temporally distal but socially proximal target (specifically, a genetic descendant) while

engaged in a structured writing task. In this chapter, I present the results of the statistical

analysis of the research hypotheses guiding this quantitative study.

IVs in this study included social PD of target (family member or stranger) and the

temporal PD of target (alive now or alive 200 years from now). The DV in this study was

construal level, measured indirectly through the participant scores of EA, as assessed

using a survey containing the 24-item brief version of the EAI (Milfont & Duckitt,

2010a). The research questions were:

- Is there a significant difference in construal level (as measured by mean
  environmental attitude scores) between individuals writing to a target who
  is near versus far in social PD?

- Is there a significant difference in construal level (as measured by mean
  environmental attitude scores) between individuals writing to a target who
  is near versus far in temporal PD?

- Is there a significant interaction of manipulations of social and temporal
  PD when the target is socially proximal and temporally distal?

In this chapter, I provide a review of the data collected, statistical analysis,

demographic characteristics of the participants, and summarized findings related to the

research questions. Descriptive statistics are provided for variables used in the study: measures of central tendency for continuous/interval variables (i.e., means and standard deviations) and frequency distributions for nominal/categorical variables. I used a two-way ANOVA to examine the hypotheses and present a summary of the results at the end of the chapter.

Data Collection

I conducted the research using an online platform built specifically for this study (MyGradResearch.com). Participant data were limited as demographic information was not necessary to collect in order to test the hypotheses. I recruited participants primarily using promoted (i.e., paid or "sponsored") posts on Facebook. There were 12 paid Facebook posts, at a total cost of approximately $730.00. Although the recruitment invitation was shared elsewhere on multiple social media sites online, engagement with those posts were negligible. The ability to track audience metrics for the promoted posts on Facebook provided some insight into who was potentially visiting the study site and ultimately participating. I describe this further in the section entitled Sample Description.

The website itself was tested extensively before the study launched to ensure that data were being stored in the appropriate locations in the output file. The initial three posts promoting the study ran for three days before a high attrition rate at the writing prompt indicated that the requirements for participating, specifically the 500-word count minimum, were disincentivizing individuals to complete the full study. I sought and received approval from Walden University's Institutional Review Board to modify the study's instructions, reducing the word count minimum from 500 to 300. Prior to that

change, only three individuals had participated fully and because their 500-word

submissions exceeded the new 300-word threshold, I retained and used their data in the

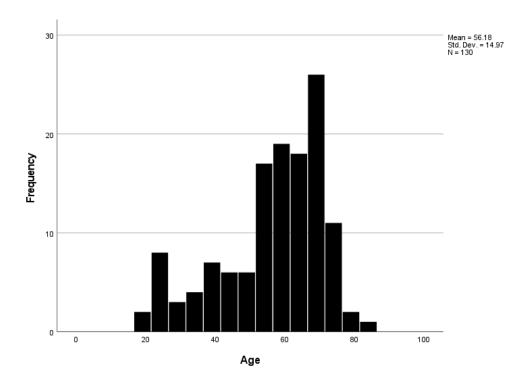study.

Sample Description

I achieved the desired sample size in the course of 2 months, meeting the number

indicated by the a priori GPower3 (Faul et al., 2009) power analysis for statistical power,

using an effect size of 0.25 and a power level of 0.80 as parameters. It was thus

considered large enough to identify statistically significant relationships in a two-way

ANOVA analysis. There were 104,944 total impressions of the 12 promoted posts on

Facebook, distributed across all 50 states and the District of Columbia to a target

audience defined as any user of the platform living in the United States older than 18

years (approximately 230 million individuals, per Facebook's demographic selection

tool).

Facebook provides some metrics for the audience targeted by promoted posts,

specifically relating to "reach," or to whom the post should have been visible, and link

clicks. This data is segmented by gender, age group, and state. The reach was split

between male (26.95%) and female (73.05%) users of Facebook. There were 3,266 link

clicks from the promoted posts, also distributed across all 50 states and the District of

Columbia. The website itself created 665 "user sessions," which represent individuals

who provided qualifying answers on the study's landing page (e.g., a year of birth

indicating they were older than 18 years and "yes" to being a U.S. citizen). Of these

participants, 289 did not consent and withdrew, and 130 completed the full study. The

remainder withdrew at other points in the study procedure, the overwhelming majority stopping at the writing submission prompt.

Participants ranged in age from 19 to 84 (using "year of birth" responses from the qualification page and rounding up to the nearest whole year) and the median age was 60 years. The age distribution can be found in Figure 1. This distribution aligns closely with the "reach" of the promoted posts on Facebook (i.e., to whom the post was shown): 63.4% of the posts were shown to users older than 55 years. Female users older than 65 years saw 24.1% of all post placements. Female users aged 55 to 64 years saw 19.5% of all placements.

Figure 1

Age Distribution of Participants

Due to the limited demographic information available about participants and the inability to randomly sample, it was not possible to infer generalizability from the sample to the population. This represents a threat to external validity, which I address in Chapter 5.

Manipulation Check, Model Assumptions, and Outliers

Kendall's tau-b correlations were run to determine the relationships between the distance conditions and their respective manipulation checks among 130 participants. There was a medium, positive association between the social distance manipulation check and social distance condition, which was statistically significant, $\tau_b = .251$, $p = .001$. There was a medium, positive association between the temporal distance manipulation check and temporal distance condition, which was statistically significant, $\tau_b = .455$, $p < .001$. This suggests that the conditional writing prompts were effective at priming the PD mindset desired in participants as they completed the EAI-Brief survey.

I chose a two-way ANOVA to study the effect of two or more independent variables and assess whether and how they interact. Several assumptions underlie the univariate two-way ANOVA testing (Warner, 2013). The DV was measured at the continuous level, the two IVs each had two categorical, independent groups, and there was independence of observations. There were two outliers, as assessed as being greater than 1.5 box-lengths from the edge of the box in the boxplot. As the two-way ANOVA is a robust test and this data were neither extreme nor otherwise unusual, I included these outliers in the results. Data were normally distributed, as assessed by Shapiro-Wilk's test

($p > .05$). There was homogeneity of variances, as assessed by Levene's test for equality

of variances, $p = .948$. Full test results can be seen in Table 1.

Table 1

Results of Assumption Tests for Normal Distribution and Homogeneity of Variances

	Shapiro-Wilk's Test			
Temporal Condition	Social Condition	Stat.	df	Sig.
Near	Near	.940	36	.052
	Far	.935	27	.094
Far	Near	.974	32	.630
	Far	.944	32	.097
	Levene's Test of Equality of Error Variances			
	Levene Stat.	df1	df2	Sig.
Based on Mean	.120	3	123	.948

Results

After I positively scored the responses to the reverse-coded statements on the

EAI-B using SPSS, I assessed the full scale and each of the 12 subscales for internal

consistency. The overall scale Cronbach's alpha was .41. The individual subscales ranged

in alpha between .38 and .86, with eight of the twelve subscales scoring higher than .70.

The alpha scores can be found in Table 2.

Table 2

Psychometric Properties for EAI-B Inventory and Subscales

Scale/Item	*M*	*SD*	Cronbach's α
Overall			.41
Scale 01. Enjoyment of nature			.49
Item 1	5.98	1.489	
Item 2	6.36	1.329	
Scale 02. Support for interventionist conservation policies			.82
Item 3	5.19	1.864	
Item 4	5.20	2.009	
Scale 03. Environmental movement activism			.75
Item 5	4.27	1.936	
Item 6	5.16	2.131	
Scale 04. Conservation motivated by anthropocentric concern			.38
Item 7	3.55	1.941	
Item 8	2.60	1.750	
Scale 05. Confidence in science and technology			.84
Item 9	4.96	1.974	
Item 10	4.45	1.809	

Scale 06. Environmental threat			.70
Item 11	6.11	1.506	
Item 12	6.13	1.640	
Scale 07. Altering nature			.84
Item 13	3.23	1.741	
Item 14	3.56	1.712	
Scale 08. Personal conservation behavior			.38
Item 15	5.92	1.280	
Item 16	5.95	1.269	
Scale 09. Human dominance over nature			.86
Item 17	2.54	1.801	
Item 18	2.84	2.098	
Scale 10. Human utilization of nature			.83
Item 19	2.62	1.485	
Item 20	2.82	1.465	
Scale 11. Ecocentric concern			.52
Item 21	5.86	1.396	
Item 22	6.15	1.347	
Scale 12. Support for population growth policies			.79
Item 23	3.50	2.211	
Item 24	3.86	2.298	

The low overall alpha for the EAI-B represents a threat to internal validity and risk for Type 2 error. This will be discussed in Chapter 5. Since eight of the subscales had acceptable alphas, the two-way ANOVA was run for each subscale in addition to the overall scale.

The first two research questions examined whether there was a significant difference in construal level (as measured by mean environmental attitude scores) between individuals writing to a target who is near versus far along social and temporal PD dimensions. The third research question explored whether there was a significant interaction of manipulations of social and temporal PD, with special interest in when the writing target is socially proximal and temporally distal.

I ran a 2 x 2 two-way ANOVA to test whether there was a statistically significant interaction between manipulations of temporal and social PD (RQ3/H3), and whether there were simple main effects for manipulations of the PD conditions (RQ1/H1 and RQ2/H2). Means and standard deviations for the conditional groups are shown in Table 3 and results of the two-way ANOVA are shown in Table 4.

Table 3

Means and Standard Deviations for Conditional Groups

Temporal Condition	Social Condition Near			Social Condition Far		
	n	*M*	*SD*	*n*	*M*	*SD*
Near	36	4.53	.49	28	4.48	.46
Far	33	4.44	.42	33	4.68	.45

Note. N = 130

Table 4

Results of Two-Way ANOVA for Study Variables

Effect	*F* ratio	Sig.	Partial η2
Temporal Condition	.363	.548	.003
Social Condition	1.359	.246	.011
T x S Interaction	3.312	.071	.026

Note. N = 130, *df* = 126.

There was no statistically significant interaction between manipulations of temporal and social PD for the composite EAI score, $F(1, 126) = 3.312$, $p = .071$, partial η2 = .026. Thus, there was no support to reject the null hypothesis for RQ3. Further, the simple main effect on composite EAI score was not statistically significant for manipulations of temporal PD, $F(1, 126) = .363$, $p = .548$, partial η2 = .003, nor for

manipulations of social PD, $F(1, 126) = 1.359$, $p = .246$, partial $\eta2 = .011$. Thus, there was also no support to reject the null hypotheses for RQ1 and RQ2.

Given that the manipulation checks appear to have worked and several of the subscales in the EAI-B showed alphas greater than .70, I ran the 2 x 2 two-way ANOVA again for each subscale independently to assess whether the manipulations of PD impacted the EAI score for any specific dimension of environmental attitude. None showed a statistically significant interaction or main effects.

Summary

The central question examined in this study was whether there would be an interaction effect between manipulations of social and temporal PD on construal level of climate change consequences, assessed indirectly by measuring scores on the EAI-B. Statistical analysis of research data did not indicate a statistically significant interaction between manipulations of social and temporal PD. Secondarily, this study examined whether there were differences in main effects of manipulating social PD and temporal PD. Here, too, statistical analysis of research data did not indicate statistically significant main effects for manipulations of either dimension of PD.

The low alpha for the overall EAI-B scale raises questions about threats to internal validity. I will discuss this further in the Interpretation of Findings section of Chapter 5, in addition to other potential limitations of the study's design that may have contributed to these results.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

Climate change represents a grave threat to humanity's way of life. Thus, finding ways to communicate about the threat and reshape attitudes is critical to countering that threat. My purpose in this quantitative study was to examine whether construal level of climate change's long-term consequences could be reduced by manipulating participants' PD along two dimensions (social and temporal) to the conditional target of a structured writing task.

The research questions and associated null and alternate hypotheses were:

RQ1: Is there a significant difference in construal level (as measured by mean environmental attitude scores) between individuals writing to a target who is near versus far in social PD?

$H_0 1$: There is no difference in construal level between social PD condition groups.

$H_1 1$: There is a difference in construal level between social PD condition groups.

RQ2: Is there a significant difference in construal level (as measured by mean environmental attitude scores) between individuals writing to a target who is near versus far in temporal PD?

$H_0 2$: There is no difference in construal level between temporal PD condition groups.

$H_1$2: There is a difference in construal level between temporal PD condition groups.

RQ3: Is there a significant interaction of manipulations of social and temporal PD when the target is socially proximal and temporally distal?

$H_0$3: There is no interaction effect of manipulating social and temporal PD.

$H_1$3: There is an interaction of manipulating social and temporal PD such that individuals in the socially proximal, temporally distal condition had higher mean EA scores than those in other conditions.

The two-way ANOVA results indicated that there was no support to reject the null hypotheses for any of the research questions. I found no statistically significant main effects, nor was there a statistically significant interaction between manipulations of social and temporal PD. Moreover, the weak internal consistency of the dependent variable (Cronbach's alpha, .41) suggested a potential threat to the validity in terms of the risk of Type 2 error. I will address this further in the section on Limitations of the Study.

Interpretation of the Findings

Comparison to the Literature

As mentioned in Chapter 2, research into how manipulating PD may positively impact environmental attitudes and behaviors has met with mixed results. I used manipulations similarly intended to proximise the consequences of climate change for the temporally distal, socially proximal condition group. Jones et al. (2017) manipulated PD with videos to some effect: the reduction of PD correlating to expressions of increased

concern and proenvironmental behavioral intentions, but with no change in the perception of distance temporally. McDonald et al. (2015), Chu and Yang (2018), and Brügger et al. (2016) obtained similar results, where the manipulations or framings would have partial effect on one aspect of the related attitude(s) but little to no effect on others. For example, Chu and Yang's (2018) attempted proximization reduced ideological polarization but with no substantive change to worldview. In the present study, the manipulation check showed statistically significant, medium positive associations along both temporal and social dimensions, suggesting that the activity itself did affect PD. Thus, there was the expected effect on PD but without the expected associated outcome for environmental attitudes (further supporting the possibility of a Type 2 error).

However, as Van Boven et al. (2010) and others have noted, it is likely that the associations between PD, construal level, and environmental attitudes (specifically those relating to climate change) are more complicated than initially assumed. Although the contents of the writing submissions were not ever considered to be of importance in testing the hypotheses put forth by this study, the intensity of the language used by some of the participants does highlight one concern that Van Boven et al. called out about PD manipulations being a double-edged sword, where intense emotional responses to those manipulations may result in further denial rather than changed attitudes. Such an effect may have been present but unaccounted for in this study.

Kim et al.'s (2013) findings that creating similar PD rather than reducing PD led to better choices being made by participants provides additional insight into how the present study may have had unintended effects influencing the results. For example,

where some participants wrote about their memories of the environment in their youth, that may have added further distance between points of comparison (e.g., their past vs. the far future of their writing target). In that way, rather than creating a similar perception of PD by moving it forward, they may have set their comparison reference point further back, thus the manipulation check would have shown that the expected effect on PD was achieved (i.e., they technically were thinking about a point far away along the temporal dimension) but would not have achieved the expected outcome because the distance between reference points was increased rather than decreased.

Theoretical Framework Reflection

Although the results of the present study neither confirmed nor disconfirmed prior research on how PD manipulations influence environmental attitude, it is the limitations of the study (discussed in the next section) that provide insights to the discipline relating to how researchers can craft better-designed studies that may ultimately generate more useful data for answering the research questions posed here. CLT and PD models in general provide robust frameworks for examining a wide range of attitude- and behavior-based constructs. However, the inconsistencies in outcomes of studies using these frameworks to examine climate change-related attitudes show that PD and construal level are only parts of the larger puzzle.

Loy and Spence (2020) purposefully combined manipulations to proximise perceptions of climate change with manipulations of identity salience to statistically significant effect, suggesting that creating a common identity with those impacted by climate change can improve environmental attitudes. In the present study, I assumed that

the proximal social distance (e.g., the relationship to a family member rather than a stranger) would inherently create a common sense of identity, a fundamentally flawed assumption when considering that West et al. (2002) found that cooperation between relatives was diminished when there was a perceived or real scarcity of resources, Tornero et al. (2018) found that monozygotic twins were more willing to self-sacrifice but no more willing to fight on behalf of their twin than their dizygotic peers, and Meleady and Crisp (2017) noted that perceived distance to the consequences of climate change created a temporal-based intergroup bias towards future generations.

These studies suggest that a more nuanced, purposeful approach to exploring the topic is necessary to obtain more consistent, reliable, and valid findings. While several of the theories used in those studies were noted as supporting theories for this one, their integration into the design of the study was too minimal to assume a more detailed explanation of their influence on the results obtained (if there was any). Any such model that could have taken those factors into consideration would have been beyond the scope of a single study, likely requiring multiple studies to triangulate how each phenomenon impacts environmental attitudes, both separately and in combination with one another.

Limitations of the Study

Regardless of whether I had found statistical significance to support rejection of the null hypotheses for the three research questions in this study, several of the limitations would have presented threats to its validity – as they do now in the absence of such statistically significant findings. These limitations fall into three primary categories, and will be addressed accordingly:

- Instrument Reliability

- Participant Recruitment Procedures

- Potential Confounds

Instrument Reliability Concerns

The first limitation to this study that likely impacted the results relates to the reliability of the EAI-B survey instrument utilized as a means of indirectly measuring construal level change (the DV). All versions of the EAI (Milfont & Duckitt, 2010a) are Likert-type scales using 12 separate dimensions of the construct of "environmental attitude." The full inventory includes 120 questions, but there are two other versions: the EAI-S, the 72-item "short" version, and the EAI-B, the 24-item "brief" version. In this study, I used the EAI-B due to concerns over having participants complete a 300-word writing prompt and then have to complete either a 72- or 120-item survey. The decision to do so was affirmed by reported acceptable alphas for the EAI-B from its authors (Milfont & Duckitt, 2010b) and in subsequent testing (Ajdukovic et al., 2019).

Ajdukovic et al. (2019) noted in their study that no prior work had been done to structurally validate the 24-item EAI-B, even though the 72- and 120-item versions had been tested extensively. However, the instrument's use in their study and the EAI-B's use in the present study did differ in several respects. First, while no other work that I have found using the EAI-B tested changing the order of the items, Ajdukovic et al. randomized the order in which the 24 items were presented, resulting in an acceptable alpha of .83. It is possible that leaving the items in the order as shown in the published EAI (Milfont & Duckitt, 2010a) - which results in reverse-coded, paired items being

presented next to each other – could have resulted in assumptions on the part of

participants that the items were redundant, a concern expressed by Sutton and Gyuris

(2015). This may have led participants to take the survey less seriously than they might

have otherwise, or could have resulted in confusion due to similarity of wording and the

reverse-coded phrasing.

Additionally, Ajdukovic et al. (2019) utilized a French translation of the EAI-B,

which was originally designed by native English-speakers. While their translation

procedure included a pretest to validate the translation, there is a distinct possibility that

some piece of information may have been communicated differently through the

translated version of the items. Their satisfactory alphas suggest otherwise, but it is a

concern that must be noted.

As noted in Chapter 4, the Cronbach's alpha for the overall scale in this study was

.41, with eight of the twelve sub-scales having acceptable alphas (i.e., $\geq .70$). Even when

assessing the overall scale when using just the items from those eight sub-scales the alpha

did not achieve an acceptable level. This represents a threat to the validity of the findings

and the possibility of a Type 2 error, wherein the null hypothesis is incorrectly rejected.

Using a Likert-type item to provide a continuous variable as DV is a contested

practice in social sciences research, with some researchers suggesting that a mean value

for a Likert-type item may not be an accurate measure of central tendency due to varying

interpretations of each of the item's response categories (Nadler et al., 2015) and others

noting that the data may not be ideally suited for hypothesis testing due to its inherently

imprecise nature (Lubiano et al., 2017). Non-parametric (i.e., distribution-free) statistical testing may provide a better approach using the EAI.

Moors et al. (2014) found that the manner in which the scales were labeled (either full versus end, numbering categories, and bipolar) could impact response bias such that participants might be more inclined to utilize either an extreme response style (ERS), where they choose answers primarily on the extremes of the scales, or an acquiescence response style (ARS), where they agree with item rather than disagree. Further, upon re-examination of the EAI-B's 24 items, I noted that at least two of the subscales contain statements that can be interpreted in such a way that the paired, reverse-coded items are not considered diametrically opposed (e.g., Statements 1 and 2) or where the core attitude is the same, regardless of the context (Statements 7 and 8). Such interpretations could explain how both of the subscales provided here as examples had low alphas (.41 for Subscale 1, .38 for Subscale 4), and how the overall instrument's alpha did not meet the acceptable level.

Lastly, concerns over the representativeness of the participant sample, discussed in the next section in greater detail, may have contributed to a lower measure of internal consistency for the composite scale. While prior tests of the EAI and its various forms were suggested to have been robust, the described participant samples were generally younger, often using students at the universities where the researchers taught. The present study's participant sample was weighted towards the over-55 demographic and thus may have been a cause for the apparent discrepant reliability.

Participant Recruitment Procedure Concerns

A second area of concern with the present study was the recruitment of participants. The initial procedure for this study called for participants to complete a writing prompt of not less than 500 words. I quickly observed this to be a deterrent to completing the full study, with the progress of an overwhelming number of participants stalling at the writing prompt stage – and indicating it would take at least six months to acquire the minimum number of participant responses.

With Walden University's IRB approval, I modified the procedure to reduce the word count to 300 words, and the description of the associated time to complete the study from "30-45 minutes" to "10-15 minutes." While this resulted in a reduction in the attrition rate it still did not significantly improve the rate at which individuals who may have seen the sponsored recruitment invitation clicked through to the study site itself.

Thus, incentivization of participants was one concern regarding recruitment procedures. The high number of participants needed to achieve statistical power for the study made small-dollar incentives for all participants cost-prohibitive. Further, an institutional prohibition on raffle-based incentives meant it was not possible to provide an incentive of meaningful value to a limited number of participants chosen randomly rather than a low-dollar incentive to all participants. While there are ethical considerations to the use of raffles or lotteries, and in particular when they are used in clinical studies (Zangeneh et al., 2008), such incentives have been shown to increase response rates and were used in a number of the studies included in the literature review in Chapter 2.

An additional concern with recruitment relates to the makeup of the participant pool. Based on the metrics provided by Facebook, I was able to confidently report certain items of interest about the audience to whom the sponsored recruitment posts were shown:

- 63.4% of posts were shown to users over 55 years

- Female users over 65 years saw 24.1% of all post impressions

- Female users aged 55-64 years saw 19.5% of all impressions

However, due to the decision to collect only a limited amount of demographic data, specifically only that which was required to qualify participants for the study, there was no way to correlate who saw the posts to who actually completed the study. Thus, there is considerable restriction on the ability to infer generalizability from the sample to the population at large. Additionally, the closeness of the mean scores for each group could indicate that there was a homogeneity in the overall sentiment of the participants. While a sentiment analysis was not included as part of the data analysis plan, a sampling of the writing submissions indicates that most of the participants (with notable exceptions) already see climate change as being real and being a danger to humanity, whether it be a stranger or family member alive today or one alive 200 years from now.

A further concern in this area is that, considering the inability to adequately incentivize participation as described previously in combination with Facebook's ad targeting algorithm showing the recruitment invitation primarily to users over 55 years, there is a distinct possibility that there was a bias present in the participant sample that influenced the results. For example, individuals who are more predisposed to altruistic

behaviors (shown to correlate to higher EA, per Dunn et al., 2008; Menges et al., 2005)

may also be more inclined to participate in complex studies that offer no intrinsic

incentives. Indeed, research has shown that individuals who have a stronger sense of

connection with their community are more inclined to participate in community-oriented

health studies (Carrera et al., 2018).

Potential Confound Concerns

There are potentially other factors that could have had direct or indirect influence

on the results achieved by the present study. First, the study ran between October and

November 2020, taking place initially in the last few weeks before one of the most

contentious elections in the history of the United States and then concluding in the

confusing and polarizing aftermath. Additionally, COVID-19 spread wildly throughout

the entire year and the national pandemic response was handicapped by an ideological

schism in the public over whether the virus was real or a hoax, with adherence to social

distancing guidelines correlating to polarized political views. The move to work-from-

home and virtual engagement also significantly shifted the experience of daily life in the

United States (as it did elsewhere in the world).

When considering these factors and how they have changed the nature of personal

interaction over the past few months, it is impossible to say with any certainty that this

study was not impacted by them as well. The pandemic alone has had a dramatic impact

on research around the world, from ethical concerns about consent in situations where

there is pressure to participate (e.g., clinical vaccine trials; House et al., 2020) and

payment incentives (Largent & Lynch, 2020), to the mental health impact on research

participants themselves resulting in a reduced desire to participate in health-based studies (Cardel et al., 2020).

Recommendations

That this study did not obtain data that could sufficiently affirm or reject the hypotheses being tested does not mean there was no knowledge of value provided by the findings. If anything, the results emphasize the broader challenge of conducting social sciences research on attitude formation, maintenance, and change, such as those relating to polarizing topics like climate change and the environment. These insights are invaluable at helping shape future research.

The primary recommendation is to refine testing of the structural reliability and validity of all three versions of the EAI. This should include assessing each version's performance individually and embedded into a larger instrument (in order to mask its purpose) and testing presentation of the items in different orders as well as possibly selecting items that may be less prone to misinterpretation for the EAI-S and EAI-B. Sutton and Gyuris (2015) did, in fact, successfully refine the EAI-S down to a 37-item version that addressed some of the concerns mentioned previously among the limitations. Their new inventory showed acceptable alphas but has not been used broadly by other researchers and so was not adopted for the present study.

The applicability of the inventory for use in pretest-posttest designs would also expand its usefulness in measuring environmental attitudes. If the present study were to be refined, an improved approach would be to utilize a pretest-posttest design to assess the change in attitudes following the intervention rather than simply assessing the attitude

after the intervention, as the present study could not account for existing levels of EA. However, this would require the aforementioned validation testing, either in a pilot or as precursor studies. Embedding the instrument into a larger scale that assesses other attitudes would also help mask the purpose of the survey, avoiding potential social desirability bias in the responses – a critical concern when assessing attitudes relating to polarizing topics (Groves et al., 2009; Liao, 2016).

Additionally, the recruitment procedures and data collected in a future study of this nature must support the ability to better infer generalizability to the population of interest. Social media – Facebook in particular - has been shown to be effective as a participant recruitment tool (Applequist et al., 2020), though the lack of standardized reporting of those recruitment procedures makes it difficult to assess the degree of efficacy of such approaches (Reagan, 2019). Additionally, not all studies found that recruitment via social media sources such as Facebook was more successful than traditional methods like snowball sampling (Chambers et al., 2020).

During a global pandemic like COVID-19, improving the standards for recruitment of online participants and correlating demographic data to infer generalizability will be critically necessary to validate the conclusions presented by psychology researchers, who are already facing a so-called "replication crisis" (Hoole, 2019; Peels, 2019; Wiradhany et al., 2019). However, this requires a larger discussion on the ethical challenges inherent in correlating such data.

For example, it would have been possible to embed a Google-based tracking code in the MyGradResearch.com website that could have allowed me to identify which

participants were coming from specific posts, including information like their location

and potentially even their personal Facebook pages (which would have revealed

personally-identifying information). No current institutional guidance outlines whether or

not such a practice is specifically prohibited, or whether it violates the broader policy of

avoiding collecting more information than is strictly necessary to test a study's proposed

hypotheses. This also highlights the challenges faced by academic and research

institutions, who will need to assess the effectiveness of their policies, procedures, and

ethical guidance and update them as necessary to address the new concerns introduced by

digital research approaches.

In combination with the challenge of collecting sufficient demographic data using

online platforms to validate inferences about generalizability of the findings is the

concern over incentivization. Although there are well-understood ethical concerns about

using raffle-style incentives as a general practice in research – clinical research in

particular, where the incentive may be undue inducement to participate for those prone to

gambling addictions (Zangeneh et al., 2008) – if researchers are prohibited from

collecting data that would allow them to identify participants (at least in so far as they

would be able to prevent repeat participation in online research studies) there is an

inherent risk to both the study's validity and the researcher's funding that participants

could game the system and receive incentives for participating over-and-over. In such a

context, there is an argument to be made that the benefits of a study that does not include

any other potential physical or psychological risks to participants outweigh that possible

harm, justifying the use of raffle-based incentives when it could increase the quality and diversity of the participant sample and reduce the cost to the researchers.

The last of the limitations, the potential confounds, are harder to solve for since they represent the unknowns and unexpected occurrences in life. The COVID-19 pandemic and recurring mass protests resulted in increased ideological polarization in the United States, creating ongoing tension in 2020 and a growing hostility between the divided halves of the populace. Part of this can be attributed to the psychological processes triggered by mortality awareness, a fundamental component of terror management theory (Courney et al., 2020; Hu et al., 2020).

It is also uncertain which direction such processes could potentially have influenced the results of this study. While terror management theory has found that mortality salience can result in more acute perceptions of ingroups and outgroups (Hirschberger et al., 2015) and increased negative affect for perceived "others" (Pyszczynski, 2013), recent research around its connection to the COVID-19 pandemic has shown that it can also trigger attachment-based fears over the prospective loss of loved ones and friends (Steele, 2020). How can these be accounted for in social psychological research? A very real probability is that these unknown factors have impacted research throughout the pandemic and election cycle, and will continue to do so into the future. The only recommendation that can be made in the face of that reality is that researchers must take extra caution in assessing the limitations of their study and the broad generalizability of the findings.

Implications for Social Change

With no findings of statistical significance, it is difficult to assess exactly what impact this study may have in effecting positive social change relating to the topic of climate change. Certainly, the recommendations provide future directions for researchers in the areas of EA, PD, and CLT to pursue. Thus, without a macro-level observation of social change implications, I am forced to look for micro-level impacts on the participants themselves.

The contents of the writing submissions were never considered to be relevant to the hypotheses tested, since the manipulation checks would assess whether the writing activities had the intended effect on the PD perceived by the participants to their assigned targets. In reviewing the submissions, one thing that stood out was that - regardless of whether the position taken on the consequences of climate change were fatalistic, optimistic, or something in between – the majority of participants in this study cared about the consequences. They understood, at least fundamentally, that climate change was real, and they cared that inaction does and will continue to impact others.

Many conjured up rich, vivid imagery in recalled memories of their childhood visits to beaches, farms, or forests. They lamented how differently those places look now if they are even still accessible at all. Some provided words of encouragement or advice on how to adapt to a world where extreme weather phenomena are the norm. Others blamed politicians, corporations, collective societal apathy, or their own generational cohorts for ignoring the scientists, rejecting the warnings of experts, and continuing to promote policies that devastate the environment. Some expressed feelings of

helplessness. Most expressed their apologies for not doing more to care for our natural environment – either at a personal level or at a larger, societal level.

Some, of course, expressed dramatically different opinions. These were fewer in number, which, as noted in the limitations section likely contributed to the apparent homogeneity in the survey responses across conditions. One thing that was noticeable from these responses was the intensity with which these participants not only disagreed with the facts relating to climate change but expressed a hatred for people who did believe in climate change. These submissions, more than those of their environmentally progressive counterparts, were filled with aggressive rhetoric, accusations of hypocrisy, and – almost uniformly – assertions that any information to the contrary was "fake news." And in the few instances where the participants who disagreed were not hostile and attempted rather to utilize reasoned arguments, the data/facts on which their assertions were predicated were either incorrect, outdated, or known to have been fabricated. But they still cared. They cared about their families, their friends, and their communities. They just expressed that concern in a different way.

In a sense, the writing submissions may provide the most valuable insight from the entire study: that regardless of what one believes about climate change, concern for family and friends is a strong motivator to express those beliefs. The debate over whether messaging that targets the heart is more effective than messaging that targets the mind may be better framed in the context of aligning the heart and the mind as the viable path to bringing people together to enact the necessary policies that will ensure future generations are not forced to endure the consequences of our inaction.

This will likely necessitate new approaches to studying attitudes, communicating scientific findings, and collaborating with policymakers. Continuing to struggle with the limitations presented by a global pandemic, researchers will have to find new ways to recruit participants, collect data remotely, and validate their findings. The recommendations provided in this chapter may provide avenues for supporting those efforts.

Conclusion

The response to the COVID-19 pandemic here in the United States has shown that, even when faced with a direct, imminent threat to individual mortality, a large portion of our fellow citizens allow ideological polarization to cloud their judgment and influence their behavior to destructive ends (Bruine de Bruin et al., 2020). The present pandemic may be the first of many to occur over the next few decades. An increase in pandemic frequency is one of the predicted consequences of climate change (Ma et al., 2019; Rees et al., 2019).

As I was working on writing the final sections of this manuscript, a new perspective article was published by Bradshaw et al. (2021) that assessed recent climate studies and data, presenting an alarming conclusion: the climate change situation at present is far worse than was currently realized – and will be far worse than was predicted for the future. The authors noted that part of the under-reporting of climate consequences is due to researchers working in "bubbles," where they only see their part of the puzzle and not the larger picture. As a researcher, I can see no greater challenge to humanity in my lifetime than addressing the threat presented by climate change.

This study was intended to contribute meaningfully to the body of knowledge about whether it was possible to influence individual attitudes to be more supportive of proenvironmental policies by manipulating perceptions of the temporal PD to the consequences of climate change. And while the data did not provide statistically significant evidence to support that approach, it is unsurprising in light of what COVID-19 has revealed about us. There is no temporal PD to this likely consequence of climate change. There is no social PD to it. This has impacted people in every state, at every socio-economic level, and across ideological lines. At the moment of this writing, the toll is at least 384,000 Americans dead due to COVID-19 or COVID-19-related complications. By the time this manuscript reaches publication, there are estimates that 100,000 more could be dead[2].

There is something fundamentally amiss in America right now, and as a researcher it is difficult not to question how much one study can contribute to identifying ways to overcome these challenges. If this study provides anything of value to our body of knowledge, it may simply be the timely reminder that the problems we face are evolving rapidly and the scientific community must be nimble and evolve our methodology to keep pace. The recommendations provided here are starting points for prospective future research.

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[2] When this chapter was drafted in January 2021, the figure provided was 384,000. Just prior to publication in March 2021, the death toll was 541,000 – exceeding the earlier estimate by more than 60,000 lives.

It has been said that the polio vaccine's creation and its widespread adoption was one of humanity's greatest achievements, effectively eradicating a disease that had devastated communities around the world. In less than a year, scientists developed not one but multiple viable vaccines to combat the spread of COVID-19, safely building on existing knowledge across multiple domains to quickly deliver vaccines that, in some cases, showed greater than 95% efficacy – well above the 50% threshold required by the Food and Drug Administration for approval. This was made possible through collaboration between the government, private industry, and the many thousands of ordinary Americans who bravely volunteered to participate in the trials.

I believe that if we can come together to achieve that great feat in our effort to combat one consequence of climate change, certainly it is possible for us to do the same to combat climate change itself.

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Appendix A: Sample Consent Form

CONSENT FORM

You are invited to take part in a research study about how individuals communicate about environmental issues, specifically climate change. The researcher is inviting any individual over the age of 18 and eligible to vote in the United States to be in the study. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This study is being conducted by a researcher named David Richardson, who is a doctoral student at Walden University.

Background Information:

The purpose of this study is to examine whether written communication about environmental issues varies depending on the person to whom the issues are being communicated.

Procedures:

If you agree to be in this study, you will be asked to:

- Provide simple demographic information (1-2 minutes)
- Use the prompt provided on the next page to write a submission of at least 300 words as a "letter" to the target specified on the prompt (10-15 minutes)
- Complete the post-activity surveys (5-10 minutes)

Voluntary Nature of the Study:

Research should only be done with those who freely volunteer. Everyone involved will

respect your decision to join or not. You will be treated the same whether or not you join

the study. If you decide to join the study now, you can still change your mind later. You

may stop at any time. The researcher seeks 128 volunteers for this study.

Risks and Benefits of Being in the Study:

Being in this type of study involves some risk of the minor discomforts that can be

encountered in daily life, such as fatigue from writing or stress from considering social

issues. With the protections in place, this study would post minimal risk to your

wellbeing.

This study offers no direct benefits to individual volunteers. The aim of this study is to

benefit society by helping improve the understanding of how environmental issue

communication varies.

Payment:

There is no payment included as incentive for your participation in this study.

Privacy:

The researcher is required to protect your privacy. Your identity will be kept anonymous,

within the limits of the law. The researcher will not ask for your name at any time or link

your responses to your contact information. The researcher will not use your personal

information for any purposes outside of this research project. Also, the researcher will not

include your name or anything else that could identify you in the study reports. If the

researcher were to share this dataset with another researcher in the future, the researcher

is required to remove all names and identifying details before sharing; this would not

involve another round of obtaining informed consent. Data will be kept secure by using

an encrypted website to collect and store the data on password-protected servers, with

unique numbers used to collate individual submissions in place of any personally

identifying information. The anonymized data will be downloaded as an encrypted file to

the researcher's personal computer, which is password protected, for data analysis. Data

will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:

You may contact the researcher with any questions you have, either now or later, via e-

mail at [omitted]. If you want to talk privately about your rights as a participant, you can

call the Research Participant Advocate at my university at 612-312-1210. Walden

University's approval number for this study is 10-01-20-0728632 and it expires on

September 30th, 2021.

Please print or save this consent form for your records. You may ask the researcher or

Walden University for a copy at any time using the contact info above.

Obtaining Your Consent

If you feel you understand the study and wish to volunteer, please indicate your consent

by checking this box and clicking on the Submit button below: []

Appendix B: Sample Writing Prompt

This activity requests that you to write a "letter" to a [genetically related family member/complete stranger][3] who is [alive today/living 200 years from now][4]. Imagine the details of the world they inhabit and consider what life is like for them as you write your submission. Please do not include any details in your submission that the researcher could reasonably use to personally identify you.

Start your writing prompt with:

I am writing to you about climate change…

After that, feel free to share any thoughts you have about this topic. For example, you may write about your personal relationship with nature and the environment; news, movies, or television shows about climate change; or your position(s) on environmental policies and practices. The researcher asks only that you tailor your message specifically to the target audience noted above.

Please note that this study does not collect personal information, and your letter and survey answers are anonymous. There is no method for identifying you from your responses.

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[3] This portion of the target description will differentiate the dimension of social PD.
[4] This portion of the target description will differentiate the dimension of temporal PD.

The researcher is asking that you write at least 300 (approximately 10-15 minutes) words, but you may go over that amount.