

THE EFFECTS OF EMPOWERMENT MESSAGING ON ACTION RESPONSES TO  
CLIMATE CHANGE

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## DEDICATION

I would like to dedicate this work of research to my respected friends and mentors David Castillo, Asis Cortes and the Casa Cortes family, Salvador Rosales Torres, Emilio Vieyra Vargas, Carlos Camarena, Tomás Estes, Guillermo Sauza, David Suro, Romulo Sanchez Parada, Aquilino Garcia Lopez, Tío Rey, Graciela Ángeles Carreño, Rodrigo Medellín and so many more who have shared with me the miracle of mezcal and agave spirits. I would also like to dedicate this thesis to several loved ones. I would like to dedicate this work to my best friend Taylor Amador who has been an enormously cherished friend since childhood. We have seen so many ups and downs in each other's lives, and you have always been my family. I am so excited to see what is in our future! I would like to dedicate this to my partner Rozz who gave loving encouragement and praise throughout the research process. Thank you for all of your relentless love and kindness, for being the coolest person I know, and being always down for anything. I love you to the moon! I want to thank my uncle Gary Campos who has given me the unconditional love I have always been worth. I love you bunches! Thank you for filling the gaps, and for seeing me as the person I've always been. I would also like to dedicate this project to my beloved chihuahua Remy who provided ample emotional support during the completion of this project. Remy, my son, you are my forever baby, and I wish I could slow down time to enjoy you for even longer. I love you always.

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## ABSTRACT

JAMIE CAMPOS

### THE EFFECTS OF EMPOWERMENT ON ACTION RESPONSES TO GLOBAL CLIMATE CHANGE

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Global climate change has many complex impacts that are cascading and increasing with a lack of direct action. Indirect and direct impacts on human life occur as a result of climate change that disproportionately impact marginalized communities. The psychological impacts of climate change are discussed, including ecological anxiety and ecological grief. The effects of powerlessness and psychological empowerment are discussed concerning their effects on psychological adaptation. In this study, I examined whether a visual message of empowerment or powerlessness will influence participants' psychological responses to climate change in a sample of 131 participants. Neither empowerment nor powerlessness narratives had an effect on levels of psychological adaptation, and climate anxiety did not exacerbate this proposed effect. There was no evidence to suggest that climate change denial moderated this proposed effect. Implications for clinical practice and future research are discussed.

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## CHAPTER I

### INTRODUCTION

Global climate change has been established by decades of research to be anthropogenic, or caused by human activity (Barnett et al., 2001; Höök & Tang, 2013; Lenoir et al., 2017; Poortinga et al., 2011; Riebsame, 1990). Climate change, including extreme weather events, rising sea levels, food and water shortages, and rising rates of infectious diseases (Chapman et al., 2014) have indirect impacts on human life, such as disruptions to major infrastructural systems and rising rates of violence, racism, and war (Turner et al., 2010). While direct impacts are acute in nature such as heat stress and direct exposure to extreme weather events, indirect impacts are subacute and reflect subsequent impacts of climate change such as loss of one's home, migration, compromised health and well-being, a struggling economy, and rising civil violence and unrest (Palinkas & Wong, 2020). Direct impacts have been discussed in mainstream media, but there is much left to explore in terms of the indirect impacts caused by global climate change, namely, mental health.

Levels of climate change and mental health impact are dependent on present and future efforts of mitigation, adaptation, and preparedness for global climate catastrophe. While everyone will be uniquely impacted by the global climate crisis, some groups endure more harrowing effects than others, particularly marginalized populations. The psychological impacts of global climate change will be influenced by several components, including food and water availability, energy resources, health and well-being, socio-economic development, inequity, marginalization, and centuries-long impacts of colonization (Palinkas & Wong, 2020; Pörtner et al., 2022; Tam et al., 2021).

*The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (2022)*

discussed the hazards associated with climate change that are cascading, complex, and compounding with a lack of direct action (Pörtner et al., 2022). The report discusses the escalating consequences of global climate change. Climate hazards are anticipated to take place concurrently, resulting in high-impact cascading effects exemplified by the interactions of complex climatic and non-climatic events. Cascading effects could include disruptions to the supply chain or energy resources due to extreme weather events, where access to food or energy is the indirect subsequent challenge to the direct impact of extreme weather events. The report projects that an increase in these hazards will result in compounding risk for climate-related disasters, which will have serious consequences for public mental health.

### **Mental Health Impacts of Climate Change**

Mental health impacts, including stress and anxiety, are projected to rise with global temperature in all regions assessed, particularly for vulnerable groups such as children, adolescents, disabled people, and older adults (Parmesan et al., 2022). Mental health ailments have emerged, including ecological anxiety, ecological grief, climate pre-post-traumatic stress disorder (PTSD), and solastalgia, and it is imperative for professionals to attend to these variations in mental health responses to climate change in a way that will stimulate pro-environmental action, an area less explored in clinical practice (Ágoston et al., 2022). Scientific knowledge and levels of education play a role in whether and to what extent an individual worries about climate change, though there are individual traits, including political affiliation and personal values, that have also been shown to inform ecologically anxious reactions.

Individuals have similar ways of grieving the environment as they do with other objects. Ecological grief is a natural response to environmental loss and degradation, particularly for

those whose lives and livelihoods are intimately connected to the natural world (Comtesse et al., 2021). Ecological grief has features of ordinary grief, such as accepting the reality of the loss, processing the somatic pain of the loss, adjusting to the internal and external world without the lost object, and finding connection with the lost object while adjusting to a new life without it (Clark, 2020).

Grieving and mourning can look different depending on the individual, their culture, and the nature of their circumstances. Ecological grief has been studied as a response to gradual, slow, and enduring ecological changes (Comtesse et al., 2021). These gradual changes over a long period have been observed as slow, violent decimation of nature which are not as visible due to the complex interactions of global climate change and the inability to identify specific precipitating events. There is also anticipation of future environmental loss that has been closely related to the prolonged grief experienced as livelihoods, ways of life, and culture are lost. Levels of ecological grief vary with youth and children, particularly those who are impacted by growing up with increasing amounts of loss.

### **Psychological Empowerment**

Substantial loss and destruction of one's livelihood, home, or cultural identity can lead one to feel powerless. With a steady increase in environmental loss, psychological empowerment may be a useful element when adapting to a changing environment. Psychological empowerment is the relationship between one's sense of self-control and self-efficacy as it relates to the achievement of goals or completion of tasks, environment, and environmental demands (Amor et al., 2021). When discussing ecological grief and anxiety, it is key to note the mechanisms for change, including that of psychological empowerment, as it increases adaptation and social engagement. Empowerment is both as a motivational and a social construct, which has

implications when considering whether to promote pro-environmental behavior at the individual or the collective level and for how one experiences their level of power (Conger & Kanungo, 1988). As those more vulnerable depend on those in power to make informed decisions about climate change, these discrepancies in power have deeper implications for proactive decision-making both at the individual and structural levels. Empowerment has been proposed as a motivational construct by which an individual will feel more externally motivated and empowered when they feel secure in their resources and their ability to manage their circumstances (Pieterse et al., 2010).

Power is a social element that informs the pursuit of goals in individuals and society. Having power contributes to self-regulation and the achievement of goals, while having less or no power inhibits those psychological processes. A need for more power reflects an individual desire to influence, teach, and lead others to achievement that can present at the individual and institutional levels (Jha, 2010). When a person's motivational needs are driven by a desire for more power, empowerment can serve as a tool to satisfy this intrinsic motivation. As a lack of power is known to impede executive functioning, the combination of psychological processes that inform decision-making and the achievement of goals results in a performance discrepancy between those in power and the powerless (Albalooshi et al., 2020). A person who is disempowered may behave more vigilantly, which can deplete their mental resources and stifle performance, whereas a person who is psychologically empowered does not spend excessive amounts of energy satisfying their need for resources to feel empowered (Albalooshi et al., 2020). Self-affirmation is the idea that the internal self is flexible enough that when an individual feels threatened in one life domain, affirming themselves in another life domain may restore a sense of self-efficacy (Albalooshi et al., 2020). Increasing self-efficacy can serve as a buffer to

psychological threat or harm (Albalooshi et al., 2020). Self-efficacy is the individual belief that one has the ability and capacity to achieve a certain outcome or set of outcomes (Bandura, 1977). Self-affirmation improves the inhibitory control element of executive functioning which contributes to higher levels of self-efficacy and greater pursuit of goals. Instilling self-efficacy through self-affirmation will counteract the impairment of inhibitory control in those who feel powerless, mitigating the performance gap within this hierarchy of power. Given that self-affirmation and promoting self-efficacy contribute to psychological empowerment, which has positive effects on an individual's pursuit of goals, it may be useful to employ this strategy at the macro level to promote healthy psychological adaptation to climate change. Promoting psychological empowerment may give an individual the sense that their actions on the micro level has a meaningful impact on their ability to psychologically adapt to climate change and produce positive collective action response outcomes.

Clayton and Karazsia (2020) conducted a study to review the impact of written empowerment and powerlessness messaging on psychological adaptation, which revealed a weak positive relationship between empowerment messaging and climate change anxiety when controlling for experience with climate change. This could be due to the order effects of the stimuli presented, the medium of messaging used (written vs. visual), or due to the vagueness of the messaging (Clayton & Karazsia, 2020). This weak relationship is inconsistent with existing literature which requires further exploration. Cognitive impairment measured higher in the empowerment condition than in the powerlessness condition, which may indicate differences due to experience with climate change. Direct experience with climate change was captured by items 14-16 of the climate anxiety scale (CAS) featuring questions such as "I have been directly impacted by climate change," and "I have noticed a change in a place that is important to me

because of climate change.” While the experience of climate change was positively correlated with psychological adaptation, this study offers evidence that there must be direct experience with climate change for this relationship to be significant.

Understanding climate change perceptions and their responses requires evaluating the process by which an individual assigns meaning to their perceptions and what medium of messaging is the most effective at internalizing the message as personally significant. Rashotte (2002) conducted a study that applied Affect Control Theory to participants who witnessed a video film presentation. Affect Control Theory is a framework that asserts that individuals in various social scenarios will attach cultural significance to the elements of their perceived situation and environment (e.g., people, places, things, etc.). The participants were assigned a visual or written depiction of a social scenario and observed based on their evaluations of the social situation. Results revealed that participants who received the visual film presentation attached more portent perceptions and personal significance than those who did in the written condition. Visual stimuli depicted a simpler representation of the actors in the film and their actions than the written version of the film, indicating that superfluous text details in written messaging can haze the meaning-making of the depiction. The author found that the perceived attitudes of the actors were more easily interpreted as viewers of the video presentation did not require as much additional information to make sense of the film (Rashotte, 2002). As visual stimuli resulted in a clearer interpretation of the film than the written stimuli did, it may be useful to explore these differences in empowerment and powerlessness messaging in climate change perceptions to promote feelings of empowerment as an adaptive response to a warming climate. Differences in visual empowerment and powerlessness messaging may produce more significant effects on an individual’s levels of psychological adaptation to climate change.

## **Definition of Terms**

1. Climate pre-PTSD- traumatic response to the stressor of experienced or anticipated effects of climate change (Budziszewska & Kalwak, 2022).
2. Solastalgia- the condition of loneliness, insecurity, and powerlessness caused by the transformation of one's home environment which can result from both acute impacts as well as chronic ecological decay caused by climate change (Ágoston et al., 2022).
3. Ecological anxiety- anxiety associated with ecological crisis (Comtesse et al., 2021).
4. Climate change anxiety- ecological anxiety that is specifically related to climate change.
5. Ecological grief- emotional reaction to ecological loss (Clayton & Karazsia, 2020).
9. Vulnerability- the predisposition or likelihood to be adversely affected by a variety of elements such as sensitivity and susceptibility to harm as well as having a lack of ability to cope and adapt (Pörtner et al., 2022).
10. Reasons for concern (RFC)- Framework for scientific communication about the accrual of risk in five broad categories (unique and threatened systems, extreme weather events, distribution of impacts, global aggregate impacts, and large-scale singular events) (Pörtner et al., 2022).
11. Affect Control Theory- a framework that asserts that individuals in various social scenarios will attach cultural significance to the elements of their perceived social situations (people, places, things, etc.; Rashotte, 2002).



## CHAPTER II

### LITERATURE REVIEW

#### **Overview of Climate Change**

Climate change is the gradual transition of weather and climate patterns over an extended period of time. There is irrefutable evidence that the planet's atmosphere is rising in temperature at an alarming rate, increasing extreme weather events, increasing droughts and floods, sea levels are rising, and agriculture systems are declining (Kim & Ahn, 2019; Markus et al., 2019; Meehl & Tebaldi, 2004; Parmesan et al., 2022; Pörtner et al., 2022). Industrialization has been identified as the primary cause of a warming climate (Budziszewska & Kalwak, 2022). The American Psychological Association Task Force for Climate Change (Swim et al., 2011) has stated in their report on the Interface Between Psychology and Global Climate Change that the interactions of climate change will occur at multiple levels which will affect individuals, families, organizations, government, and societies (Swim et al., 2011). Climate change theory has evolved from scientific speculation and curiosity to proven fact backed by decades of research (Barnett et al., 2001; Gornitz & Nasa, 1985; Hook & Tang, 2013; Lenoir et al., 2017; Parmesan et al., 2022; Poortinga et al., 2011; Riebsame, 1990).

Anthropogenic climate change has caused extensive detrimental effects and destruction to ecosystems and the people who inhabit them to an extent that has surpassed Earth's normal climate variability (Padhy et al., 2015; Parmesan et al., 2022; Reser & Swim, 2011).

Vulnerability to climate change is dependent on one's level of climate change impacts relative to their ability to cope and adapt to a changing environment and society (Parmesan et al., 2022).

Individuals who have been minoritized due to their race or ethnicity, disability, sex or gender identity, sexual orientation, or age all have pre-existing vulnerabilities that are exacerbated by

climate change impacts. Other groups may be considered vulnerable due to their disproportionate impact of climate change stress and available resources to cope which can include, indigenous people, farmers, first responders, and climate scientists. Vulnerable people and communities are disproportionately affected by climate change compared to people in more industrialized regions. The increase in occurrences of extreme weather and climate change disasters have caused widespread decimation of ecosystems, communities, and infrastructure, including record-breaking heatwaves, catastrophic precipitation events, wildfires, and drought (Parmesan et al., 2022). Climate change has caused pervasive damage and permanent species extinctions on land and in Earth's marine ecosystems. A sustainable balance, or sustainability, occurs when a population interacts with its environment in a way that allows the population to thrive to its fullest extent without causing permanent harm to the environment it relies on (Ruggerio, 2021). Climate change has decreased food and water supplies, which has impeded human sustainability with the higher frequency of extreme weather events (Cunsolo & Ellis, 2018; Parmesan et al., 2022).

*The 2022 Sixth Assessment Report of the Intergovernmental Panel on Climate Change* includes detailed impacts of climate change in the near term from 2021-2040 and in the mid to long-term 2041-2100. In the near term, the report states that Earth's warming by more than 1.5°C since the second half of the nineteenth century would amount to indefinite increases in climate change consequences, including multiple acute risks to environments and human beings. The level of environmental impact and its subsequent impact on humans is dependent on the environment's exposure to climate hazards as they increase in the coming term. Actions to reduce greenhouse gas emissions would limit destruction and the loss of environment to climate change, though damages will still occur in the face of these efforts. Near-term risks for natural

losses are moderate to high for forest terrain, seagrass, and kelp, and Arctic and ice-based ecosystems. The continual rise in sea level will edge toward coastal communities and infrastructure and submerge low-lying terrain into the ocean. With the rise of urbanization, energy, water, and other commodities will be strained as these resources will be exacerbated by climate change impacts. Violence will increase due to strained socioeconomic conditions, which may lead to migration patterns. Differences by region exist, and risk is greater in places where species and human beings are close to their thermal threshold, primarily along coastlines or in close proximity to ice or rivers. Risks are high in areas where climate struggles exist even in the absence of anthropogenic climate change drivers which are unavoidable even when accounting for each emissions scenario, though these impacts can be moderated by adaptation. Reasons for Concern (RFC) are projected to become higher as they are associated with increasingly extreme weather events as well as widespread irreparable damages to Earth's ecosystems (Parmesan et al., 2022).

*The 2022 Sixth Assessment Report of the Intergovernmental Panel on Climate Change* continues to discuss climate change impacts ranging from the mid to long term (2041-2100) (Pörtner et al., 2022). Beyond 2040 and considering the levels of greenhouse gas emissions, climate change will amount to a multitude of risks to both natural and industrialized systems. For the 127 noted risks, mid and long-term effects are expected to be several times higher than current measures indicate. The rate of climate change is strongly dependent on near-term efforts to reduce greenhouse gas emissions and acclimate to the incoming changes that are happening immediately, as well as the expected adverse impacts. Damage to, destruction of, and a loss of ecosystems and biodiversity are already known risks for every area of the world due to accumulated global warmth and will continue to be compromised with each increment toward a

warmer climate. On land, 3-14% of species will likely confront a high risk of extinction to global warming levels of 1.5°C, which may increase up to 3 to 18% at 2°C, 3-29% at 3°C, 3-39% at 4°C, and 3-48% at 5°C. Compromises in physical water and the occurrence of water-related risks will increase in all regions in the mid to long term. Melting water availability for irrigation is expected to decline by nearly 20%, diminishing water resources for agriculture, hydropower, and for human use in the mid to long term, these risks doubling with the rise of global temperature reaching 4°C (Pörtner et al., 2022).

On smaller islands, water scarcity will result from climate change, as changes to the direction of water flow, timing, and associated precipitation patterns are expected to grossly impact freshwater environments in all emissions scenarios. Increases of water damages to homes, communities, and infrastructure are projected to be higher than 1.4 to 2 times at 2°C and 2.5 to 3.9 times at 3°C than they are at the current warming rate of 1.5°C without adaptation. Once global warming has reached 4°C, nearly 10% of the terrestrial land surface is expected to face increases in extreme river flows in the same area, implying the need for all water-use solutions. Problems with water management will increase in both the near and long term, depending on the rate, magnitude, and region-specific details of future global warming, and will be exceptionally challenging for areas with strained resources for water access. Global warming will create barriers to food access and production, particularly in minoritized communities where food security and nutrition are already challenged. At a rising temperature of 2°C or higher, food security threats and risks will be more severe, leading to nutrition deficiencies in South Asia, Sub-Saharan Africa, Central and South America, as well as in Small Islands.

A warming climate will reduce soil nutrient availability, disrupt ecosystem services such as pollination, increase pest and disease outbreaks, reduce marine biomass, and undercut food

production in many areas on land and in the sea (Parmesan et al., 2022). If the global temperature increases to 3°C or higher, climate change levels in the long term will expose regions to global warming-related hazards and will manifest substantially outpacing the 2°C or lower global warming point. Increased exposure to dangerous levels of heat will occur with notable geographic differences in areas without heat-adaptive methodology, causing greater numbers of premature death. Scientists state with high confidence that environment-sensitive food, water, and vector-borne diseases are at higher risk in all emissions scenarios with or without adaptation. Billions of people could be at risk of deadly illnesses, such as dengue fever in areas such as Europe, Central and South America, sub-Saharan Africa, and Asia due to climbing global temperatures (Parmesan et al., 2022).

Nearly a billion people are expected to be at risk from coastal-specific climate change hazards in the mid-term in all greenhouse gas emission scenarios (Parmesan et al., 2022). Exposure to flooding is expected to increase to around 20% in the event that the sea level rises higher than .15 meters in comparison to 2020 sea levels. Rising sea levels pose a threat to Small Islands and low-lying coastal areas. The cost of repairing and maintaining key infrastructure is expected to increase with rising global temperatures, causing major disruptions to fundamental systems including transportation, energy, and urban buildings. Economic damage is expected to rise non-linearly with a warming climate. Displacement is expected to increase as precipitation levels increase with subsequent flooding, monsoons, drought, and rising sea levels. As the climate becomes warmer, migration is expected to increase from areas where there is high exposure to extreme weather events and low capacity for adaptation (Parmesan et al., 2022).

*The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (2022)* discusses the vulnerability of certain groups who face greater exposure to climate change and

extreme weather events (Pörtner et al., 2022). The report describes climate change impact patterns that are driven by multiple factors, including socioeconomic development, frivolous use of water and land resources, marginalization, inequity, and the intergenerational effects of colonialism. Since the release of the IPCC Fifth Assessment Report, there is more substantial evidence of the destruction and degradation of ecosystems caused by anthropogenic climate change which increases the risk for already vulnerable populations. Ecocide and loss of resources will have especially devastating effects on Indigenous communities who directly depend on the environment to meet basic human needs (Parmesan et al., 2022). Vulnerability is higher and more concentrated in East, Central, and West Africa, South Asia, South and Central America, the Arctic, and Small Islands. Poverty, political instability, and scarcity of resources will increase human-environment vulnerability levels in certain regions. Vulnerability will increase in areas where there are frequent occurrences of violent crime and higher levels of ecosystem-dependent livelihoods.

The future of vulnerable ecosystems will strongly depend on the actions of the present and future development of society, including production and consumption, socioeconomic pressures, and the sustainable use of Earth's land and water resources (Parmesan et al., 2022). Future vulnerability will be higher where the potential for local, national, and municipal authorities, the private sector, and communities to be able to sustain infrastructures and basic public services. If core systems, such as waste management, health, water, and transportation are not adapted to a changing climate, these areas will become increasingly vulnerable to the impacts of climate change. Future risks of climate change are increasing as socioeconomic development rises, including wealth inequality, mass migration, and urbanization (Parmesan et al., 2022).

Many experts agree that there is a high degree of uncertainty with many of the climate scenario models that project future risks and impacts which highlights the need for careful planning and management to anticipate future effects of climate change (Kim & Ahn, 2019; Markus et al., 2019; Meehl & Tebaldi, 2004; Parmesan et al., 2022). Experts have affirmed that future risks will include severe drought and extreme flooding, which will compromise food production and water resources in the near term (Chen et al., 2019; Greuell et al., 2015; Kim & Ahn, 2019; Markus et al., 2019). This increase in risk is particularly vulnerable where there is rough terrain and high population density (Chen et al., 2019). Droughts and floods cause significant damage to agricultural production and living systems, and this systemic vulnerability and future risk are the guiding elements used to prepare for future drought and flood challenges (Chen et al., 2019).

Drought and heat waves are anticipated to be impactful globally, with the greatest increase in urban areas (Guerreiro et al., 2018). In low-impact estimates, drought is expected to intensify in urban areas while river flooding is expected to increase, high-impact estimates anticipate that most urban areas will experience increased flood and drought risks (Guerreiro et al., 2018; Parmesan et al., 2022). Floods and droughts disproportionately affect people whose incomes are below the federal poverty threshold, particularly in population-dense areas (Parmesan et al., 2022; Winsemius et al., 2018). This pattern of impact remains unchanged in future climate estimates, though the number of people who suffer from the impacts of drought and flood can rise or fall substantially depending on the region and other compounding risk factors (Winsemius et al., 2018). Without considering the additional compounding risks for climate change, urban areas are expected to increase in flood and drought occurrences nearly

twice as much by the year 2030 while flood and drought risks are expected to increase globally by 250% with regional variations (Parmesan et al., 2022).

The highest rates of human mortality come from both air and atmospheric-related deaths, which has signaled a need for public health measures (Hajat et al., 2014). Climate change will increase allergen-related illnesses, including asthma and hay fever due to a longer pollen season (Balbus et al., 2016; McMichael et al., 2006). Mosquito and tickborne infectious diseases are expected to increase with rising temperatures and heavy rainfall, which will heighten infectious disease transmission (McMichael et al., 2006). Water-borne illnesses such as cholera may increase with rising temperatures and contamination from flooding events, particularly in warming estuaries (McMichael et al., 2006). Several important factors influence the severity and spread of disease, such as the mobility of people, livestock, and goods; public health measures in place; the availability of medicine; the quality of medical care available; individual behavior; and the political climate (Jones et al., 2019). While drug and pesticide resistance are increasing, researchers urge the need to continue to challenge existing and novel diseases, especially vector-borne illnesses (Jones et al., 2019). An estimated 12,000 people will die per year in China by 2050 from air pollutant illnesses fueled by extreme heat waves and atmospheric stagnation, which will present novel challenges for managing air quality in the future (Hong et al., 2019). Health challenges including chronic obstructive pulmonary disease (COPD), diabetes, cardiovascular disease, and obesity are expected to increase with climate change which is associated with a number of compounding risk factors such as population density, medication, and dietary needs, exposure to heat-related stress, and difficulties receiving aid or protective measures (i.e., evacuation, migration; Balbus et al., 2016).



Food production is scheduled to be compromised with the rising levels of CO<sub>2</sub> in the Earth's atmosphere, which will create widespread food insecurity (Arunrat et al., 2021; Hatfield & Walthall, 2014). Record high-temperature maximums and record low-temperature minimums are anticipated to increase rapidly by the end of the century, which could have implications for agriculture and food production (Meehl et al., 2004). Food poisoning and salmonella increase with rising temperatures, which may further compromise food health and security (McMichael et al., 2006). With food production's inability to meet global demands, food shortages will become more pressing, particularly for those in tropical, small-island nations, and in countries that depend on imports to meet their own supply chain demands (Ho et al., 2016). Taiwanese research has indicated that agricultural production and fishing have declined due to climate change, causing further instability in the food supply which varies in quality and quantity (Ho et al., 2016). Future risk assessment for food production depends on national rates of agricultural production rather than food security itself which is further influenced by a nation's ability to increase its imports (Sundström et al., 2014).

An individual nation's ability to compensate for agricultural losses depends on the global level of agricultural production and availability of food, alluding to the complex and interacting nature of risks and adaptation factors that may present differently in the coming decades (Sundström et al., 2014). Global warming has been predicted to reduce global food production over 10% by the year 2050 with substantially more risk for malnutrition in all scenarios tested (Tai et al., 2014). Agriculture will suffer impacts where crops are sensitive to CO<sub>2</sub> levels and drought (Parmesan et al., 2022). Whereas some crops (such as wheat) are more sensitive to ozone effects, and others (such as maize) are more sensitive to rising temperatures, these measures provide guidance for air quality interventions in agricultural production and planning

(Parmesan et al., 2022). Air quality management has been noted to potentially offset a small portion of climate impacts in certain scenarios which may be useful for future planning in food and agricultural production (Tai et al., 2014).

In addition to crop failure, food production will be interrupted by rising sea levels that will compromise infrastructure with heavy rainfall and storm surges which may reduce the ability to produce food (Parmesan et al., 2022). Health will be at risk and will be worsened by the interaction of acute food production shortfalls that are further exacerbated by rising temperatures and extreme weather conditions. These interactions will result in increased food prices, lower household incomes, and higher rates of malnutrition and climate-related deaths in areas where there are no or lower levels of adaptation. Risks to food security as a result of climate change will be further exacerbated by the health risks of food contamination of crops and seafood. In urban areas, climate impacts to core infrastructure will lead to losses and damages across water and food systems which will have interactions that will have effects beyond the direct climate hazard. In the Amazon region and in other mountainous regions, the ripple effects from climate hazards will result in the irreversible loss of living systems and biodiversity with a 2°C increase in temperature (Parmesan et al., 2022).

Unavoidable rising sea levels will bring ripple and compounding effects that will result in the loss of coastal ecosystems and services, groundwater supply, flooding, and will cause damage to coastal infrastructure, causing harm to livelihoods, developments, well-being, health, food and water supplies, and a loss of cultural values in the near and long-term. Extreme weather and climate will result in disastrous economic and social impacts across national borders via supply chains, natural resource exchange, and markets, with higher transboundary risks in the energy, food, and water sectors. Water resource availability will compromise the risk of future

infrastructure projects including hydropower which will reduce food and energy production. Risks will increase, as there will be pushback in response to efforts to reduce the risks of a warming climate, which will raise maladaptation and worsen the side effects of the reduction of emissions and carbon dioxide removal. The report discusses solar radiation modification and its potential to offset global warming and lessen the effects of some climate hazards, though significant residual effects of climate hazards may occur at regional and timescales (Parmesan et al., 2022).

### **Psychological Impact of Climate Change**

Globally, humans have been enduring various and cascading psychological impacts of climate change that will be experienced disproportionately by vulnerable people (Ágoston et al., 2022; Clayton, 2021; Costello et al., 2009; Hogg et al., 2021; Padhy et al., 2015; Swim et al., 2011). Salient experiences of adversity or injury due to extreme weather events may be experienced as direct impacts, but many individuals experience psychological effects that are subtler, more gradual, and appear primarily through media consumption (Reser & Swim, 2011; Weber & Stern, 2011). While it is necessary to quell the severity of immediate impacts, it is also important to recognize the interactive nature of various levels of living systems at play in the changing global climate (National Research Council, 2008).

### **Indirect Psychological Impacts of Climate Change**

While direct and indirect psychological impacts cause distress, psychological distress as a result of climate change can also affect social and community well-being. While direct impacts are easily identifiable and acute such as heat stress or an extreme weather event, indirect impacts are more long-term, subsequent, and subacute in nature (Palinkas & Wong, 2020). Social and community well-being may depend on the environment's ability to sustain agriculture and

habitation which will influence populations that vary in geographic distribution due to inter and intrapersonal changes in social relationships (Cianconi et al., 2020; Clayton, 2021; Hayes et al., 2018). Climate change, and its environmental impacts, including rising sea levels that can result in both acute and chronic mental health challenges for those whose homes and communities, may be compromised (Hayes et al., 2018; Tam et al., 2021; Yardley, 2007). While an event may have a direct impact on one geographic area, its subsequent indirect effects may affect another geographic location that may be connected economically.

Heat has been shown to cause violence, where with every incremental increase in ambient temperature, violence, and aggression will also increase (Anderson, 2001; Miles-Novelo & Anderson, 2019). Scientific estimates predict that with every temperature increase of two degrees Fahrenheit, there will be an increase of approximately 24,000 assaults or murders in the United States (Anderson, 2001; Miles-Novelo & Anderson, 2019). This causal relationship has been tested both in lab settings and in regional temperature variations indicating that heat can directly cause violent behavior, which has implications for public health measures (Anderson, 2001). This becomes important when thinking about the psychological impacts of heat and violence and who is more susceptible to these effects. One study found that women who felt powerless endured higher rates of intimate partner violence and depression which may give practitioners helpful information about how climate change and increasing temperatures are an underlying cause that fuels other social perils (Filson et al., 2010).

Climate change will also have effects on between-group relationships, which may result from a lack of resources or when environmental destruction requires one group to relocate away from their home to migrate to a new territory (Costello et al., 2009; Hayes et al., 2018; Palinkas & Wong, 2020; Reuveny, 2008). Researchers note that when community leadership fails to

effectively address climate change disasters, individuals will lose trust and security in their authorities, which can exacerbate within and between-group conflict (Abbott, 2008; Palinkas & Wong, 2020). Psychological distress can occur with relocation, which may involve detachment and grieving of one's home place, disruption of community support, and the desire to maintain cultural integrity once one has relocated (Adger et al., 2009). This social and geographical disconnection can cause feelings of grief, an identity crisis, or anxiety in those with a strong attachment to their home or nationality (Doherty & Clayton, 2011).

Between-group tensions will be exponentially raised with the fact that Western cultures have contributed far more to greenhouse gas emissions than other low and middle-income nations, which may have implications for countries such as the United States, where racism and marginalization have centuries-long pre-existing tensions. There will be an increased disparity in access to resources, which will exacerbate intergroup tension (Costello et al., 2009; Hayes et al., 2018). Individuals and communities with fewer resources will endure stronger consequences of climate change, which hinders their ability to afford technology that can mitigate financial and medical harm caused by climate change (Bullard & Johnson, 2000). Within groups, those with one or more marginalized identities are more likely to have fewer resources, which can heighten pre-existing social hostility (Bullard & Johnson, 2000). Victimization increases when there are anomalously hot temperatures, which can have varying impacts (Gorislavsky & Mares, 2022). Risk for victimization caused by climate change is greater among African American males who spend time outdoors than White women who remain indoors, which suggests that there are contextual factors that contribute to one's experience of climate change (Gorislavsky & Mares, 2022).

As the environment is a part of human health and well-being, decreased access to thriving ecosystems is another mental health consequence of a rapidly changing climate (Wilson, 2002). Many have suggested the benefits of having access to natural ecosystems for physical and mental health, where climate change is a major threat to biodiversity and humans exacerbate this lack of access with deforestation and urbanization (De Vries et al., 2003; Maas et al., 2006). In urban areas, environmental destruction reduces the availability of green spaces, such as hiking trails or public parks, where ecosystems are fast declining and their demands for resources outweigh the infrastructural ability to maintain them (Younger et al., 2008). Access to nature is more important for marginalized groups, which has implications for the social and community impacts of climate change (Kuo & Faber Taylor, 2004). Groups whose lives and identities are closely connected to a particular place or the environment, such as farmers or Indigenous groups located in the Arctic, will be exceptionally sensitive to the psychological impacts of climate change (Burley, 2010; Symon, 2005).

### **Direct Psychological Impacts of Climate Change**

Climate disasters and extreme weather events are likely to have more salient impacts on the severity and pervasiveness of mental health challenges in communities, important implications for psychological well-being, and may cause stressful social, environmental, or economic disruptions (Cianconi et al., 2020; Costello et al., 2009; Clayton, 2021; Few, 2007; Fritze et al., 2008; Page & Howard, 2010; Seaman, 2016). Direct climate change impacts are immediate and acute such as ambient heat stress and extreme weather events. Direct psychological impacts of climate-related disasters can include PTSD, major depression, somatic disorders, and other mental health challenges, including substance use problems, suicidality, and abuse (Fritze et al., 2008; Galea & Vlahov, 2005; Marshall & Picou, 2008; Seaman, 2016;

Singels et al., 2005). More enduring and severe heat waves caused by climate change are associated with higher rates of death, suicide, homicide, and violence (Anderson, 2001; Basu & Samet, 2002; Meehl & Tebaldi, 2004; Qi et al., 2009). Distressing responses following a disaster may result in the development of PTSD, mood and anxiety disorders, and other mental health challenges such as prolonged grief or substance use problems (Heir et al., 2008). A climate disaster may catalyze pre-existing mental health conditions and can increase vulnerability to future distressing events (Heir et al., 2008). Some noted approaches to intervention and prevention of climate disasters are promoting a sense of safety, calmness, individual and community-level self-efficacy, connectedness, and hopefulness (Hobfoll et al., 2007).

### **Mediators and Moderators of Psychological Impacts**

Media consumption is an important consideration that may help describe how climate change can have psychological impacts on individuals having few or no direct experiences to climate change (Burke et al., 2018; Reser & Swim, 2011). Psychological distress has potentially more influence from media rather than distressing weather patterns on their own (Reser et al., 2012; Stokols et al., 2009; Swim et al., 2011). The media often has a political agenda and does not always include providing accurate information, but instead may attempt to sensationalize climate change events, market to a particular demographic, or present climate change as an object of debate rather than established scientific fact (Tam et al., 2021). With the availability of technology that provides a rapid delivery of information and imagery, an individual may respond with anxiety or passivity depending on how relevant or overwhelming the presented threat may be (Stokols et al., 2009). Similar to the effects of the terrorist attack of September 11<sup>th</sup>, 2001, media exposure has the power to intensify the psychological distress of disastrous events (Marshall & Picou, 2008).

Mental health professionals have affirmed that early intervention is beneficial for communities that may need resources for basic needs and effective psychological trauma recovery, especially those that are family-focused and promote community cohesion and cooperation (Haskett et al., 2008; Norris et al., 2002). Family interventions that attend to emotional and affective features have been shown to increase community organization, cooperation, and communication between those affected and those in authority (Haskett et al., 2008; Norris et al., 2002; Tam et al., 2021; Vernberg et al., 2008).

The severity of an individual's psychological distress in response to climate change events are moderated by resilience and vulnerability, the same mental processes that have the potential to influence an individual's sense of safety (environment-based livelihoods, living in low elevation, having a disability), where levels of severity can further limit their ability to mitigate and adapt to a warming climate (Brklacich et al., 2007). On the community level, having adaptive traits, such as strong community mental health, equitable access to resources, and engagement of citizens in disaster response and policymaking mitigates climate change while bolstering community resilience in the period following a climate crisis (Ebi & Semenza, 2008; Norris et al., 2008). An individual's proximity to ecological impacts of climate change, including rising sea levels and occurrences of extreme weather, will interact with other areas of vulnerability (population density, socioeconomic status, race/ethnicity), which has implications for the severity of disaster-related effects (Brouwer et al., 2007; Cianconi et al., 2020; Cutter & Finch, 2008; Few, 2007). Climate change researchers have identified particularly vulnerable groups at greater risk, including disabled people, children, older adults, people in developing countries, racial and ethnic minorities, and those who were vulnerable before climate-related events (Clayton, 2021; Haskett et al., 2008; Norris et al., 2002). People with mental illness have



higher levels of vulnerability due to the use of psychotropic medications which are sensitive to heat-related effects (Page & Howard, 2010).

A person's sense of urgency pertaining to climate change is mediated by cognitive estimates of individual risk and their responsibilities, which is moderated by the response of one's social affiliates (Leiserowitz, 2007). Though there are no significant differences in education level for people who are alarmed or dismissive of climate change, these groups do show differences in political values, levels of altruism, and attitudes about environmentalism (Clayton, 2021). There has been a noted association between political conservatism and climate change skepticism (Feygina et al., 2010). Whether a person has an immediate life stressor can also serve as a moderator in an individual's perception of climate change threats, including Women of Color who often have more pressing, imminent life demands (Pew Research Center, 2009; Weber, 2006).

### **Socioemotional and Affective Responses to Climate Change**

The indirect and more subtle impacts of climate change include socioemotional and affective responses that come with witnessing environmental destruction and human suffering presented in media (eco-grief, depression, eco-anxiety) that may cause one to reconsider their lifestyle or economic choices whereas the onset of climate PTSD reflects direct and immediate psychological impacts (Clayton, 2021; Hayes et al., 2018; Palinkas & Wong, 2020). The need to belong and between group tensions negatively predict anti science attitudes (Fasce et al., 2021). While it is key to understand the magnitude of the global climate crisis, personal encounters with the impacts of climate change are universally experienced. For those impacted, this experience can elicit strong psychological reactions, which can cause distress or uncertainty (Böhm, 2003; Clayton, 2021; Stokols et al., 2009). In the United States, the majority of Americans believe that

climate change is real; however, nearly half of Americans do not know that climate change is caused by human activity (Ballew et al., 2019; Bergquist et al., 2022). As many as 8 out of 10 Democrats believe that climate change is a serious threat to the nation's well-being, which has increased from 6 out of 10 Democrats since 2013 (Tyson et al., 2023). In contrast, approximately 1 in 4 Republicans believe that climate change is a serious threat to the nation's well-being, which has remained stagnant for the last decade (Tyson et al., 2023). These findings indicate that each party has grown further apart in terms of beliefs about the seriousness of climate change threats (Tyson et al., 2023). An individual's political ideology is formulated first, which is followed by whether the individual trusts the climate change information source, the scientist, or the media presenting the information (Boulianne & Belland, 2022). Support for former President Donald Trump is a strong predictor of climate change skepticism (Boulianne & Belland, 2022).

Fletcher et al. (2021) conducted a survey in the United States in October 2016 that identified technological optimism, environmental attitudes, and gender to be stronger predictors of climate change worry than an individual's ability to imagine the year 2050 and their future feelings about climate change. A noteworthy observation of this study is that the survey had taken place immediately before the 2016 Presidential election, at a time when 74% of Americans expressed worry about climate change. When participants were tasked to describe future travel in the year 2050, only 29% of respondents expressed ideas about low-carbon machinery, indicating that imagining a sustainable future is less common than pervasive climate change worry (Fletcher et al., 2021).

Individual experiences of stress, cognitive factors, and an individual's choice in coping strategies influence how global climate change threats affect one's psychological well-being as well as their day-to-day behavior (Pakmehr et al., 2021; Stokols et al., 2009; Wandersman &

Hallman, 1993). Promoting information about the anthropogenic nature of climate change increases public comprehension about climate change and support for green policies (Bergquist et al., 2022). The effect of promoting this information is stable across political beliefs with no pushback among Republican responders (Bergquist et al., 2022). This evidence indicates that the more the public is aware of the causes of climate change, its impacts, and potential solutions, the majority of Americans can adjust their beliefs about climate change, evaluate its risks, and vote for supportive policies (Bergquist et al. 2022).

### **Apathy and Climate Change Denial**

A common response to climate change is climate change denial which can range from blatant refusal of climate science or a subconscious reaction to climate change in which an individual postpones their anxiety by seeking instant gratification or material consumption (Wong-Parodi & Feygina, 2020). Some argue that this can also include the “green consumer” who expresses worry for the environment with no major changes in lifestyle, an individual whose elevated conscience and interconnectedness with the environment motivates them to take responsibility for their actions with no major lifestyle changes or spreading of awareness (Maiteny, 2002). Some may find it a challenge to accept the global climate crisis because it would require them to accept a potentially severe threat to their life. Accepting this reality would also morally require them to make vast changes in their own lives and communities.

People in the United States and those who are right-wing or have conservative beliefs are more likely to have more overt climate denial attitudes (Brulle, 2020; Krange et al., 2019; Hultman et al., 2019; Wong-Parodi & Feygina, 2020). Individuals from collectivist cultures and who have an integrated connection with nature are less likely to deny climate change, indicating that individualism is a barrier to climate change acceptance (Nartova-Bochaver et al., 2022).

Discussing denialism in the modern era requires us to define denialism in the present day where more and more people have accepted the facts of climate change. Apathy is a form of climate change denial that has also been an overwhelming description of the public's reaction to climate change. Scholars have described apathy as a psychological paralysis when confronted with the scope of the problem which can sometimes appear as psychological splitting, where the knowledge of the reality of the situation is removed from the emotional experience of the problem (Lertzman, 2010; Randall, 2009). Moser (2007) described apathy as the “drumbeat of news about various overwhelming environmental and societal problems” (p. 68). This pervasive apathetic reaction impedes individuals and communities from evolving their beliefs to reflect a more pro-environmental response to the climate crisis. Apathy has also been argued to be a functional tool for adaptation in which individuals perceive their current level of distress as a baseline for their reactions, where apathy serves to quell incapacitating anxieties that prevent us from living our lives as “normal” (Kahn, 1999). This highlights the paradox of living life as “normal” as adaptive only for the individual and not the environment. For marginalized groups, nonresponse to climate change can be explained by having more pressing life demands, which serve to moderate the urgency associated with climate change risk perceptions (Clayton, 2021; Pew Research Center, 2009; Weber, 2006). Women of Color and people with less education or income are more likely to disengage from climate change action due to having more immediate life stressors (Clayton, 2021).

Jylhä et al. (2022) discussed climate science denial in their review *Science Denial: A Narrative Review and Recommendations for Future Research and Practice* in which they discussed the common features of climate science denial including having cognitive biases or limited cognitive capacity which frequently finds individuals subscribing to conspiracy beliefs in

an effort to make sense of information in a way that will not require substantial changes in their lifestyle. Jylhä et al. (2022) discuss conflicting worldviews and ideologies that may disrupt the status quo or the free market economy with collective measures to transform infrastructure and tax emissions. Populism and conspiracy beliefs often develop out of the fear that powerful groups (scientists, politicians, etc.) victimize everyday people to carry out their own personal and corrupt agenda. Climate science denial is commonly an attempt to regulate one's emotions, where climate change may cause personal and imminent threats to one's well-being or otherwise may jeopardize something important for the denier. A novel examination of climate science denial in adolescents reveals similar patterns to far-right, conservative, and hedonistic attitudes as well as hope-based denial where adolescents desired meaningful change while having low self-efficacy in their ability to make an impact to lessen the effects of climate change (Jylhä et al., 2022).

Climate change denial can function as social justification for resisting climate change mitigation measures as well as a coping mechanism that can alter the perception of one's internal and external experience to reduce personal distress (Norgaard, 2011; Vaillant, 2000). Hostile sexism has been found to be strongly related to climate change denial which supports ecofeminist approaches for the modification of denialist attitudes (Nicol et al., 2022).

Nonresponse to climate change has been associated with socially influenced denial in places where collective denial of environmental threats maintains the interest of the occupying group, such as areas where oil and gas production is a major commodity (Norgaard, 2011). This socially influenced denial inhibits climate change mitigation, which will further impede psychological adaptation to the changing environment. The inability or refusal to accept the reality of climate

change can further reduce one's ability to adapt by denying that climate change is a pressing and imminent existential threat.

As more and more people become aware of climate change, there remains a sizeable population that continue to deny the existence or underestimate the impact of human activity on climate change (Dunlap & Jacques, 2013; Häkkinen & Akrami, 2014; Lewandowsky et al., 2015; McCright & Dunlap, 2011; Tam et al., 2021; Washington, 2013; Wong-Parodi & Feygina, 2020). Many have reported not feeling concerned about climate change threats (Leiserowitz et al., 2013), though it is important to examine the source of this denialism. Research has shown that personal ideology and exposure to climate change education are variables associated with climate change denial (Greitemeyer, 2013; McCright & Dunlap, 2011). Gifford (2011) described the seven elements of climate change denial including ideologies, limited cognition, comparison with others, discrediting of science, limited behavior (prefer easy over effective action), perceived risks, and sunk costs (financial investments, behavioral momentum, and conflicting values). These structural barriers prevent the internalization of the reality of climate change and further reinforce the magnitude of the crisis.

Political affiliation plays a significant role in the acknowledgment of the climate crisis. Jylhä and Hellmer (2020) found that right-wing leaders and constituents dismiss global climate change at higher rates with anti-egalitarian and exclusionary preferences being the strongest predictors of denialism followed by traditional values. Survey-based research indicates that free market values are strongly associated with climate change skepticism (Dixon et al., 2017; Heath & Gifford, 2006). Political affiliation influences response to climate change messaging, with Democratic and left-aligned individuals more likely to respond positively to messaging encouraging pro-environmental behavior (Palm et al., 2020). Researchers suggest that free

market approaches to climate change may resolve the concerns of Republicans, which may make these solutions more effective for these individuals (Dixon et al., 2017). Right-leaning White men in the United States are more likely to refute climate change science, with greater differences presenting for White conservative men who self-report understanding the global climate crisis well (Jylhä & Hellmer, 2020; McCright & Dunlap, 2011). These false beliefs perpetuate high levels of denial in the United States, setting back the global population from effective adaptation and mitigation.

Sharry (2019) discussed climate change denialism as it presents in many forms. Many individuals no longer deny the visible truth about climate change, but many refute the connection of climate change to human actions. One of the less-explored versions of climate change denial is the idea that humans do not have a role in contributing to climate change or that climate change is not caused by human activity (Boulianne & Belland, 2022). This form of climate change denial is a barrier during a time when it is imperative that there is international cooperation to address climate change. Others may acknowledge the crisis and refuse to think about it and focus on their daily lives, ignoring the problem rather than actively denying it. Some may choose to think more optimistically, with wishful narratives that mitigate the severity of the crisis or with the hope that the government will make substantial policy changes. Some may hope that future geo-engineering advancements will quell the effects of greenhouse gas emissions. Denial may also exist with the rejection and ridicule of those who speak the truth about the climate crisis, undermining the issue by undermining the messenger. Sharry argued that acceptance is the antidote for denialism and that Acceptance and Commitment Therapy (ACT) methods are appropriate for accepting the reality of climate change and promoting responsive action (Sharry, 2019).

## **Ecological Anxiety**

Ecological anxiety is an emotional response to future threats of climate change that manifest in adverse emotional states, such as uncontrollable worry, physical arousal, and apprehensiveness (Comtesse et al., 2021). Ecological anxiety, which includes symptoms of loss of appetite, panic attacks, weakness, irritability, and sleeplessness, has been discussed in the academic discourse (Hogg et al., 2021; Nobel, 2007). There is some difficulty with deciphering regular worry from pathological anxiety due to the ambiguous nature of what is certain about climate change threats and what constitutes an inflated reaction. Media outlets have described eco-anxiety regarding climate change as distressing symptoms, including sleeplessness, weakness, irritability, loss of appetite, and panic attacks (Clayton, 2021). Those who work in climate-related professions, such as environmental scientists, experience greater levels of micro-anxiety and stress about their future and the impacts of a changing climate (Tam et al., 2021). This anxiety and stress about the future often includes deciding whether or not to have children (Tam et al., 2021).

Others define ecological anxiety as a perpetual fear of environmental demise, the general feeling that the environmental pillars of existence and life are soon to crumble, and a non-specific concern about our relationship to the environment (Clayton, 2021). It is important to distinguish the non-pathological nature of most cases of ecological anxiety when discussing appropriate forms of treatment (Clayton, 2021; Ojala, 2022). Ecological anxiety has qualities that resemble anxiety, including uncontrollability, unpredictability, and uncertainty. Ecological anxiety is characterized by existential anxiety, though it usually manifests as “practical anxiety,” stoking problem-solving behaviors and attitudes. Ecological anxiety is a repeating cycle of



anxiety and denial and trying to stay aware without acknowledging the magnitude of the problem (Hogg et al., 2021; Maiteny, 2002; Panu, 2020).

Ojala (2022) further detailed the psychological impacts of climate change in their narrative review. Global climate change and other ecological issues decrease safety and security, leading to existential anxiety related to being severely disjointed from the natural world (Ojala, 2022). For some individuals, worries about global climate change are perceived on a macro level, with underlying elements of morality and ethics. These individuals do not worry as much about their own immediate lives as they do about people in distant areas of the world, nature and animals, and the future of humanity. This type of macro concern and way of thinking is more common among people with strong universal values and who greatly desire global justice, equality, peace, and the preservation of nature and animals. Politically left-leaning individuals share greater worry than those on the right. Hence, scientific knowledge plays a part in whether people worry, though other elements are related to individual aspects, including values and political affiliation (Ojala, 2022). Ojala (2022) stated that another way of thinking about anxiety and worry as it relates to the ecological crisis is from an existential lens, where worry and anxiety are seen as rational and productive reactions to threats that have the potential to harm personal values and provoke a sense of responsibility.

Panu (2020) remarked in their publication about how eco-anxiety resembles all versions of anxiety. They describe that eco-anxiety appears as worry and fear, though they are distinct. There is debate about what terminology is appropriate to distinguish severity levels of eco-anxiety. The social dissonance that occurs in communities is so strong and counterintuitive that commentators have named its phenomenon “socially constructed silence,” where competing ideologies bifurcate groups and reinforce a lack of cohesion and communication (Norgaard,

2011, p. 82). Ojala (2022) has argued that worry about climate change anxiety can be seen as existential anxiety, as climate anxiety satisfies the three components of existential anxiety: the ontic piece, as it is a threat to the future and survival of humanity, as well as a direct threat to the well-being of some groups; the moral piece, as it relates to the morality about whether it is ethical for us to live this way in relation to nature and other human beings; and the spiritual piece, as it poses questions pertaining to whether there is any purpose in taking action on the individual level given the complexity and magnitude of the issue at hand. Scientists often more broadly refer to ecological anxiety as climate anxiety, where it encompasses a diverse range of anxious distressing psychological reactions to climate change (Clayton & Karazsia, 2020; Panu, 2020; Wu et al., 2020).

Larionow et al. (2022) found functional and cognitive impairment positively correlated with direct experience with climate change, environmental identity, behavioral engagement, and environmental motive, a person's personal values in the context of addressing climate change. Functional and cognitive impairment were also negatively correlated with a sense of safety and climate change denial, indicating that people with higher levels of climate anxiety experience lower levels of climate change denial and have more pro-environmental motivations and behaviors.

## **Ecological Grief**

Ecological grief has been confirmed as a natural response to environmental loss, particularly in those who hold closer relationships with ecosystems and the natural world (Clark, 2020; Comtesse et al., 2021; Cunsolo & Ellis, 2018). Grief in response to ecological losses closely resembles ordinary grief patterns. Ecological grief is described as a normal response to death and the mourning process, including classic features of accepting the reality of the loss, processing the mental and somatic pain of loss, adjusting the external and internal world without the lost object, and finding connection with the lost object while emerging into a new life without it (Clayton, 2021). As grief will pervade many communities whose environments are facing or already enduring ecological collapse, the loss of norms and ability to depend on their environment will evoke a paradoxical reaction to experiencing PTSD symptoms in advance of perceived threats to the environment (Clark, 2020).

Cunsolo and Ellis (2018) discussed other definitions of ecological grief, including: “intense feelings of grief as people suffer climate-related losses to valued species, ecosystems, and landscapes” (p. 275). Cunsolo and Ellis (2018) reiterated current findings that global ecosystem productivity is in steep decline and the sixth mass extinction is already in effect. The authors’ report describes the biosphere as a whole becoming permanently damaged by human activity. Cunsolo and Ellis stated that ecological grief is a normal response to ecological loss, especially for those whose lives and work are deeply connected to the environment. The authors noted that grieving and mourning can look many different ways for different people, cultures, and the nature of the situation. Ecological grief has been observed as a response to gradual, slow, and enduring ecological changes. These incremental changes are referred to by Nixon (2011) as “slow violence,” which is not as visible due to the interactional nature and lack of identifying

precise precipitants (p. 11). The anticipated loss of future ecological offerings is closely related to the grief experienced over the loss of livelihoods, ways of life, and culture. Levels of ecological grief will vary with children and youth particularly impacted by growing up with increasing loss.

Cunsolo and Ellis (2018) described three overarching types of ecological grief: a) grief related to physical ecological loss, such as the decimation of landscapes, species, or ecosystems that are often due to acute events, such as natural disasters or as a response to long-term changes to weather patterns, landscape, or environments; b) grief as a response to the disruption of place-based knowledge and identity, including the loss of one's sense of self among landscapes, seasonal experiences, and in changing ecosystems; c) grief due to the expectation of future losses of ecosystems, organisms, and associated place-based knowledge, culture, and practice. Cunsolo and Ellis (2018) pointed out that bereavement and mourning can also raise questions about what we as humans choose to value, namely, what losses we choose to mourn, such as ecological loss.

Ojala (2022) discussed the features of ecological grief, including its many forms varying by location, geography, and culture. They add that ecological grief, as with ordinary grief, varies from person to person and can be expressed through a range of emotions, such as frustration, anger, stress, fear, distress, helplessness, hopelessness, and pre-and post-traumatic stress disorder. Ojala (2022) pointed out that ecological grief stems from feeling disenfranchised and that this type of mourning often goes unnoticed in sociocultural spaces and is not reflected in policy.

Clark (2020) described an “Anthropocene horror” in which this phrasing is used to describe a sense of terror about the evolving environment that is mediated by media outlets and

expert projections, fueling a sense of danger that may not originate from any one source, event, or place (p. 61). Clark noted that this is a well-known experience among environmental activists and scientists, though it is now permeating into the larger global population. Broadly speaking, scholars have described responses to climate change risks as, a) an active denial that prioritizes rationality over emotion with an inability to tolerate scientific uncertainty, b) a disinterest that externalizes the threat with fatalism, or c) engagement with emotional attunement to justify their thoughts and reactions, individual responsibility, and their belief in the ability of their community to handle their circumstances (Langford, 2002).

### **Marginalization and Climate Change Impacts**

Marginalization can include personal experiences, a socially influenced process or outcome, or a condition that can present as part of a binary dominant or submissive group (Hall & Carlson, 2016). Gender differences reproduce climate change vulnerabilities and marginalization with more women enduring immobility challenges due to an intergenerational lack of resources that prevent them from migrating from uninhabitable areas (Bhadwal et al., 2019; Balikoowa et al., 2019; Lama et al., 2021). National policy to promote climate change adaptation does not consider women's intergenerational vulnerabilities where agricultural livelihoods are more common and where gender disparities prevent access to information, markets, technological advancements, and labor (Paudyal et al., 2019). Progress in climate change policy is occluded by gender assumptions that women are more nurturing and connected to nature, that gender equality is exclusively a women's issue, and that gender equality is measured quantitatively (Lau et al., 2021). People who are multiply marginalized are at a higher risk for negative climate change outcomes, and conversely, people who have multiple aspects of resilience can better withstand the effects of climate change (Versey, 2021).

Small groups who have less political power experience disproportionate climate change impacts on their environment (Raleigh, 2010). Climate change vulnerability depends on one's access to needed resources, one's regional governmental policies or support, cultural interpretations of risk and loss, and one's level of knowledge about the issue (Thomas et al., 2019). Minoritized people with low income and people who are marginalized politically are more vulnerable to climate change, where shifts in major infrastructure cause significant health or economic adversity for diverse groups (Shonkoff et al., 2011). It is important to note that people who have marginalized identities are more vulnerable to climate change impacts, while having less capacity and resources to cope and adapt (Demetriades & Esplen, 2010).

Gaard (2015) discussed some of the restrictions that gender roles place on women and children, who endure more severe levels of poverty in the face of climate change. Gender role expectations can limit women's mobility, may be burdened with caregiving and food production responsibilities, and may be prevented from making climate-related decisions. Women in developing countries frequently endure the burden of climate change impacts through increased poverty such as having to travel further to retrieve water, supplies, or fuel. During food shortages, women are usually first to sacrifice their share of food to prevent children from going hungry. As desertification decreases food production, other economic difficulties will increase labor-based migration for the men in the households, which frequently yields unfulfilled promises. These women are left with additional caregiving, agricultural, and household duties with fewer resources to cope with seasonal and extreme weather events (Gaard, 2015).

### **Public Messaging About Climate Change**

Persuasive messaging can shape perceptions and motivations to support pro-environmental actions (Bolsen & Shapiro, 2017; Druckman & McGrath, 2019; Hart & Feldman,

2016; Palm et al., 2020; van der Linden et al., 2017). When individuals consume communications that accentuate specific messaging about climate change, such as the prescription to engage in pro-environmental behavior or support candidates that endorse pro-climate policies, they may focus on the highlighted message when processing their opinion. This may also shape their opinion in light of the message, a phenomenon referred to as the emphasis framing effect (Druckman, 2011; Palm et al., 2020). Thematic messaging, messaging that describes broader narratives of impacts related to climate change, can have weaker effects on an individual's likelihood to take meaningful action against climate change than episodic messaging or focusing on individual narratives of climate change impacts (Bolsen & Shapiro, 2017). Thematic messages are more effective at increasing government and political support for climate change compared to episodic messaging (Bolsen & Shapiro, 2017).

Hart and Feldman (2016) conducted a survey of 1,426 participants and examined the effects of text manipulation in news media on individual levels of internal efficacy, a pillar of psychological empowerment, concerning their acting on climate change. Text manipulations provided information about how likely participants were to believe in themselves (internal efficacy) or others (external efficacy) to take action on climate change. The results indicated that a single exposure to a news story including messages of positive internal efficacy increased a participant's perceptions about their own internal efficacy, while stories that depicted negative external efficacy lowered the participant's levels of perceived external efficacy. Narratives that discussed climate solutions with empowerment messaging, as well as impacts, had more positive effects than powerlessness messaging that only highlighted the impacts of climate change. The study demonstrated that there are indirect effects on individual action changes (such as the decision to conserve energy) that have resulted from more efficacious and action-oriented

messaging; however, the study was limited to the use of text versus visual imagery to appeal to climate change perceptions.

Palm et al. (2020) conducted a study that examined the effects of climate change messaging from various sources with six randomly assigned conditions that presented a message about climate change that included recommendations for individual actions, policy actions, messages endorsed by climate scientists, and a control condition with no source baseline. While the study highlighted the effects of behavioral change in response to climate change messaging, the messages presented did not have elements of powerlessness or empowerment but rather offered items that highlighted the source of climate change information and presented the crisis as both an environmental and a national security threat. Researchers found that regardless of the information's source, suggesting behavioral change limited individuals' willingness to alter their personal actions to mitigate carbon emissions, made them less likely to vote for pro-climate leaders, yielded fewer believing in the accelerated rate of climate change, and resulted in diminished trust in science (Palm et al., 2020). This highlights the ineffective nature of burdening individuals with the responsibility for behavioral change while not supporting their psychological capital with empowerment strategies.

Ironically, messaging efforts to reduce climate change denial can increase denial for certain populations (Dixon et al., 2017; Hart & Nisbet, 2012; Lewandowsky et al., 2015; Zhou, 2016). Climate change denial can increase when individuals need to make sense of new information shaped by their existing cultural, political, and personal predispositions (Dixon et al., 2017). Information that is inconsistent with an individual's existing beliefs is usually interpreted in a way that secures rather than changes their prior beliefs (Bolsen & Shapiro, 2017; Dixon et al., 2017; Lodge & Taber, 2013). Individuals who are less exposed to media coverage depicting



uncertainty about climate change are more likely to be open-minded about their views compared to those who had more exposure to media coverage with uncertainty messaging, indicating that the amount of exposure to skeptical messaging about climate change may have implications for behavioral change (Happer & Philo, 2015).

Ferguson and Schmitt (2021) discussed six types of climate change messaging that promote consumer sustainability including messages that 1) capture personal motivation, 2) promote pro-climate normativity, and 3) challenge individual resistance. Other types of messaging aim to increase collective effort to target the unsustainable citizens and leadership in favor of a more sustainable future: 4) identifying community problems, 5) increasing key transformational narratives, and 6) striving for stable peace (Ferguson & Schmitt, 2021). These types of messaging accentuate the value of individual experience while minding intergroup differences in efforts to combat climate change. This study aims to utilize messaging that targets identifying community problems, forming key transformational narratives, and striving for stable peace.

When considering the source of climate change messaging, research has shown that the influence of military leaders as a pro-climate resource can have positive benefits for the effects of climate change persuasion, particularly with the narrative of preserving national security in the United States (Bolsen et al., 2019). Contrarily, messaging delivered by climate scientists linked to national security threats significantly reduced participants' perceptions of the severity of climate change, reduced their support for policy changes, and minimized perceptions of a scientific consensus (Bolsen et al., 2019). Previous research has focused on uncertainty and denial in climate change messaging, however, further work is needed to examine whether specific empowerment and powerlessness messaging has influential effects on responses to

climate change. Examining empowerment and powerlessness messaging will provide a better understanding of its effects on how an individual internalizes those messages, assesses their own level of risk or danger, and what they do in response to that evaluation.

### **Empowerment Messaging on Climate Change**

Psychological empowerment is the relationship between one's sense of self-efficacy and self-control in relation to their role, environment, and their environment's demands (Schermyly & Meyer, 2016). When analyzing ecological grief and ecological anxiety, it is important to consider mechanisms for change, including psychological empowerment, as a means to increase levels of adaptation and behavioral engagement. Empowerment has been found to contribute positively to the production of zai pits, small holes in the ground that are filled with seeds and compost for agricultural production, demonstrating that empowerment interventions can be independent and impactful on climate change adaptation at the individual level (Wouterse, 2017). With the adoption of zai pits, farmers can increase their agricultural yields and stimulate more food production for their families and communities (Wouterse, 2017). This process of empowering farmers benefits both the individual and the community by adapting to climate change in a way that produces a meaningful systemic shift. Furthermore, ecosystem-based adaptation has been enhanced by empowerment interventions which lead to a critical examination of power discourse, especially for marginalized groups whose access, agency, and hopes are conditioned by social infrastructure that may be hindered by a current lack of adaptation choices (Woroniecki, 2020). Greater psychological empowerment increases levels of adaptation and resilience among migrants, which benefits individual well-being and improves access to resources, engagement, self-efficacy, and feeling in control of one's situation (Cakir & Yerin Guneri, 2011; Prilleltensky et al., 2001).

Psychological empowerment has been found to lead to innovative behaviors in the workplace and higher levels of flexibility among employees (Amor et al., 2021; Malik et al., 2021; Muduli & Pandya, 2018). An individual's sense of self-determination, fueled by empowerment, is an intrinsic motivator that encourages them to participate in an organization flexibly (Muduli & Pandya, 2018). Psychological capital, including hope, resilience, self-efficacy, and optimism, serves a mediating role between psychological empowerment and job satisfaction, employee turnover, and commitment to one's role (Shah et al., 2019). When psychological needs are satisfied and there are higher levels of psychological capital, employees are more likely to be intrinsically motivated, engaged, and are more likely to exhibit proactive work behaviors (Shah et al., 2019). Psychological empowerment partially mediates the relationship between work engagement and structural empowerment, with work engagement positively associated with task performance and negatively associated with intentions to quit their job (Amor et al., 2021).

According to Keiffer (1984), empowerment manifests at three different psychosocial levels: the personal, the small group, and the community levels. On the personal level, empowerment leads to people gaining more control and agency over their daily lives and engagement with the community (Keiffer, 1984). At the small group level, empowerment shapes interpersonal experiences, understanding, and influences the effort made by the small group (Lord & Hutchison, 1993; Presby et al., 1990). On the community level, empowerment involves the implementation of these efforts and the strategies used to reinforce community control (Labonte, 1989; Lord & Hutchison, 1993). Empowerment is a process developed through the dimensions of these psychosocial levels of interaction.

Conger and Kanungo (1988) discussed psychological empowerment as two different constructs: as a relational and a motivational construct. Empowerment as a relational construct is described as an individual's sense of power over themselves and having power over others. In this system, the dependence and interdependence of individuals have implications for who has power and who does not. If individual A depends on individual B more than individual B depends on individual A, then individual B has more power and agency than individual A. This power discrepancy becomes relevant when power is the function of how dependent or independent individuals are on one another to produce a cooperative outcome. When thinking about power differentials and who is disproportionately affected by climate change, those who are most vulnerable depend on those in power to make structural decisions that will counteract climate change and its residual effects on vulnerable populations. Conger and Kanungo discussed empowerment as a motivational construct where power is an external motivator and an individual's power needs are met when they feel secure in their resources and ability to handle their circumstances. Conger and Kanungo described empowerment as the motivational machinery behind self-efficacy.

Spreitzer (1995) discussed four components of motivationally driven empowerment, including meaning, competence, self-determination, and impact. Meaning is what gives an individual a sense of purpose and intention behind their actions or work relative to their personal values and experiences. Competence is often used interchangeably with self-efficacy in the literature; Spreitzer (1995) described it as an individual's ability to perform activities with skill and proficiency. Self-determination is described as an individual's sense of choice and autonomy in initiating and attending to the environment's demands. Impact is defined as the individual's sense of influence on the completion and success of satisfying the environment's demands.

These attributes are said to be manifestations of an active rather than passive approach to meeting the environment's demands.

When looking at transformational leadership, Pieterse et al. (2010) described psychologically empowered people as self-efficacious and able to sufficiently influence their work environment in significant ways, promote proactive behavior, exhibit initiative, and are able to act independently. The authors noted that transformational leadership may spark innovation, though individuals require the need to feel able to take the initiative to innovate via psychological empowerment. The study revealed that psychological empowerment was found to be a moderator in the relationship of innovative behavior in both transformational and transactional leadership indicating that psychological empowerment is the fuel needed to incite motivational change.

Empowerment is known to be a powerful mechanism to facilitate behavioral change (Muduli & Pandya, 2018; Shah et al., 2019; Smith & Rule, 2016; Ting & Carter, 1992). Empowerment may be sourced through social support, spirituality, self-compassion, or behavioral health services (Ting & Carter, 1992). Individuals who volunteer regularly with groups report feeling less powerless and having more favorable attitudes toward non-profit organizations and toward helping behaviors (Zboja et al., 2020). In an effort to promote empowerment, one might consider pleasurable and less harmful behaviors to replace problematic or environmentally harmful behaviors. Failure to adapt may be a result of overemphasizing messages of lifestyle compromises, perpetuating attitudes of helplessness, and inaccessibility of resources. Empowerment has been found to be particularly impactful for marginalized communities (Ting & Carter, 1992).

Empowerment may be facilitated by promoting organizational culture by encouraging the involvement and participation of the community and electing policy that appropriately reflects an individual's resources and ability to meet their demands while simultaneously providing social support (Amor et al., 2021; Malik et al., 2021; Muduli & Pandya, 2018). Torp et al. (2011) defined empowerment as a construct that associates individual strengths and skills, resources for help, and proactive attitudes to issues of social policy and change (Torp et al., 2011). This process helps an individual gain control over their own life and their level of engagement in the community (Torp et al., 2011). Torp et al. (2011) discussed elements of empowerment, including the theme of opposition and its aim to support groups and individuals as they acquire the strength to change their circumstances that reinforce powerlessness. The authors highlight empowerment as a function of liberal strategy whereby individuals are viewed autonomously and tasked with both the responsibility and capability to make their own decisions. These pillars of empowerment serve to balance an individual's environmental demands, their sense of control, and external support from their community and leaders (Torp et al., 2011).

### **Powerlessness to Climate Change Messages**

Power is a social construct that influences the pursuit of goals both at the individual and systemic levels. Having power contributes to self-regulatory functions and goal-oriented behavior while having a lack of power has been shown to inhibit those psychological processes (Albalooshi et al., 2020). Power is the level of control over needed resources and outcomes (Fiske, 2010). A lack of power can impede executive functioning, a combination of cognitive processes that guide decision-making and goal-directed behavior, resulting in a performance discrepancy between the powerless and those with power (Albalooshi et al., 2020). Attending to this discrepancy becomes key when considering that the number of powerless people outnumbers

those who are powerful, and it is more likely that an individual will encounter circumstances that will induce feelings of powerlessness in daily life.

Experiences of social rejection decrease an individual's sense of power, while social acceptance does not effectively remedy this experience of rejection (Kim et al., 2019). Self-affirmation has been shown to be a positive coping strategy for people who feel powerless in one life domain whereby they will compensate by channeling power in another life domain (Ge et al., 2020). This compensation increases an individual's feelings of adequacy which can act as a buffer for other distressing psychological hazards. Self-affirmation improves inhibitory control in those who are powerless, a key ingredient for self-efficacy and the pursuit of goals. Therefore, reinstating self-efficacy via self-affirmation has been shown to counteract the impaired inhibitory control of the powerless and mitigate the response gap between the powerful and the powerless (Albalooshi et al., 2020).

Williams and Jaftha (2020) conducted a study that examined the effects of feelings of powerlessness on climate change action (Williams & Jaftha, 2020). The researchers discussed the commons dilemma, whereby the benefits of a certain action are advantageous to the individual performing the action (Williams & Jaftha, 2020). This may contrast the cost of an action that is not solely endured by an individual but rather shared among the whole community (Williams & Jaftha, 2020). Individuals may dismiss this undue harm to others and choose to proceed with the action that will cause harm for everyone and provide short-term satisfaction for the individual. As powerlessness and the commons dilemma are separate constructs, Aitken et al. (2011) concluded in their study that powerlessness involves the questioning of whether an individual has the ability to make a difference, whereas perceptions of the commons dilemma imply an unwillingness to change their behavior unless others do (Aitken et al., 2011). This

highlights the resulting belief that individual contributions are fruitless efforts for change due to others' inaction.

Environmental attitudes are influenced by an individual's emotions, interests, knowledge, and social context (Gifford & Sussman, 2012). These individual characteristics influence pessimistic beliefs about the environment as well as their willingness to take pro-environmental action (Aitken et al., 2011; Haller & Hadler, 2008; Williams & Jaftha, 2020). In the individual's social context, the level of political centralization, affluent traits, the presence of pro-environmental values and political affiliation, and the severity of pollution in their environment were found to influence environmental fatalism (Haller & Hadler, 2008). The more informed an individual is, the less powerless to climate change they felt, indicating that there are educational implications in others' experiences of powerlessness (Aitken et al., 2011).

Though powerlessness is a common experience for many, most research has focused on the problems associated with an excess of power. For people who report higher levels of wealth than power, power was found to have less influence on psychological well-being compared to those with a reported higher power versus wealth status (Jin et al., 2019). This evidence indicates that having power is more significant to psychological well-being than obtaining wealth and that having wealth does not satisfy all power needs. A lack of power decreases direct anger expression, making individuals more likely to share their anger with others rather than direct it towards the source of their distress (Petkanopoulou et al., 2019). Findings illustrating the inhibitory nature of powerlessness have stimulated discussion on how the experience of powerlessness shapes an individual's psychosocial perceptions and behaviors. Foulk et al. (2020) conducted a study to explore Social Distance Theory as a method to develop a model to depict the experience of powerlessness as it decreases social closeness and further causes social



disengagement. The model was designed to shed light on the processes that cause feelings of powerlessness that subsequently diminish social closeness, demonstrating that an individual's motivation and their social expectations of others' interests highlight this relationship. By investigating these organizational elements of powerlessness through Social Distance Theory, the model helped to clarify the relationship between experienced powerlessness and perceived social closeness. Feelings of powerlessness can mitigate an individual's perceived social closeness by diminishing motivation to affiliate with others in their social group as well as by decreasing their expectations of their peers' interest in affiliation (Fouk et al., 2020; Loy & Spence, 2020). People who measure high in social distance report feeling that developing countries will experience more devastating climate impacts than their own developed country, while those who are low in the social distance feel that people who have similar identities will also face equally harsh devastation as a result of climate change (Spence et al., 2012).

The social proximity of climate change perceptions has implications for how and how soon an individual will respond to climate change with meaningful action (Loy & Spence, 2020). Feelings of powerlessness are negatively correlated with responding to climate change with action (Aitken, 2009; Keller et al., 2022; Williams & Jahfta, 2020), and experiencing powerlessness is associated with de-emphasizing the importance of acting on climate change (Williams & Jahfta, 2020). When news media features climate change issues, many report feeling that the ecological crisis was a problem too big for individual action to have a significant impact on climate change (Aitken et al., 2011; Harrison et al., 1996). This may be due to a lack of information about what sorts of individual changes will have a relatively significant impact at the individual level and whether these small individual contributions (recycling, reducing, conserving) are more significant to psychological well-being than participation in collective

strategies to implement larger changes, such as voting for policy or legislation. Promoting empowerment requires both instilling positive encouragement and self-efficacy as well as offering practical and accessible strategies to make a difference.

Diasporic Puerto Rican anthropologist Hilda Lloréns (2018) reported the devastating impacts of Hurricane Maria, discussing the detailed imagery of crumbling architecture, homes, the electric grid, and apocalyptic scenes of unfettered destruction. News media portrayed aerial views of the massive hurricane, people being rescued from waters deep enough to swallow homes and vehicles, and the desperation of Puerto Ricans who were without basic resources for days, weeks, and months at a time. Lloréns emphasized the culturally traumatic nature of this imagery not only for the haunting implications of environmental demise but for the years and decades of neglect by the U.S. government which has effectively left Puerto Ricans to fend for themselves, exacerbating the psychosocial impacts of the extreme weather event. Through a series of interviews with Puerto Rican survivors of Hurricane Maria, citizens described their response to the imagery as sad, extremely sad, helpless distraught, devastated, pained, sorrowful, anguished, impotent, shocked, and horrified (Lloréns, 2018). Harrowing depictions of extreme weather events and the effects of climate change can have intersectional impacts on those with marginalized identities, further complicating feelings of powerlessness. The overwhelming negativity surrounding climate change news coverage incites feelings of powerlessness, hopelessness, and helplessness, which requires further exploration.

### **Visual and Written Stimuli**

Clayton and Karazsia (2020) examined the effects of written empowerment and powerlessness narratives on psychological adaptation. The results indicated that there is a weak relationship between empowerment narratives and climate change anxiety when controlling for

climate change experience. Climate change anxiety scores, including several items surveying experience with climate change, were higher in the empowerment group, highlighting the importance of having prior experience with climate change in order to feel empowered to address it. With the positive relationship between climate change experience and psychological adaptation, this study supports the need for there to be direct experience with climate change in order for the relationship to be significant.

Rashotte (2002) discussed Affect Control Theory as it applies to the effectiveness of different perceptions of visual and written stimuli. Affect Control Theory is an interactionist framework that proposes that individuals act in social situations and serve as observers of social situations while attaching cultural significance to the various aspects of those social situations (e.g., behaviors, settings, objects, actors, etc.). Individuals will seek information in these interactions that will guide their personal understanding of the exchange. Affect Control Theory applies this logic and accounts for the information received in social interaction. Rashotte (2002) found that video presentations revealed a more simplified, easily interpreted illustration of actors and their behaviors than the written stimuli did in each trial. The author discussed that the attitudes of an actor's behavior are more clarified in the video presentations and that witnesses do not require as much additional information as readers of information do. For the object-person relationship, however, observers of the video messaging employed the same information as the readers of information to evaluate while adding an evaluation of nonverbal cues. They discussed that the attitudes of an actor's behavior are more clarified in the video presentations and that witnesses do not require as much additional information as readers of information do. For the object-person relationship, however, observers of the video messaging employed the same

information as the readers of information to evaluate while adding an evaluation of nonverbal cues.

Barromi Perlman (2016) found that the use of visual stimuli in the form of photography provided greater levels of empowerment than written syntax in students who were assigned a reflective diary project which required observation, introspection, and articulation of their thoughts and ideas. The students were able to absorb the sensations and perceptions of the people, places, and things being photographed. The visual depiction of people, places, and things was shown to have a more significant effect than the primarily written stimuli issued by teachers (Barromi Perlman, 2016; Rashotte, 2002).

Understanding the mechanisms for meaning making of visual and written messaging can provide researchers, educators, and practitioners with a direction to focus their messaging targets ranging from news media to clinical care. Falihi and Wason-Ellam (2009) discussed the differences between visual and verbal literacy, stating that a learner makes sense of all elements presented by interpreting and negotiating the relationships and attachments between each element, including color, shape, line, and texture by which one discerns its meaning. Hence, meaning cannot be assigned unless the context is considered. Furthermore, an individual's subjective experiences, memories, and their own cultural values are a lens through which meaning is assigned to what is being viewed. Similar to reading comprehension and verbal literacy, recognition of imagery is the mechanism that drives visual literacy (Falihi & Wason-Ellam, 2009). Visual literacy is an important concept to evaluate when discussing effective strategies to promote personal significance in response to climate change messages.

Taken together, as empowerment strategies lead to effective behavioral change, it is important to review the effectiveness of visual empowerment and powerlessness messaging in

addition to the already tested methodology of written stimuli. Clayton and Karazsia (2020) have recommended that empowerment and powerlessness conditions be examined as they inform psychological adaptation. Adding visual representations to climate change messaging and modifying the order of stimuli presented may prevent framing biases and order effects in the sample of participants.

Clayton and Karazsia (2020) have proposed that future researchers should consider reframing the empowerment and powerlessness conditions of stimuli presented in order to produce greater effects on psychological adaptation. While a written message priming the conditions for empowerment and powerlessness yielded insignificant results, Clayton and Karazsia (2020) have speculated that visual representations may have the potential to produce more significant effects on psychological adaptation as opposed to written stimuli.

### **Psychological Adaptation**

In the earlier days of climate change policy discourse, more focus was placed on mitigating greenhouse gas emissions, while expert suggestions to promote adaptation were vehemently opposed (Pielke et al., 2007). Psychological adaptation is a range of reactions that address new situations, emotional responses, cognitive processes, detachment, formulating protective responses, and may help with emotional regulation (Reser & Swim, 2011).

Psychological adaptation can look differently depending on the individual, though it is a vital process needed to maintain psychological well-being (Aronsson & Schöb, 2018; Diener et al., 2006; Frederick & Loewenstein, 1999; Lucas, 2007; Luhmann et al., 2012; Lyubormirsky, 2011). Adapting to climate change is an evolving process that involves external appraisals that influence preparative responses to the harmful effects of climate change which includes acute disasters as well as chronic ecological changes over time (American Psychological Association

Task Force on the Interface between Psychology and Global Climate Change, 2009). These psychological processes aim to make sense of the world with the anticipation of impacts, resources needed, the use of coping strategies, and their own emotional reactions (Swim et al., 2011). Psychological adaptation motivates an individual to provide oneself with security, clarity, stability, and control over their situation (Swim et al., 2011).

Psychological adaptation has variations in its presentation. Qing et al. (2021) discussed disaster preparedness in the farming community, which had a significantly positive effect on individual well-being, overall health, and life satisfaction. They found that farmers who have better prepared for disaster will perceive the lowest risk compared to farmers who do not prepare for natural disasters (Qing et al., 2021). The perception of estimated risk for disaster was found to be a mediating factor that will determine to what extent the farmer's preparation for a disaster impact will have on their overall health and psychological well-being (Qing et al., 2021). This finding highlights the individual variation in psychologically adaptive processes for vulnerable groups.

Mental health professionals can care for climate change impacts while inspiring proactive coping responses (Macy & Brown, 1998; Randall, 2009; Seaman, 2016). Emotional reactions, a sense of self-efficacy and responsibility, and the subsequent psychological adaptation responses to climate change can be recognized as intertwined components of an individual's global psychological response (Brewer, 2008; Norgaard, 2011; Reser & Swim, 2011; Palinkas & Wong, 2020; Tam et al., 2021). Psychological adaptation is a series of affective, cognitive, and motivational processes that require becoming more attuned to the climate crisis, resulting in increased recognition of its reality and risks, assuming a problem-solving approach, and evolving into a more pro-environmental way of life (Bradley et al., 2020). Psychological adaptation

involves reprocessing and cognitive reorientation that results in a desire to take responsibility to help counteract climate change (Bradley et al., 2020). The psychological adaptation process serves a mediating role in whether an individual will choose to engage in collective environmentally significant actions (National Research Council, 2008, Weber & Stern, 2011).

Humans are more likely to be motivated to perform adaptation behaviors when it is to their own individual advantage (Bechtolt et al., 2021). A person's attitudes and beliefs about climate change play an important role in their psychologically adaptive processes, which is partially informed in conjunction with how they perceive themselves in relation to climate change threats (Bechtolt et al., 2021). External appraisals give an individual unique insight into whether their adaptive actions will be successful in protecting themselves from climate-related hazards, and their own levels of self-efficacy will determine if they feel capable of performing those actions (Van Valkengoed & Steg, 2019). Meta-analytical data suggests that it is predominantly negative emotions that are catalysts for psychologically adaptive behaviors, namely, guilt, anger, and fear (Van Valkengoed & Steg, 2019). Other elements that inform an individual's adaptive behaviors include social norms and perceived level of responsibility (Bechtolt et al., 2021). Taken together, psychological adaptation is a dynamic process that is an individual's unique method of action to cope or otherwise fail to cope with their circumstances.

### **Summary and Rationale for Proposed Study**

The proposed study is timely given the devastating and wide-ranging impacts of global climate change. Those affected by climate change are likely to experience migration, food, and water shortages, loss of their home, and extreme weather conditions (Clayton, 2021; Costello et al., 2009; Few, 2007; Fritze et al., 2008; Page & Howard, 2010). Individuals are also likely to experience indirect impacts including violence, between-group conflict, mental health

challenges, and loss of trust in leadership (Anderson, 2001; Clayton, 2021; Costello et al., 2009; Reuveny, 2008). In the United States, most Americans have expressed their interest in climate change, with nearly half of the population reporting feeling helpless, disgusted, sad, and in some cases hopeful (Lawrance et al., 2022; Maibach et al., 2009).

Climate change denial can serve as social permission to avoid action as well as a coping tool, which can change the perception of one's experience with climate change depending on perceived distress or threat (Norgaard, 2011; Vaillant, 2000). Some individuals may find it difficult to accept the truth of climate change, because it would warrant them to confront a potentially life-threatening risk that may require them to make significant changes to their lives (Ojala, 2022). Responses to climate change hazards can appear as an active denial where rationality occludes emotional reactions, creating intolerance of scientific uncertainty (Langford, 2002). Denialism may also appear as a disinterest that resigns climate change risks with fatalism or the notion that fate is predetermined and out of individual control (Langford, 2002).

For some, concerns about climate change occur on a broader level with underlying sentiments of ethical and moral considerations (Ojala, 2022). These individuals may not worry as much about their own personal life or well-being as much as they do about other places in the world, nature, animals, and the future of life on Earth (Ojala, 2022). Ecological anxiety is a continuous cycle of denial and anxiety that occurs while trying to stay attuned without reconciling with the magnitude of climate change (Hogg et al., 2021; Maiteny, 2002; Panu, 2020).

Given the novelty of climate change and mental health research, much work is left to be done in the way of examining the effects of empowerment and powerlessness messaging on psychological adaptation to climate change (Clayton & Karazsia, 2020). Interdisciplinary



conversations have sparked recognition of the socioemotional responses to climate change, the assumed responsibility and self-efficacy of individuals, and the related psychological adaptation processes that humans undergo. These are intertwined elements of psychological responses to climate related disasters that must be considered with further study (Brewer, 2008; Norgaard, 2011; Reser & Swim, 2011; Tam et al., 2021).

As visual stimuli produce more effective meaning-making outcomes that shape personal significance compared to written stimuli, I explored this phenomenon as it occurs in psychologically adaptive processes (Rashotte, 2002). I sought key information while examining powerlessness and empowerment messaging in climate change perceptions regarding how to promote pro-environmental psychological adaptation. Promoting empowerment at the individual level may give them a sense of self-efficacy, self-affirmation, and motivation to change their behavior in a way that is cohesive with overall well-being and collective survival while policy changes are slow to be implemented. There is limited research examining the relationship between climate change messages of empowerment and powerlessness, and how they affect psychological adaptation. This study bridges the gap between these constructs, identifies whether climate change denial moderates this effect, whether climate anxiety strengthens the effect of empowerment or powerlessness, and whether people with multiple marginalized identities experience higher levels of climate anxiety.

## Research Questions and Hypotheses

To address the gaps in the literature, the current study examined the following research questions.

RQ1: Does climate change denial moderate the relationship between messaging about climate change and an individual's psychological adaptation?

H1<sub>o</sub> for RQ1: Climate change denial moderates the relationship between messaging about climate change and psychological adaptation. Specifically, the effect of messaging on psychological adaptation are stronger for individuals with lower levels of climate change denial compared to those with higher levels.

RQ2: Are individuals with climate anxiety more susceptible to the effects of visual empowerment and powerlessness messaging?

H1<sub>o</sub> for RQ2: Relative to those who are lower in climate anxiety, those with higher levels of climate anxiety will endorse a stronger relationship between empowerment and psychological adaptation.

H2<sub>o</sub> for RQ2: Relative to those who are lower in climate anxiety, those with higher levels of climate anxiety will endorse a stronger relationship between powerlessness and psychological adaptation.

RQ3: Do people with multiple marginalized identities experience higher rates of climate change anxiety?

H1<sub>o</sub> for RQ3: People who have multiple marginalized identities experience higher rates of climate change anxiety.

## CHAPTER III

### METHODS

#### **Participants**

G\*Power was used to conduct a power analysis to ensure that a sufficient number of participants were sampled for the statistical method. The significance level was set to .05 and the probability level was set to .80 which resulted in a sample of 115 participants. A total of 36 participants were recruited through SONA, an online undergraduate recruitment system for a public university primarily for women in a Southwestern state. Social media platforms such as Instagram, Facebook, and Reddit.com were also used for recruitment. As right-wing individuals are more likely to deny climate change (Hultman et al., 2019), recruitment attempted to oversample Republican-identified persons to achieve a statistically balanced representation of political affiliations. This was done by posting the recruitment flyer to Republican interest forums via Reddit.com. Prolific, a crowdsourcing platform for issuing contract jobs, was used for additional recruitment. Participants from SONA were provided .5 hours of SONA credit for their response, Prolific participants were given \$4 for their response, and social media participants were entered into a raffle for two \$50 Amazon gift cards upon responding to the survey. All adults ages 18 and over were eligible to participate.

#### **Procedure**

Once IRB approved the proposal, participants were recruited (Appendix A) and were provided access to the survey (Appendix B). Participants were asked to review and complete the informed consent document (Appendix C) and demographic form (Appendix D) prior to responding to the survey. Participants were randomly assigned to one of two video messaging conditions (Appendix E) for empowerment and powerlessness messaging. The empowerment

condition featured protests led by a national organization for climate advocacy, Sunrise Movement. The empowerment condition included clips discussing climate change super solutions, bipartisanship, and advocacy. The powerlessness condition featured a compilation of climate disasters and the visible effects of climate change with video clips of news stories narrating the harrowing impacts of extreme climate events. Following the film, participants completed a climate change denial questionnaire (Appendix F) to collect information about their levels of climate change denial using a five-item scale from McCright and Dunlap (2011). Once the Climate Change Denial (CCD) scale was completed, participants completed the 22-item Climate Anxiety Scale (CAS) developed by Clayton & Karazsia (2020; see Appendix G) and the 7-item Psychological Adaptation Scale (PAS) developed by Reser et al., (2012; see Appendix H).

## **Measures**

### **Demographic Form**

The demographic form asked questions about the participant's gender identity, age, and race/ethnicity to evaluate whether participants had two or more marginalized identities. Other questions inquired about the participant's household income, immigration status, number of dependents, level of education, and employment status. Additional questions were presented about identity factors such as political affiliation, the desire to have children, and whether one has direct experience with climate change. The demographic items were chosen to assess for various areas of marginalization, and I used this measure to compare mean levels of climate anxiety across groups.

## **Experience with Climate Change**

Participants' experience with climate change (EXP) was assessed with questions in both the demographic form and as part of a subscale in the Climate Anxiety Scale (CAS). Experience with climate change was assessed with yes/no demographic items such as, "Have you ever experienced an extreme weather event or a natural disaster?" and "Have you ever had to relocate as a result of a natural disaster or extreme weather event?" Items capturing experience with climate change on the CAS include, "I have been directly affected by climate change," and "I know someone who has been directly affected by climate change," and are scored using a 7-point Likert scale. To calculate scores for experience with climate change, items 15-17 of the demographic form were recoded into a new variable. Items 14-16 of the CAS were recoded into a new variable. EXP was calculated by averaging the scores of the recoded demographic items and the CAS subscale scores across all items, which yielded a Cronbach's alpha of .54.

## **Empowerment and Powerlessness Messaging**

Participants were randomly assigned and presented with either an empowering or powerlessness message film condition. The 1-minute and 48-second empowerment video featured climate change protest footage with inspiring messages of encouragement, inspiration, and empowerment with intermittent clips of news stories that feature climate change solutions, activism, and a tone of optimism. The powerlessness condition featured a 1-minute, 55-second compilation of climate change catastrophes with intermittent clips of news media depicting defeat, doom, and powerlessness amid the perilous conditions.

## **Climate Change Denial**

Climate change denial was assessed using the Climate Change Denial Scale (CCD), a five-item scale from McCright and Dunlap (2011). The scale, previously used in research (McCright & Dunlap, 2011), includes five dichotomous items to evaluate beliefs about climate change and attitudes about the climate science community where a rating of one indicates the presence of denial and a zero indicates no presence of denial. I assessed the reliability of the scale with a Cronbach's alpha of .73, which demonstrated an acceptable range for reliability. Items such as "The effects of GW [global warming] will never happen" and "The seriousness of GW [global warming] is generally exaggerated in the media" are included in the scale. A moderation analysis was used to test whether climate change denial serves as a mediator between climate change messaging and levels of psychological adaptation.

## **Climate Anxiety**

Climate change anxiety was measured using the Climate Anxiety Scale (CAS; Clayton & Karazsia, 2020), a 22-item questionnaire. The scale includes the following subscales: cognitive-emotional impairment (items 1-8), functional impairment (items 9-13), experience with climate change (items 14-16), and behavioral engagement (items 17-22). Items were rated on a 5-point Likert scale with 1 indicating "never" and a 5 indicating "almost always." Each subscale was scored by averaging the scores across all items within each subscale. High scores for each subscale indicate high levels of cognitive-emotional impairments, functional impairment, experience with climate change, and behavioral engagement respectively. Clayton and Karazsia (2020) did not report the measure's internal consistency, although the current sample yielded a Cronbach's alpha of .91, indicating high internal consistency and reliability.

## **Psychological Adaptation**

Psychological adaptation was measured using the Psychological Adaptation Scale (PAS) adapted 7-item true or false coping scale from Reser et al. (2012), with a Cronbach's alpha of .93. Sample items include, "I have changed the way I think about the seriousness of environmental problems because of climate change," and "I tend to think differently these days about what is acceptable and sustainable and not acceptable with respect to consumer products and packaging, and consumption in general." Psychological adaptation is calculated by averaging scores across all items. High scores indicate higher levels of psychological adaptation. A moderation analysis was used to examine whether climate change denial moderates the interactions between empowerment and powerlessness messaging on levels of psychological adaptation. The sample pool yielded a Cronbach's alpha of .93 for the CAS, suggesting good internal consistency and reliability.

## **Statistical Analysis**

In this study, I aimed to answer three questions: 1) Does climate change denial moderate the relationship between messaging about climate change and an individual's psychological adaptation? 2) Are individuals with climate anxiety more susceptible to the effects of visual empowerment and powerlessness messaging? 3) Do people with multiple marginalized identities experience higher rates of climate change anxiety?

### **Research Question One**

I expected to find that higher levels of climate change denial would influence the proposed effect of the empowerment condition. Specifically, I expected that the empowerment condition would have a positive effect on psychological adaptation and the powerlessness condition would have a negative effect on psychological adaptation. A multiple regression

analysis was utilized to examine whether climate change denial influenced the effects of climate change messaging on levels of psychological adaptation. I conducted the regression with an interaction term (climate change denial x film condition) while controlling for personal experience with climate change. Climate change denial items were recoded where “True” is a 1 and “False” is a 0. The scores of all items were added together where higher scores indicated higher levels of climate change denial and lower scores indicated lower levels of climate change denial. The mean of the dependent variable psychological adaptation and moderating variables (climate change denial and the film condition) were centered to reduce multicollinearity and to help with interpretation. The independence of residuals was assessed utilizing a Durbin-Watson statistic. SPSS was used to estimate the coefficients ( $\beta$  values) for each term in the model, including the interaction term. *P*-values and effect size were also calculated.

### **Research Question Two**

To explore whether climate change anxiety exacerbated the proposed effect of the film conditions on psychological adaptation, I used a one-way analysis of variance (ANOVA) to compare means. The analysis included psychological adaptation as the dependent variable, the film conditions as the independent variable, and climate change anxiety as a varying factor. I expected that the film condition would have a greater impact on psychological adaptation for individuals reporting higher climate anxiety. Assumptions were checked for independence of each of the film conditions, normality of model residuals, and homogeneity of variance.

### **Research Question Three**

To test whether individuals with more than one marginalized identity were more greatly impacted by climate change anxiety, I utilized an independent samples *t*-test to compare means. It was proposed that individuals with more than one marginalized identity would experience



higher levels of climate change anxiety. Assumptions were checked to ensure continuity, distribution, and homogeneity of variance. Participants who reported living most of their lives in the United States and had two or more marginalized identities were placed in the “Yes” group and those who had one or fewer marginalized identities were placed in the “No” group. Participants outside the U.S. were not included as income and immigration status were specific to the United States. Participants were categorized as marginalized if they had two or more of the following identities: minoritized gender, race and ethnicity, immigration status, income, and education. Specifically, those who identified as a “Man” were coded for non-marginalization and all other gender responses were coded as marginalized. All BIPOC individuals were coded as marginalized and White respondents were coded as non-marginalized. All non-U.S. citizens were coded as marginalized, and all U.S. citizens were coded as non-marginalized. Income was calculated by including all who made less than \$30,000 and those with more than two dependents who made less than \$70,000. Individuals’ income was evaluated based on the US Consensus Bureau’s report *Poverty in the United States: 2022* (2023). All participants who had up to a high school education were coded as marginalized and those who had education beyond high school were coded as non-marginalized. Due to the limited variability in age, age was not included in this analysis.

## CHAPTER IV

### RESULTS

A total of 144 participants were recruited for the study. Duplicate cases were removed, responses that were shorter than 4 minutes in duration, scale responses that reflected zero variance, responses that had impossible values, and those who did not consent were removed from the dataset. Outliers were identified using a box and whiskers plot that were outside of the 3rd IQR. Once the data-cleaning process was completed and outliers were removed, the pool yielded 131 participants. For the participants who completed demographic information, 47.7% ( $n = 62$ ) identified as men, 50.4% ( $n = 66$ ) as women, .8% ( $n = 1$ ) as non-binary, and ( $n = 1$ ) .8% as transgender. Most participants identified as White (42%;  $n = 55$ ), followed by Hispanic or Latiné (22.9%;  $n = 30$ ), Black or African American (21.4%;  $n = 28$ ), Asian American or Other Pacific Islander (9.2%;  $n = 12$ ), multiracial (.8%;  $n = 1$ ), American Indian or Alaska Native (.8%;  $n = 1$ ), and individuals who chose to self-described (1.5%;  $n = 2$ ). A total of 19.1% ( $n = 25$ ) participants reported they finished high school or earned a GED, some college 24.4% ( $n = 32$ ), associate degree 5.3% ( $n = 7$ ), trade or technical degree 2.3% ( $n = 3$ ), bachelor's degree 36.6% ( $n = 48$ ), Master's degree 9.2% ( $n = 12$ ), and Ph.D. or equivalent 2.3% ( $n = 3$ ).

Due to participant non-response, not all groups within each demographic variable added up to 100%. A multinational pool of participants was recruited by setting parameters within the Prolific recruitment tool to not restrict nationality. The interpretation of these analyses may be limited due to differences in language which were not assessed. The demographic form further clarified nationality by inquiring about what nation the participant has spent most of their life in. The following countries had five or more responses: United States ( $n = 48$ ), South Africa ( $n = 19$ ), Poland ( $n = 7$ ), United Kingdom ( $n = 5$ ), Portugal ( $n = 6$ ), Canada ( $n = 7$ ), and Mexico ( $n =$

13). Other responses were received from Greece ( $n = 1$ ), Zimbabwe ( $n = 1$ ), Italy ( $n = 2$ ), Slovenia ( $n = 1$ ), Chile ( $n = 1$ ), Japan ( $n = 1$ ), Venezuela ( $n = 1$ ), New Zealand ( $n = 2$ ), Australia ( $n = 2$ ), The Netherlands ( $n = 1$ ), Nigeria ( $n = 1$ ), Egypt ( $n = 1$ ), Spain ( $n = 1$ ), Trinidad ( $n = 1$ ), and Israel ( $n = 1$ ). Details of participant demographics are included in Tables 1-2. Table 3 only includes participant data for those who indicated spending the majority of their life in the United States.

**Table 1**

<i>Income and Employment Status</i>		
Characteristic	<i>n</i>	%
Household Income		
Less than \$13,000	13	9.9
\$13,000-\$30,000	39	29.8
\$30,000-\$55,000	31	23.7
\$55,000-\$70,000	18	13.7
\$70,000-\$95,000	13	9.9
\$100,000+	16	12.2
Employment		
Unemployed or employed	20	6
Part-time	22	16
Full-time	50	60
Student	38	18

**Table 2**

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*Dependents and Social Support*

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Characteristic	<i>n</i>	%
Number of Dependents		
0	34	26
1-2	50	38.2
3-4	35	26.7
4-5	7	5.3
6+	3	2.3
Social Support		
Poor	5	3.8
Fair	54	41.2
Good	55	42
Excellent	16	12.2
Have children		
Yes	23	17.6
No	107	81.7
Want children		
Yes	91	69.5
No	38	29.8

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**Table 3**

<i>Immigration Status and Political Affiliation for U.S. participants</i>		
Characteristic	<i>N</i>	%
Immigration Status		
U.S. citizen	44	93.6
U.S. resident	2	4.3
Immigrant	1	2.1
Undocumented	0	0
Prefer not to say	0	0
Political Affiliation		
Republican	9	19.1
Democrat	23	48.9
Libertarian	2	4.3
Independent	7	14.9
Apolitical	6	12.8

### Statistical Analyses

#### Research Question One

IBM Statistical Package for the Social Sciences (SPSS) version 28.0.1.0. (142) was used to run the analyses. To determine whether climate change denial (CCD) moderated the effect of the film condition (CON) on psychological adaptation (PAS) while controlling for experiences with climate change (EXP), a regression analysis was used to identify if there was a conditional relationship. I proposed that higher levels of climate change denial would reduce the proposed effect of the film conditions on psychological adaptation. Scales were checked for zero variance and variables were inspected for impossible values. Scale reliability was assessed, and new variables were computed to reflect scale totals. Categorical variables were inspected for

distribution and continuous variables were reviewed for normality assumptions. The model included psychological adaptation as the dependent variable, the film condition as the independent variable, climate change denial as the moderator, and the interaction term of the film condition (CON) x Climate Change Denial (EXP). The results of the descriptive and correlation analyses are presented in Table 4.

**Table 4**

<i>Descriptive Statistics and Correlations for Multiple Regression</i>							
Variable	<i>M</i>	<i>SD</i>	Cronbach's Alpha	1	2	3	4
1. EXP	2.23	0.51	.54	—			
2. CCD	1.91	0.21	.73	.34**	—		
3. CAS	2.38	0.59	.91	.71	.30**	—	
4. PAS	3.06	1.02	.93	.59	.30	.76**	—

*Note.* Experience with climate change (EXP) scores ranged from 1.17-3.50, Climate Change Denial Scale (CCD) scores ranged from 1.00-2.00, Climate Anxiety Scale (CAS) scores ranged from (1.09-3.86), and Psychological Adaptation Scale (PAS) scores ranged from 1.00-5.00. Possible scores ranged from 1.00-5.00 for the CCD, 1.00-5.00 for the CAS, and 1.00-5.00 for the PAS.

\*\* $p < .001$ .

There were no statistically significant main effects identified for the film conditions and climate change denial on levels of psychological adaptation ( $b = .37, SE = .71, t = .529, p = .60; b = .25, SE = .23, t = 1.11, p = .27$ , respectively). The interaction between the film conditions and climate change denial was non-significant, ( $b = .85, SE = .30, t = 2.80, p = .53$ ). The reliability of the Climate Change Denial scale had a Cronbach alpha of .73, which suggests that the relatedness of the items within the scale are acceptable. These findings indicate that there was no effect of either film condition on psychological adaptation. There was a significant positive relationship between those who had experience with climate change and their levels of

psychological adaptation in that those who had more experience with climate change and higher levels of psychological adaptation ( $b = 1.06, SE = .15, t = 7.04, p < .001$ ), however, this interpretation is limited due to the EXP scale's low reliability. There was a weak positive correlation identified for those who had higher levels of climate change denial who reported having more experience with climate change,  $r(130) = 0.34, p < 0.001$ . This relationship requires further investigation.

### **Research Question Two**

An analysis of variance (ANOVA) was used to evaluate the effects of the film conditions on psychological adaptation at varying levels of climate anxiety. It was hypothesized that individuals who are higher in climate anxiety would be more susceptible to the proposed effects of the film conditions. There was no main effect identified for the empowerment and powerlessness conditions, which indicates that climate change anxiety does not influence the strength of this proposed effect. The results did not yield a main effect  $F(1, 127) = 0.32, p = .58$  with a standardized coefficient of ( $b = -.049$ ). An omnibus test indicated that the mean level of psychological adaptation of the empowerment condition was not significantly higher or lower than the mean of the powerlessness condition ( $p = .25$ ). There were no significant differences in climate anxiety levels associated with the empowerment or powerlessness condition; however, there was a positive association between higher levels of climate anxiety associated with higher levels of psychological adaptation  $F(3, 123) = 24.59, p < .001$  in that those who had higher levels of climate anxiety also measured higher in psychological adaptation. The results of the analysis are included in Table 5 and 6.

**Table 5**

*Means, Standard Deviations, and One-Way Analyses of Variance in Psychological and Social Resources and Cognitive Appraisals*

	EMP		POW		<i>Df</i>	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
CON	3.11	1.10	3.01	.94				
Measures								
CAS	2.40	0.62	2.34	.55	126	.60	.55	.11
PAS <sup>b</sup>	3.11	1.09	3.01	.94	126	.55	.58	.10
CASxCON <sup>a</sup>	-.05	1.02	-.06	.97	126	.05	.96	.01

<sup>a</sup> Interaction term of Climate Anxiety Scale (CAS) and the film conditions (CON).

<sup>b</sup> Psychological Adaptation Scale (PAS)

**Table 6**

*One-Way Analyses of Variance*

Model		Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	<i>p</i>
		<i>B</i>	<i>SE</i>	<i>b</i>		
1	(Constant)	-.008	.058		-.141	.888
	Zscore(CON)	-.038	.058	-.038	-.659	.511
	CASxCON	-.069	.059	-.068	-1.167	.246
	Zscore(CAS)	.761	.059	.753	12.916	<.001

### Research Question Three

An independent samples *t*-test was utilized to examine whether people with multiple marginalized identities experienced higher levels of climate anxiety. It was hypothesized that those with two or more marginalized identities who spent the majority of their life in the U.S. would have higher rates of climate change anxiety compared to those who had two or fewer marginalized identities. The variables chosen to measure marginalization were based on broad scientific consensus that suggest these factors are significantly related to marginalization



(Algarin et al., 2019; Nadal et al., 2021; Watson-Singleton et al., 2023). The sample for this analysis was limited to the United States because the demographic variables for immigration status and household income were specific to a U.S. sample. The analysis revealed that there were no observed group differences between those who had two or more marginalized identities and those with one or fewer marginalized identities on levels of climate change anxiety which did not support the hypothesis presented. A subsample of participants who reported living most of their lives in the United States were included in this analysis. Participants endorsing two or more marginalized identities, were assigned to the “YES” marginalized group and those with fewer than two of these identities were assigned to the “NO” non-multiply marginalized group. People with multiple marginalized identities experience greater effects of climate change (Versey, 2021), therefore those who had two or more of these vulnerabilities were included in the analysis. Table 7 includes the means and standard deviations for the two groups.

**Table 7**

<i>Independent Samples T-Test</i>							
	YES <sup>a</sup>		NO <sup>b</sup>		<i>t</i> (48)	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
CAS <sup>c</sup>	2.23	.58	2.35	.55	4.91	.44	-0.23

<sup>a</sup> multiply marginalized in the United States (*n* = 21)

<sup>b</sup> non-multiply marginalized in the United States (*n* = 27)

<sup>c</sup> Climate Anxiety Scale (CAS)

## CHAPTER V

### DISCUSSION

I desired to gain information about empowerment and powerlessness messaging to increase psychological adaptation to climate change. To achieve this, I employed previously utilized scales and consultation from interdisciplinary experts. I created stimuli to depict visual empowerment and powerlessness narratives. Participants were assessed for marginalization, experience with climate change, levels of climate change denial, climate anxiety, and psychological adaptation. There were no main effects from the film condition on psychological adaptation, and this study affirms that empowerment and powerlessness narratives had no observed influence on how the sampled participants responded to climate change.

This study found no evidence indicating that climate change denial moderates the relationship between messaging about climate change and an individual's levels of psychological adaptation. There were no detected effects of empowerment and powerlessness messaging for those who had lower levels of climate change denial compared to those who were higher in climate change denial. The strength of the standardized beta coefficient indicates that there was no association between the predicting variables and levels of psychological adaptation. There was no evidence found to suggest that climate change denial moderates the proposed relationship between the film conditions on levels of psychological adaptation; however, there was a small positive relationship identified for those who had experience with climate change who measured higher in levels of psychological adaptation. This relationship suggests that experience with climate change may be needed for someone to adapt to climate change with pro-environmental action, though the experience with climate change measure had low reliability which may limit this interpretation. This low reliability may be due to participants' lack of association with their

experiences with extreme weather events being related to climate change. The reliability of this measure has not been previously reported by researchers. Researchers should consider a more reliable measure in future investigations. It could also be that experience with climate change reduces climate change denial. The absence of the effect of the film condition of the empowerment and powerlessness conditions on psychological adaptation suggests that more work is needed to evaluate the mechanisms for change and tools to promote behavioral engagement.

The data from this study suggest that climate change denial did not moderate an effect of the film conditions on psychological adaptation, for which certain aspects of climate change denial were not dynamically measured. Climate change apathy and denial can have multiple presentations such as those who have an elevated understanding of the interconnectedness of the environment and personal well-being without any major changes in their lifestyle (Maiteny, 2002). This behavioral discrepancy of climate denialism was not captured which may be another facet of climate change denial that needs to be considered. Another aspect that was not captured in the Climate Change Denial (CCD) was psychological splitting, or the emotional separation of the worry from the reality of the situation (Lertzman, 2010; Randall, 2009). The CCD scale did not assess this emotional compartmentalization of climate change denial and only targeted factual understanding of the climate crisis, which did not include relative congruent or divergent emotional reactions to the crisis. Another aspect of climate denial to consider is environmental fatalism, where an individual may have a hopeful attitude toward the crisis while having low levels of self-efficacy to take needed action (Jylhä et al., 2022). Climate change denial patterns did were non-significant in these analyses.

## **Integration with Existing Research**

This study built on the work of Clayton and Karazsia (2020), who initially reviewed written empowerment and powerlessness messaging and found a weak positive relationship between empowerment messaging and climate anxiety while controlling for experience with climate change. My study, in combination with previous studies, suggests that neither visual nor written narratives significantly impact levels of psychological adaptation. A reason for this may be due to potentially confounding variables of politics and exposure to social media. Though politics was not a focal point of the stimuli presented, elements of political affiliation do inform how an individual engages with climate change, with more right-wing individuals being less likely to take pro-environmental action (Brulle, 2020; Hultman et al., 2019; Krange et al., 2019; Wong-Parodi & Feygina, 2020). It was not within the scope of the study to limit by political affiliation given the multinational sample. It is possible that there are influences based on how much exposure an individual has to social media and of varying social media sources that better explain a person's predisposition to adapt to the crisis with pro-environmental action. Additionally, levels of education and access to scientific knowledge about the climate crisis may have shaped participant's responses.

When considering the multinational sample, perceptions of Western politics may have shaped the messaging of the film stimuli which could have influenced psychological adaptation scores. Individuals may have had varied reactions to political elements of the film which could have portrayed different impacts depending on levels of industrialization of their place of dwelling. For example, participants from less industrialized countries may have experienced different reactions to the film than other participants who are the primary emitters of greenhouse gas emissions (Costello et al., 2009; Hayes et al., 2018). It was not within the scope of the

present study to examine differences by nationality. An individual's level of carbon impact may also be considered in future psychological estimates of empowerment and powerlessness messaging, where some participants have a greater responsibility to reduce than other areas of the world who emit fewer greenhouse gases (Maiteny, 2002; Ojala, 2022). The current sample included a diverse range of nationalities, which may limit the interpretation of this analysis due to varying social and political conditions within each geographic domain.

As there was no main effect of the film conditions on psychological adaptation, there was no interaction of climate change anxiety on this proposed effect. Individuals are more likely to psychologically adapt when it is to their own personal advantage (Bechtolt et al., 2021), which may not have been captured in the empowerment and powerlessness film conditions. If a person's personal beliefs about climate change shape their psychological adaptation processes (Bechtolt et al., 2021), the film conditions may not have effectively targeted these self-reflecting reactions and personal estimates of danger. External estimates of risk give a person information about whether their adaptive reactions will protect themselves from climate disasters and their own feelings of self-efficacy will shape how capable they feel in performing adaptive actions (Van Valkengoed & Steg, 2019).

Consistent with previous research, it appears that climate change anxiety is associated with higher levels of psychological adaptation, which suggests that one may feel worried, fearful, and impacted by the crisis, motivating them to take pro-environmental action (Clayton & Karazsia, 2020; Ogunbode et al., 2022; Pickering & Dale, 2023). Persuasive messaging can shape pro-environmental action (Bolsen & Shapiro, 2017; Druckman & McGrath, 2019; Hart & Feldman, 2016; Palm et al., 2020; van der Linden et al., 2017), which suggests that climate anxiety can be a useful tool for emotionally appealing to individuals. Because ecological anxiety

is an emotional response (Comtesse et al., 2021), it would be helpful in future studies to assess this emotional feature to expand psychological adaptation and pro-environmental behavior. As climate anxiety and experience with climate change are positively associated with psychological adaptation, organizational efforts may focus on these groups for community-building and methods for mutual empathy between groups.

To expand pro-environmental behavior, individuals must restore their relationship and value for the environment, which has been adulterated by colonization and industrialization (Palinkas & Wong, 2020; Pörtner et al., 2022; Tam et al., 2021). Due to the complex, cascading, and aggrandizing power of colonization and this subsequent growing disconnect from nature (Pörtner et al., 2022; Tam et al., 2021), individuals have lost an internal sense of what it uniquely means to be an important part of a powerful, magnificent collective (Clayton 2021; Pikhala, 2022; Tam et al., 2021). Restoring this sense of humanity at the individual and collective level will have restorative effects that will lead individuals to reflect existentially about their own sense of humanity and their relationship with nature (Clark, 2020; Clayton, 2021; Comtesse et al., 2021; Cunsolo & Ellis, 2018).

Existing research has found that multiply marginalized individuals experience more barriers to daily functioning, preventing them from adapting psychologically with pro-environmental action (Bouman & Steg, 2019; Uribe & Chapman-Ludwig, 2023), however, there were no significant differences in climate anxiety levels measured for those who are multiply marginalized. Because other aspects of marginalization were not captured in the demographic form (sexuality, disability, etc.), the validity of the marginalization variable and relative climate anxiety levels should be scrutinized. Additionally, the variable for U.S. citizenship was not evenly distributed which may have shaped the outcome of the marginalization measure. As

discussed in the literature review, individuals who have less power have more difficulty thinking and functioning than a person with more power, where power and marginalization are deeply intertwined (Anderson et al., 2021; Han et al., 2021; Singh et al., 2020). Because people with multiple marginalized identities most often have other more immediate life stressors and fewer resources to cope, this could also be a reason that climate anxiety levels were not higher for this group (Pew Research Center, 2009; Weber, 2006).

Based on previous research (Demetriades & Esplen, 2010; Versey et al., 2021), I expected that individuals in the United States who are multiply marginalized would be more impacted psychologically by climate change anxiety than those with one or fewer marginalized identities, however, there was no relationship identified with the measure used. Ecological or climate anxiety is a chronic fear reaction to environmental destruction and can appear as a general concern about our relationship with nature (Clayton, 2011; Comtesse et al., 2021). The infrastructure of the United States encourages people to disconnect from nature, thereby decreasing the likelihood that they will be directly impacted by climate change. This might lead to a lack of concern or apathy about climate change (Tam & Milfont, 2020), yielding insignificant differences between the two marginalized groups. In general, both marginalized and non-marginalized groups in the United States might be less affected by climate change than people in other parts of the world. Additionally, people who dwell in more industrialized nations may not have internal moral conflict about one's consumption and need to make lifestyle changes, a noted characteristic of climate anxiety (Doherty & Clayton, 2011; Hayes et al., 2018; Palinkas & Wong, 2020), perhaps due to the lack of concern for others' well-being in a hyper-individualistic society. The current findings related to marginalization might also point to the need to revise the measurement of marginalization in future research.

## **Clinical Considerations**

Given the evidence of this study, clinicians should consider using more than empowerment strategies alone to facilitate change. Clinicians can facilitate change by improving relational wellness to decrease individual isolation (Johnson et al., 2021; Jordan, 2018). In addition to clinical interventions rooted in action-based coping, interventions focused on emotional regulation and increasing social connectedness are also advantageous for managing climate anxiety (Bingley et al., 2022; Hogg et al., 2021). Indigenous voices have recommended that leaders assemble a wide range of knowledge systems to understand the complexity of the issue at hand and for healthcare professionals to consider place-based emotional attachments in the assessment of the health and wellbeing of others (Johnson et al., 2021).

Understanding how to promote psychological adaptation may require examining in more detail the effects of politics and social media on pro-environmental action and expanding bipartisan narratives surrounding the crisis. Clinical interventions suggest that cohesion and cooperation are facilitated by effective communication between community members and those in power (Haskett et al., 2008; Norris et al., 2002; Tam et al., 2021; Vernberg et al., 2008). The climate crisis causes mistrust between citizens and those in power (Anderson, 2001; Costello et al., 2009; Reuveny, 2008; Tam et al., 2021), and this political mistrust is closely associated with political polarization (Bugden, 2022). Clinicians might engage in activism to increase trust and cooperation between political groups, individuals, and those in power. These efforts by clinicians and leaders to display warm interactions with others with opposing values will aid in diluting the political polarization (Voelkel et al., 2021) that has weakened psychological adaptation and pro-environmental action.



Greater focus should be placed on dismantling the mechanisms that prevent people from acting, such as systemic oppression, growing wealth inequality, and a lack of resources. Between-group conflict will rise due to the disproportionate contribution of greenhouse gas emissions from Western societies, which will increase resource disparities in areas where there are pre-existing conflicts due to racism and other forms of marginalization (Costello et al., 2009; Hayes et al., 2018). Interventions aimed to address systemic trauma require joining in with the oppressed, raising awareness of and labeling oppression, and taking collective social action (Afuape, 2020). Addressing systemic oppression in therapy can also include advocating for change outside of the clinical setting (Markin & Coleman, 2023) and learning the collective history of their systemic trauma (Williams & Jaftha, 2020). The interacting effect of systemic oppression and tensions over resources suggest that there needs to be a fundamental change in the oppressive systems that are the substrates of the crisis and non-response (Clayton, 2021; Raleigh, 2010). Furthermore, addressing the climate crisis may require more relationally focused methods to fundamentally change how we relate and interact with one another.

The American Psychological Association (2011) reaffirmed psychologist's duty to address the climate crisis by centering the human-environment relationship in mental healthcare, acknowledging human behavior as a driving force behind the crisis, recognizing the disproportionate impact the climate crisis has on marginalized groups, and understanding the processes that prevent public comprehension of the crisis (APA, 2011). The APA report further asserts that psychologists and mental health professionals need to utilize education, community engagement, and research to disseminate knowledge about the climate crisis (APA, 2011). The APA (2020) later reaffirmed its 2011 policy on addressing the climate crisis by including the demand for cross-disciplinary research to explore solutions (APA, 2020). Increasing community

and social engagement will increase mutual empathy between groups and dismantle pervasive “othering” that has resulted from political polarization (Jordan, 2018; Kubin & von Sikorski, 2021). Psychology researchers have recommended the reduction and selective exposure to social media to reduce political polarization and the emotional distance it creates (Kubin & von Sikorski, 2021). Clinicians may consider using relational-cultural approaches to increase mutual empathy, decrease isolation, and strengthen identity development at the individual level (Jordan, 2018; Liu et al., 2022). Relational-cultural therapy harnesses connective strategies that improve self-compassion, connection with others, and build mutual empathy (Jordan, 2018; Liu et al., 2022; Westcott & Grimes, 2023).

Clinicians may also consider the evidence of this study to encourage psychologically adaptive behaviors for clients who report feeling anxious about the climate. Because climate change anxiety is associated with higher levels of psychological adaptation, clinicians may use action-focused coping as a therapeutic tool to alleviate climate anxiety (Hogg et al., 2021). To explore the complexity of the climate crisis in clinical settings, clinicians must consider multiple disciplines in their assessment of climate human health and well-being. Psychologists have newly suggested the exploration of posthuman knowledge in providing ecological context for human emotions by facilitating existential reflections about one’s humanity, their relationship to their planet, their relationship with other humans, and their relationship with non-humans as a means to address climate anxiety (Boyd et al., 2022). Clinicians may also note that individuals who report having experience with climate change are more likely to respond to the crisis with psychologically adaptive behaviors which give clinicians more insight about who is more likely to respond pro-environmentally.

## **Future Research**

Nationality and level of industrialization in one's dwelling country may play a role in how one responds to climate change, an important consideration of future investigations. Future initiatives may consider more intentional sampling of specialized groups including young people, Indigenous groups, and those working in agricultural industries. In order to dismantle the extreme polarization that has resulted from social media, scientists might consider more relationally informed methods to build mutual empathy between groups. More research is needed in order to identify mechanisms that permeate bipartisanship between groups, an important precedent for promoting cooperation and mutual empathy (Christie & Morrison, 2021; Wong-Parodi & Feygina, 2020). This study did not account for levels of trust in authority, and it may enrich the data to include items that assess political polarization and trust in leadership when evaluating future mechanisms for change.

Part of this work may involve exploring methodology that will challenge the negative relational images that have been shaped by disinformation, political tensions, and systemic oppression (Jordan, 2018). Individuals who use social media build up relational schemas that often reflect demonized versions of others who subscribe to a particular political ideology (Hultman et al., 2019; Jordan, 2018; Kubin & von Sikorski, 2021; Raleigh, 2010). This polarization occludes the individual's perceptions about the dynamic and flawed nature of another person who is different than them, naturally having "good" and "bad" aspects of themselves (Hultman et al., 2019; Kubin & von Sikorski, 2021). This pervasive act of "othering" those who do not have the same values, has inhibited bipartisan efforts and has further isolated individuals and communities (Hultman et al., 2019; Jordan, 2018; Kubin & von Sikorski, 2021; Zhou, 2016).

Given the limitations of this study, researchers might expand the measurement of experience with climate change to confirm whether the impacts reported are climate-related. Similarly, researchers might consider expanding current measurements of climate change denial. An improved measure for climate change denialism might include items that assess for emotional detachment from the crisis or behavioral discrepancies that diverge from a person's emotional feelings about the crisis. Future research may also consider other areas of marginalization that may not have been captured by the demographic form of this study, such as disability, relationship orientation, or sexuality. A more reliable measure is needed to assess marginalization that includes a wide range of marginalized identities. Improving the marginalization measure might include adding demographic items or clinical interviewing.

This study confirmed that there is no effect of empowerment or powerlessness messaging on psychological adaptation, so future studies may explore other mechanisms for change that can better improve psychological adaptation. To improve empowerment strategies, researchers might consider exploring the duration of the effects of empowerment and the process of internalizing a sense of empowerment using a longitudinal research design. It may require more than one exposure of the film to internalize the positive effect of empowerment.

Future studies may also intentionally sample those with pre-existing climate anxiety in order to assess levels of psychological adaptation and may also consider the impact of exposure to social media and political polarization's effect on psychological adaptation. Continuing to address the worsening mental health crisis resulting from climate change requires ongoing consultation and cross-disciplinary insight from environmental scientists, political experts, religious leaders, educators, and other related field experts.

## Strengths

An important strength of this study is the added evidence that more collective and relational methods are needed to restore the foundation of human connection with one another and to our environment. Evidence showed that the visual manipulation of this condition did not yield an effect, suggesting that scientists may use more systemic approaches to improve human relations. An added strength of this study is the diverse sample pool which strengthens the generalizability of the study. Having a multinational sample gives cross-cultural data on the effectiveness of the messaging framing and whether the same mechanisms for change apply to varying groups. The diversity of the sample pool accentuates the need for multicultural considerations when formulating climate solutions.

An additional strength of this study is the confirmation that neither visual nor written empowerment and powerlessness messaging had a significant effect on psychological adaptation. While the written presentations of empowerment and powerlessness messaging yielded a small relationship with psychological adaptation (Clayton & Karazsia, 2020), it was expected that visual empowerment and powerlessness depictions would yield stronger effects. This messaging effect did not appear significant in either study, which suggests that other mechanisms for change should be considered.

This study sought interdisciplinary review and editing from Ecologist Dr. Annika Nelson, which adds to the strength of the study's interpretation. Climate change is a multifaceted, complex crisis that requires expertise from several areas to make well-informed investigations. Because of the interdisciplinary nature of the study, the results have practical implications for future directions in research to examine dynamic mechanisms for change. Future research should

continue to include environmental scientists, political experts, and other relevant fields in future research.

### **Limitations**

There are some limitations of the study that may contextualize the results. The empowerment film condition featured messaging highlighting bipartisanship, cooperation, and constructive narratives around climate change action that targeted participants' self-efficacy. There are, however, still other important factors of empowerment that may have been unaccounted for, such as a person's sense of control over their situation. Future studies may remedy this by also empowering participants with resources or a set of tangible and direct actions to take within the survey. Other applicable tools for empowerment to consider are community-building initiatives with an aim to facilitate bipartisan dialogs. This study did not include political affiliation as a variable in the analysis which may limit the interpretation of these findings.

The measurement of marginalization may need to be reviewed as the demographic form did not inquire about disability status, sexuality, and other marginalized identities, which may limit the interpretation of the independent samples *t*-test. If other areas of marginalization were accounted for, climate anxiety levels may have been higher for the multiply marginalized (Hall & Carlson, 2016). Additionally, not all items were used in the demographic form which may limit the interpretation of the marginalization measure. The marginalization outcomes of this study may have been limited due to the uneven distribution of the U.S. citizenship variable in the marginalization measure. The dynamic nature of marginalization may require more complex psychometric tools, such as clinical interviewing or additional demographic form items. . . Scientific knowledge of the climate crisis also contributes to whether or not someone worries

about climate change (Ojala, 2022), and the lack of climate change education in United States public schools is pervasive (Khalidi & Ramsey, 2019; Siegner & Stapert, 2020). The deficit of scientific knowledge and understanding about the climate crisis widely available to the public may provide an explanation as to why there were no exceptional findings for climate anxiety levels in the marginalized and non-marginalized.

The absence of an empowerment effect may be due to missing components of motivational empowerment. A person feels motivationally empowered when an individual's power needs are met, they have adequate resources, and when they feel they have the capability to manage their situation (Conger & Kanungo, 1988), and it appears that the film conditions did not satisfy these aspects of empowerment. Participants experienced no changes in their resources and no meaningful shift in their relative political or social power. Motivational empowerment may not be possible until participants feel in alignment with their leadership and until major infrastructure changes take place that make pro-environmental living more accessible. The duration of the proposed effect from the empowerment and powerlessness film conditions should be noted. It is possible that the length of the films did not last long enough to reach key outcomes in the study. For example, if a person received the empowerment condition, they may not have internalized an increased sense of empowerment in enough time to respond to the Psychological Adaptation Scale (PAS). The lack of this effect may also be due to the under-sampling of Republican-identified persons in the study. Furthermore, there were no items to check for participant's attention for which this inattentiveness may have hindered empowerment effects. More information is needed about the types of resources that strengthen a sense of empowerment and the duration of any benefits gained from increased empowerment.

Additionally, the measurement of experience with climate change was not reliable, with Cronbach's alpha of .54. There is a need to review the validity of the control variable for experience with climate change. It is possible that individuals who have experience with extreme weather events may not attribute those experiences to climate change, which may weaken the validity of the experience with climate change measure. The weakness of the experience with climate change measure may limit the interpretation of the relationship between experience with climate change (EXP) and psychological adaptation (PAS). An improved measure is needed to capture dynamic aspects of climate change impacts. More information is needed about the subjective nature of climate change denialism, experience with climate change, and whether a person who is experiencing extreme weather impacts believes they are attributed to a warming climate. Self-report measures may not be as useful for these purposes.

### **Conclusion**

This study aimed to identify whether there was an effect of empowerment and powerlessness messaging on action responses to climate change. It was thought that climate change denial may have moderated this proposed effect, though the results indicated that there was no observed main effect from the film conditions. This study aimed to gain information about climate anxiety and whether having climate anxiety made an individual more susceptible to this proposed effect. While climate anxiety and experience with climate change are positively associated with psychological adaptation, there was no observed effect of climate anxiety increasing this proposed effect. Taken together, it may be more fruitful to explore between-group solutions that promote collectivism, mutual empathy, and meaning-focused coping tools.

As the perils of the climate crisis increase psychosocial distress and create more danger, rapid solutions are needed to transform how individuals relate to people who are unlike



themselves. Empowerment and powerlessness narratives have no observed effect on how a person responds to climate change, therefore it may be more productive to explore collective approaches to managing climate anxiety and increasing psychological adaptation. Individualism, white supremacy, capitalism, and systemic oppression have been known to be driving forces that have counteracted pro-environmental efforts (Hultman et al., 2019; Krange et al., 2019), and it is imperative that the field of mental health employ a decolonized perspective of our social and ecological concerns.

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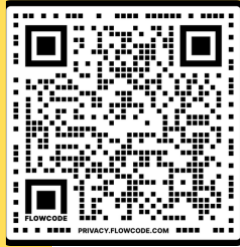
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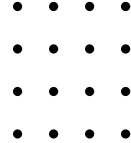
<https://doi.org/10.1080/09644016.2016.1166602>

APPENDIX A

RECRUITMENT FLYER



Use this QR code to  
access our survey  
for research  
participation!



TELL US  
your thoughts about  
**THE**  
**CLIMATE**

YOUR PARTICIPATION IN THIS RESEARCH STUDY IS  
COMPLETELY VOLUNTARY. THERE IS A POTENTIAL  
RISK OF LOSS OF CONFIDENTIALITY IN ALL EMAIL,  
DOWNLOADING, ELECTRONIC MEETINGS AND  
INTERNET TRANSACTIONS.

Are you a TWU  
student needing  
credit? Enter your  
SONA ID  
anonymously at the  
end of the survey!

For questions or concerns about  
this study please contact:

Jamie Campos, B.S.  
Principal Investigator  
jcampos14@twu.edu  
(940) 898 2303

APPENDIX B  
STUDY DISCLOSURE  
TEXAS WOMAN'S UNIVERSITY

Measuring Attitudes About Climate Change Action

Primary Investigator: Jamie Campos; jcampos14@twu.edu; 940-898-2303

Faculty Advisor: Claudia Porras Pyland, PhD.; cporras@twu.edu; 940-898-2312

Key Information: This study is being conducted for research purposes to evaluate the influence of media messaging on action responses to global climate change. The time to complete participation in this study is approximately 20 minutes. Participation in this study is completely voluntary. The risks and benefits of the study are discussed in the following sections.

Study Description: In this study, you will watch a 2-minute video and complete an online questionnaire following the viewing of the film presented. Each response will record how often the statement applies to you. Additionally, you will be asked to provide some basic demographic information. The time to complete this study is estimated to take about 20 minutes. Your participation is completely voluntary, and you may withdraw at any time.

Potential risks and Benefits: Some potential risks of the study may include breaches in confidentiality and being exposed to footage that may elicit an upsetting response. There is potential for confidentiality to be broken in all email communications, electronic meetings,

downloading, and online transactions. Identifiable personal information will not be used, and confidentiality will be maintained to the fullest extent possible. Your participation in this study will provide you with SONA credit as a student in a psychology course.

The researchers will diligently work to ensure that potential risks are minimized as much as possible. You should let the investigator know immediately if there is a problem with participation, and it will be addressed accordingly. Texas Woman's University does not provide medical aid or financial compensation for any injuries incurred by your participation in this study. If you have any further questions about participating in this study, you may contact the researcher or their faculty advisor (see contact information above). If you have any additional questions about your rights as a participant in this study or need any additional information about the management of this study, you can contact the Texas Woman's University Office of Research and Sponsored Programs at 940-898-3378 or by email at [IRB@twu.edu](mailto:IRB@twu.edu).

By proceeding with this survey, you are endorsing that you are 18 years of age or older and have read and agree with the terms of this informed consent form.

Resources for mental health concerns:

Good Grief Network

<https://www.goodgriefnetwork.org/>

TWU CAPS

<https://twu.edu/counseling>

## APPENDIX C

### DEMOGRAPHIC FORM

#### Demographic Form

1. Age:
2. Gender:
  - Man
  - Woman
  - Non-binary
  - Transgender
  - Gender non-conforming
  - Two-Spirit
  - Agender
  - Other, please describe:
  - Prefer not to say
3. Race/Ethnicity:
  - Black or African American
  - White
  - American Indian/Alaska Native
  - Asian American or other Pacific Islander
  - Hispanic or Latiné
  - Biracial
  - Multiracial
  - Other, please describe:
  - Prefer not to say
4. What country have you spent the majority of your life in?
5. Highest level of education
  - Highschool or GED
  - Some college
  - Associate degree
  - Trade or technical degree
  - Bachelor's degree
  - Master's degree
  - PhD or equivalent
6. Household income per year
  - Less than \$13,000
  - \$13,000-\$30,000
  - \$30,000-\$55,000
  - \$55,000-\$70,000
  - \$70,000-\$95,000
  - \$100,000+
7. How many dependents are in your household?
  - 0
  - 1-2
  - 3-4
  - 5-6
  - 6 or more

8. **Employment status:**  
 Unemployed or under-employed  
 Part-time  
 Full-time  
 Student
9. **How would you rate your level of social support?**  
 Poor  
 Fair  
 Good  
 Excellent
10. **Do you have children?**  
 Yes  
 No
11. **Do you want children?**  
 Yes  
 No
12. **Have you experienced food insecurity?**  
 Yes  
 No
13. **Have you experienced housing insecurity?**  
 Yes  
 No
14. **Immigration status**  
 U.S. citizen  
 U.S. resident  
 Immigrant  
 Refugee  
 Undocumented  
 Prefer not to say
15. **Have you ever lost your home, property, or vehicle to a natural disaster or extreme weather event?**  
 Yes  
 No
16. **Have you or someone you love been physically or emotionally harmed by a natural disaster or extreme weather event?**  
 Yes  
 No
17. **Have you ever had to relocate as a result of a natural disaster or extreme weather event?**  
 Yes  
 No
18. **What is your political affiliation**  
 Republican



- Democrat
- Libertarian
- Independent
- Apolitical

## APPENDIX D

### STIMULI

Video #1- Empowerment Condition: <https://vimeo.com/manage/videos/858674706>

Video #2- Powerlessness Condition: <https://vimeo.com/manage/videos/858669885>

## APPENDIX E

### CLIMATE CHANGE DENIAL SCALE

Please rate the following items as either true or false:

1. The effects of global warming will never happen.
2. Recent temperature increases are not primarily due to human activities.
3. There is no scientific consensus that global warming is occurring.
4. The seriousness of global warming is generally exaggerated in the media.
5. I do not worry about global warming at all.

## APPENDIX F

### CLIMATE ANXIETY SCALE

Please rate the following items on a 5-point Likert scale, where 1= never, 2= rarely, 3= sometimes, 4= often, and 5= almost always.

1. Thinking about climate change makes it difficult to concentrate.
2. Thinking about climate change makes it difficult for me to sleep.
3. I have nightmares about climate change.
4. I find myself crying because of climate change.
5. I think, “why can’t I handle climate change better?”
6. I go away by myself and think about why I feel this way about climate change.
7. I write down my thoughts about climate change and analyze them.
8. I think, “why do I react to climate change this way?”
9. My concerns about climate change make it difficult to have fun with family or friends.
10. I have problems balancing my concerns about sustainability with the needs of my family.
11. My concerns about climate change interfere with my ability to get work or school assignments done.
12. My concerns about climate change undermine my ability to work to my potential.
13. My friends say I think about climate change too much.
14. I have been directly affected by climate change.
15. I know someone who has been directly affected by climate change.
16. I have noticed a change in a place that is important to me due to climate change.
17. I wish I behaved more sustainably.
18. I recycle.

19. I turn off lights.

20. I try to reduce my behaviors that contribute to climate change.

21. I feel guilty if I waste energy.

22. I believe I can do something to help address the problem of climate change.

## APPENDIX G

### PSYCHOLOGICAL ADAPTATION SCALE

Please rate the following items on a 5-point Likert scale where 1= never, 2= rarely, 3= sometimes, 4= often, and 5= almost always.

1. I have changed the way I think about the seriousness of environmental problems because of climate change.
2. I have seriously thought about alternative places to live because of the increasingly evident impacts of climate change
3. I am increasingly aware of how my daily activities might be affecting the natural environment
4. In recent years I have thought more about what I and my family might do to reduce our carbon footprint
5. When considering the challenges of climate change it is important to look for things that I can address and change in my everyday life
6. Climate change has forced me to change the way I think about and view how we live in and use our natural environment
7. I tend to think differently these days about what is acceptable and sustainable and not acceptable with respect to consumer products and packaging, and consumption in general