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# The Psychological Impacts of Climate Change Education on Undergraduate Students

Maya Bostwick

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Maya Bostwick

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Advisors:
Amy Seidl, PhD, Associate Director, Senior Lecturer, University of Vermont
Rachelle Gould, PhD, Assistant Professor, University of Vermont
Chair: Alice Fothergill, PhD, Professor, University of Vermont

**Abstract**

This undergraduate senior thesis focuses on the mental health effects of learning about climate change in a college environment and students' ability to cope with these effects. Specifically, this research asks if increased understanding about climate change makes a student more or less able to cope with the psychological impacts of climate knowledge. Anxiety, grief, and despair can impede climate action, and for a younger generation who is facing the greatest environmental challenge to date, it is vital that they are well-prepared to cope with their climate emotions in a way that does not prevent them from making change. I surveyed and conducted a focus group of sophomores and seniors majoring in both environmental science and environmental studies at the University of Vermont (UVM) about their prevailing emotions surrounding climate change, how their environmental classes affect their emotions, and if they have coping strategies to navigate negative emotions. While this study is centered on the student experience and does not intend to order professors to teach their classes in a certain way, the data prompts several considerations about affective preparedness in environmental education.

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**Table of Contents**

## Introduction

Climate change is a familiar threat that looms over us all. It has integrated itself into our everyday lives, and shows up in our media, policy, and economics. It is a global problem that demands attention and immediate action if we are to avoid global warming beyond 1.5°C in the coming decades (IPCC, 2018). The burden climate change puts on today's society is great and requires a cohort of strong-willed, resilient people to take on such an enormous existential challenge.

Younger generations are more likely to carry this burden and be the ones to spur long lasting action campaigns. They are the generations who are inheriting a climate-changed world that puts the very idea of a stable future at risk. Because of this, young people face a tremendous amount of pressure if they are to take on environmental issues.

Climate anxiety, grief, and despair can be major roadblocks to action. The scale of climate change makes it overwhelming, causing paralyzing fear or depression. Affective preparedness is an essential ingredient to the environmental movement that is often overlooked (Ray, 2018). Just as we strive to make ecosystems more resilient, we must strive to make people resilient to the psychological toll that climate change takes. Because young people are set up to lead climate action, encouraging resilience and healthy coping mechanisms in this cohort of people is particularly impactful.

This study uses environmental students at the University of Vermont (UVM) as a looking glass into how affectively prepared the future climate activists, policymakers, and scientists are to take on the challenge of their future. The term "affective" is a psychological term referring to moods or feelings. UVM provides a good microenvironment to study because it is well known for its Environmental Program and houses a population of environmental students who have

dedicated themselves to becoming very educated about environmental issues. UVM is also home to a variety of environmental clubs and organizations that students choose to participate in, ranging from Vermont Students Towards Environmental Protection (VSTEP) to the UVM Beekeepers. If highly educated and involved students are finding themselves downtrodden by their emotional response to climate education, it does not reflect well on being able to make real progress in mitigating climate change.

This thesis serves as a preliminary investigation into whether environmental students are struggling with their mental health as a result of their climate change education at UVM, and if there are ways to help prepare them to be more resilient. The goals of this study are to bring light to students' personal experiences and serve as a resource for educators who are curious about the effect that climate change education has on their students' emotional health.

## Literature Review

### *Climate Change and Its Effects*

Climate science is a discipline that has been around for centuries, with records of weather and temperature beginning as early as the 1600s after the invention of the thermometer (Le Treut et al., 2007). Climate science has since built upon these foundations to give scientists a more sophisticated understanding of climate. Climate models have grown more complex since the 1970s as physics helped us gain a deeper understanding of how different aspects of climate interact. From 1951 and 1997, the amount of climate science literature grew exponentially as scientific tools and methodology advanced (Le Treut et al., 2007).

The 1960s era also brought environmental awareness to the forefront of popular culture. Rachel Carson's *Silent Spring* called attention to the dangers of using chemicals like DDT in

agriculture and pest control, eventually leading to the government restriction or prohibition of every chemical named in her book by 1975. Some scholars go as far as to say that Carson's book championed the modern environmental movement, changing American views on environment and inspiring a period of activism (Stoll, 2012).

Environmental disasters such as oil spills, chemical fires, and species extinction brought on more activism that eventually led to the celebration of the first Earth Day on April 22, 1970. By October 3, 1970, both the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA) were formed (NOAA, 2019). Since then, the need for environmental protection has only become more pressing as the threat of climate change grows each year.

Climate change in the modern era is largely human caused. A 2018 report by the Intergovernmental Panel on Climate Change (IPCC) states with high confidence that human activities have caused a 1.0°C rise in global temperature, with a likelihood of reaching 1.5°C between 2030 and 2052 if no action is taken (IPCC, 2018).

This rise in temperature will have both direct and indirect effects. Direct effects of climate change are often highly visible, such as human health issues brought on by extreme weather events. Other direct effects happen over a longer period but can be clearly linked to climate change, such as forced migration due to sea level rise (Clayton, Manning, Krygsman, & Speiser, 2017). Long term effects like sea level rise will continue for centuries to millennia, affecting both current and future generations (IPCC, 2018).

Indirect effects are not as clearly linked to climate change but are damaging, nonetheless. Society-wide problems like weakened infrastructure and unstable food systems are two ways in which climate change indirectly affects people at a broad scale. Stress reactions brought on by

direct effects of climate change and chronic stress from long-term environmental changes are other ways that climate change indirectly causes harm (Maier, Whitehead, & Walter, 2018). The emotional distress brought on by losing one's home to a disaster caused by a natural hazard or being food insecure, for example, is an indirect effect of climate change. A 2017 guide sponsored by the American Psychological Association (APA), Climate for Health, and ecoAmerica explains that "gradual, long-term changes in climate can also precipitate a number of emotions, including fear, anger, feelings of powerlessness, or exhaustion" (Clayton et al., 2017). Even without experiencing a direct, traumatic event caused by climate change, the existential threat itself can be overwhelming.

### *Psychological Effects of Climate Change*

There is a multitude of words used by scholars to describe the psychological effects of climate change. One of the most general terms is "eco-anxiety." The APA describes eco-anxiety as "a chronic fear of environmental doom" or "watching the slow and seemingly irrevocable impacts of climate change unfold, and worrying about the future for oneself, children, and later generations" (Clayton et al., 2017). In this way, eco-anxiety differs from an emotional response to experiencing a direct effect of climate change because it is more existential; it is a fear that climate change is taking away the future (Pihkala, 2018).

Preceding the creation and widespread use of eco-anxiety is the term "solastalgia," coined by Glenn Albrecht in 2005. Solastalgia is not merely another word for eco-anxiety, however, as it describes a more specific emotional response. In Albrecht's own words, "solastalgia is the pain or sickness caused by the loss or lack of solace and the sense of isolation connected to the present state of one's home and territory" (Albrecht, 2005). In this way,

solastalgia is distinct from eco-anxiety because it refers to the pain of losing one's home in the present, not a general fear of the future. Solastalgia is most often a result of a direct experience, such as watching one's homeland be irreversibly changed by climate change. The term is based on the concept that a person's sense of place is important to their identity, and that the loss of that sense of place is emotionally distressing (Albrecht, 2005).

Albrecht also coined the term "ecoparalysis" to describe a different kind of ecological distress, one where a person is overwhelmed by their care for an environmental issue. Ecoparalysis is notable because it proposes the idea that a lack of action does not always come from apathy. In fact, ecoparalysis comes from the opposite; instead of not caring about the environment, people care too much and are paralyzed by their emotions (Pihkala, 2018). Sally Weintrobe, a psychoanalyst who focuses on climate change, describes something similar, calling it "environmental melancholia" when people are overwhelmed by their emotions towards an environmental threat (Weintrobe, 2013). Ecoparalysis and environmental melancholia demonstrate the affective side of climate action, and how being unable to control one's distress about environmental issues can lead to inaction, thus preventing much-needed progress from being made.

*Grief*

As the natural world goes through widespread changes and losses, ecological grief is another very present emotion. Ecological grief is similar to personal grief in the way that people respond to the loss emotionally, physically, and behaviorally. Secondary emotions such as anger or helplessness can arise out of both ecological and personal grief (Eaton, 2017). Grief also has a physical component, causing fatigue, headaches, or gastrointestinal problems. Ecoparalysis, for

example, can be seen as a symptom of ecological grief in the way that it creates a lack of energy or motivation to act. Furthermore, grief alters our behaviors by causing depression, trouble sleeping, or appetite issues (Eaton, 2017). Substance abuse is another behavioral symptom of grief that ecological grief can perpetuate, as people turn to drugs or alcohol to cope with the emotional pain they feel (Albrecht, 2005).

While the response to ecological grief is like personal grief, ecological grief is distinct for reasons of complicity, scale, and magnitude. While we do not usually play a firsthand role in the death of a loved one, for example, we are complicit in creating environmental destruction through our everyday carbon footprint (Eaton, 2017). These feelings of personal responsibility complicate environmental grief because we are not only grieving a loss, but we also have to come to terms with the idea that we are not innocent when it comes to environmental degradation. The scale and magnitude of ecological grief are also different than a personal loss. Again, the loss of a loved one is usually a singular and relatively isolated event, but habitat destruction, disasters, and species extinction happen all the time on a global scale. We are confronted with this environmental loss every day, not only through personal experience but through the media, who give us narratives from all around the globe. We are not having to deal with a singular loss at a time, but with countless losses at what feels like a constant rate (Eaton, 2017). Loss at this scale and magnitude can be paralyzing and create overwhelming grief, anger, and hopelessness.

Ecological grief can come from a variety of sources. First, there is the ecological grief that comes from a physical loss, or as Albrecht calls it, solastalgia. This grief comes from losing a physical place that a person has a deep connection to. While this loss can come from a singular

event such as a hurricane, it can also develop slowly over time as gradual changes eventually lead to the loss of a once-known physical environment (Cunsolo & Ellis, 2018).

The loss of a physical environment also comes with the loss of environmental knowledge, another source of ecological grief. People who live in close relation to the land have extensive knowledge about their environment. Once this environment is disrupted by climate change, that knowledge is lost. As ecological knowledge is tied to the identity of many groups who live closely with the land, physical environmental loss can also lead to loss of cultural identity, causing deep ecological grief for those who experience it (Cunsolo & Ellis, 2018).

Ecological grief can also come from a fear of future losses. In the same way that environmental grief can stem from the loss of cultural knowledge, this future-facing grief comes from the sadness associated with losing cultures or ways of life to climate change in the future. Anticipated grief is closely associated with eco-anxiety because it comes from fears about what the future will look like, and despair about what we will lose (Cunsolo & Ellis, 2018).

The fear and grief that come from climate change are extraordinarily complex because they force us to take on these emotions at a scale and magnitude that we may be unprepared to face. Given the overwhelming nature of these emotions, understanding how people cope with negative emotions and finding ways to manage them in a healthy way are essential to creating hopeful, motivated citizens who are ready to take action against climate change.

## ***Ways of Coping***

### *The Transactional Model of Coping*

One method of looking at the ways humans cope with strong emotions is the transactional model of coping. As researcher Maria Ojala summarizes, the transactional model of coping states

that “people use coping strategies to handle stress and negative emotions, and their choice of such strategies will affect their behavior and psychological well-being” (Ojala & Bengtsson, 2019). The transactional coping model has two appraisal stages. In primary appraisal, a person determines whether a situation is a threat to something they value. If they determine that the situation is a threat, negative emotions arise. In the context of climate change, this could look like a person wondering whether or not climate change will impact their children’s futures. When they determine that climate change does pose a threat to the quality of life their children will have, they could start to feel fear, anger, grief, or hopelessness.

During the secondary appraisal stage, people try and cope with the emotions caused by the threatening situation. The transactional model of coping proposes two categories of coping: emotion-focused coping and problem-focused coping. In emotion-focused coping, the coping is centered around getting rid of the emotion itself. People may avoid current or future situations that cause negative emotions or try to distance and distract themselves from the situation at hand. In problem-focused coping, people try and confront the situation head-on to dispel their negative emotions. They may take direct action against the threatening situation or talk with others to create a plan (Ojala & Bengtsson, 2019).

While the transactional model of coping only outlines these two ways of coping, Ojala proposes a third: meaning-focused coping. Meaning-focused coping promotes positive emotions as a way to alleviate negative ones. Meaning-focused coping does not try and get rid of the negative emotions altogether but allows positive emotions to “work as buffers, helping people confront the sources of their worry, thereby promoting problem-focused coping and active engagement” (Ojala & Bengtsson, 2019). While emotion-focused coping such as avoidance or distraction impedes problem-focused coping, meaning-focused coping promotes problem-

focused coping by encouraging action and making negative emotions less paralyzing. Meaning-focused coping is especially useful when the threat level of a situation, like climate change, cannot be reduced (Ojala & Bengtsson, 2019).

*Denial, Negation, and Disavowal*

Although meaning-focused coping and problem-focused coping may be the most effective way of coping with climate change, emotion-focused coping is the most prevalent. Denial, negation, and disavowal are three ways of emotion-focused coping that are present in Western culture when dealing with climate change.

The difference between climate denial and negation is a subtle one. According to Sally Weintrobe, climate denialism "involves campaigns of misinformation about climate change, funded by commercial and ideological interests" (Weintrobe, 2013). We see this in narratives that try and discredit climate science and claim that climate change is not human-caused, or that it is not happening at all. Climate deniers seek to avoid the problem of climate change by trying to change the dominant narrative about it. Denial is laregly present in wealthy Western nations, many of which are demonstrating declining levels of climate concern in spite of strengthened climate science. Interestingly, some studies show a relationship between cliamte change denial and speaking English (Stoknes, 2015).

Climate negation, on the other hand, openly rejects the idea of climate change. Negation is a coping mechanism used to distance oneself from the problem of climate change and the emotions that follow it by claiming the entire problem is not real. It is a defense mechanism against the overwhelming feelings of grief and fear that might be too much to handle when

learning about climate change (Weintrobe, 2013). Negation is a psychological solution to climate change, one that allows an individual to rid themselves of the emotional burden (Stoknes, 2015).

Disavowal is another form of emotion-focused coping that is a bit more nuanced than denial or negation. Disavowal accepts that climate change is real, but minimizes the danger of the situation. This kind of thinking can be dangerous on its own because it unconsciously distorts reality in a way that prevents the truth from being seen or accepted (Fletcher, 2018). Not only does this thinking have ramifications on climate action as a whole, it also impacts an individual's psyche. Minimizing the significance of climate change comes with an inability to accurately percieve guilt and responsibility. As Weintrobe explains,

> One of the consequences of disavowal is an increasing difficulty in thinking with any sense of proportion about issues of guilt and responsibility for our share of the damage. With disavowal we can simultaneously feel it is none of my fault while unconsciously increasing feeling it is all my fault, thereby losing an ordinary sense of mea culpa – that it is some of my fault (Weintrobe, 2013).

The tension between knowing the reality of climate change and repressing it does not solve emotional issues, it intensifies them. Knowing climate change is real but refusing to face it only causes more anxiety and guilt, which leads to more disavowal, creating a viscious cycle (Pihkala, 2018). The results of Maria Ojala's 2019 study on coping and proenvironmental behavior further support this idea, stating that "deemphasizing the problem [of climate change] was negatively associated with proenvironmental behavior, whereas problem-focused and meaning-focused coping were positively associated with proenvironmental behavior" (Ojala & Bengtsson, 2019). While disavowal is known to be ineffective in combatting negative emotions, it is unfortunately

one of the most prevalent responses to climate change in the Western world, along with denial (Weintrobe, 2013).

### *Generational Concerns*

#### *Psychological Impacts on Young People*

While climate anxiety, guilt, and despair affect people of all ages, the psychological impacts on young people are especially important to acknowledge. Young people are uniquely positioned to make significant future change, but they will be doomed from the start if they are dragged down by their own emotional responses to climate change. As mentioned previously, emotional distress brought on by climate change can cause additional psychological problems like substance abuse and other mental health disorders (Albrecht, 2005; Clayton et al., 2017). If this generation of young people is already struggling with their own mental health issues, they are not likely to be motivated to take on a problem so global as climate change. A 2019 survey by the APA revealed that Generation Z reported having worse mental health than older generations. Mass shootings and a rise in suicide rates were the topmost reported stressors for Gen Z, with climate change rounding out the top three. Fifty-eight percent of Gen Z reported stress caused by news events related to climate change (Bethune, 2019). Climate change is clearly a significant cause of emotional distress for young people, and they generally have a pessimistic view of their future. This is further compounded by the other stressors Gen Z report feeling, leading to a lack of empowerment to do the work that is necessary to change the grim outlook that so many young people hold (Ojala & Bengtsson, 2019).

Furthermore, the way that adults respond to the worries of young people influences their sense of agency. Studies have shown that young people who have healthy coping mechanisms

and a sense of empowerment also feel that adults take their emotions seriously when talking about climate change. On the other hand, young people who turn to disavowal to cope with climate change feel like adults do not take their emotions seriously, therefore causing them to feel like they cannot have any influence on the future (Ojala & Bengtsson, 2019). Older generations have an obligation to help young people combat climate change, and part of this means giving them the tools to express their emotions and manage them in a healthy way.

### *Intergenerational Equity*

This generational obligation comes from the concept of intergenerational equity. Climate change affects younger generations disproportionately; they will be around longer and will suffer the future effects of climate change more than older generations. The effect of climate change on younger generations has become central to the environmental movement, with young people expressing an urgency to act and anger towards older generations for leaving them with an environmental mess (Diprose, Liu, Valentine, Vanderbeck, & McQuaid, 2019). Younger generations are calling upon the argument of intergenerational equity to back up their moral claim to a better future.

Intergenerational equity sets forth the idea that well-being should be distributed through time, "ensuring the well-being of present and future generations of a population or nation" and "promoting temporal sustainability of a well-being decision" (Summers & Smith, 2014). A 2013 Report of the UN Secretary-General on Intergenerational Solidarity and the Needs of Future Generations proposes three elements of intergenerational equity: the conservation of options, the conservation of quality, and the conservation of access (Weiss, 2019). These three elements are intentionally vague to give future generations the flexibility of having their own values and

preferences. Intergenerational equity is complicated in this sense because it is trying to ensure well-being for generations that are perhaps not even born yet, meaning they cannot speak for themselves or fight for their own values. However, intergenerational equity assumes that future generations have collective rights, and that one of these rights is a stable climate on Earth (Weiss, 2019).

Intergenerational equity can be split into two different focal points: diachronic equity and synchronic equity. Diachronic equity focuses on equity between generations who are alive today and those who are not yet born (Diprose et al., 2019). As mentioned above, this is complicated by the fact that unborn generations cannot advocate for themselves. Synchronic equity deals with equity between different generations that are alive today (Diprose et al., 2019). Conversations around current inequities that affect today's young people, such as mental health and climate change, are centered around synchronic equity rather than diachronic equity.

It is also important to note that climate change is not the only inequity that younger generations are facing today. Wealth accumulation and debt are two other areas where young people are falling short of previous generations. When Baby Boomers were 35, for example, they held over one fifth of U.S. wealth while Generation X held less than a tenth of American wealth by the time they were 35 (Schwab, 2020). American federal debt is also increasing, burdening younger generations who are already struggling with their own student debt (Schwab, 2020). On top of all this is, of course, climate change. Faced with the threat of surpassing a 2°C global warming, younger generations are faced with either having to leave behind the lifestyles that previous Western generations led or to find sustainable solutions fast. This leaves an unbelievable amount of pressure on young people to solve problems that have been accruing for decades or more, some of which they had nothing to do with creating.

Generational injustice is clearly already present today. Discourse surrounding intergenerational equity, however, often talks about preventing inequity, but not what to do after it happens (Almassi, 2017). Bringing reparative justice into intergenerational equity can help bridge this gap and fix current problems of injustice. Reparative justice is distinct from both compensatory justice, which centers around soothing the injured group, and retributive justice, which focuses on punishing the group at fault (Almassi, 2017). Rebuilding trust and confidence in shared values and our ability to uphold them are key components of reparative justice. It is an important yet overlooked aspect of intergenerational equity because it ensures longevity of a moral standard, even if groups fail to meet that standard. This kind of action goes deeper than just taking responsibility for past wrong-doings and moving on, it requires restoring intergenerational trust. The environmental movement has great potential to enact reparative justice and focus on building a better future through intergenerational trust and respect.

### *Integrating Affective Preparedness into Environmental Education*

The paralyzing effects that negative climate emotions can have combined with young people's unique position to create change means that they need to be educated on how to deal with their climate emotions in a healthy way. Failure to educate students affectively can be framed as a failure of the intergenerational obligation to prepare younger generations to mitigate climate change. Environmental education is a fitting place to start working on providing students with all the tools they need to combat climate change, including affective coping skills.

The North American Association for Environmental Education (NAAEE) defines environmental education as "a process that helps individuals, communities, and organizations learn more about the environment, and develop skills and understanding about how to address

global challenges" (NAAEE). Environmental education is an ongoing, interdisciplinary process that promotes action and civic engagement. In order to promote a sense of self-efficacy and motivation to combat climate change, environmental education must provide both climate knowledge and affective knowledge.

A sustainability worldview is one important way in which environmental education can change ways of thinking to be more conducive to climate change mitigation. A person with a sustainability worldview holds values and perceptions that support sustainability, is future-oriented, and is solutions-focused (Nolet, 2016). The threat of climate change requires a sustainability worldview. As Victor Nolet, scholar of sustainability education, explains,

> the tremendous challenges we face today are unparalleled in human existence, but the thinking that informs our public policy, our educational institutions, and our financial systems has changed very little since the dawn of the Industrial Revolution (Nolet, 2016).

A changing world requires a change in thinking, and environmental education helps this shift by introducing a sustainability worldview to students.

While a sustainability worldview is a fundamental way to encourage climate change mitigation, a person's values are often very ingrained and difficult to change. While environmental educators can introduce other values that are aligned with sustainability and climate mitigation, they can also create active climate citizens by giving students general information about climate change and other environmental issues. Studies have shown that having climate change knowledge increases the likelihood that somebody is concerned about climate change, even if their culture or ideology makes them more likely to be a climate skeptic (Stevenson, Nils Peterson, & Bondell, 2018).

Climate knowledge alone, however, is not enough to change behavior and make people more likely to act on climate change (Stevenson et al., 2018). Climate change requires not just physical adaptation, but mental adaptation as well. Environmental education can address this in an interdisciplinary way by bringing in psychological concepts. Psychology can give educators insight into how people understand climate change and are affected by it mentally. It can also help environmental educators understand the potential mental health effects of climate change, and how fostering emotional resilience and mindfulness are valuable to helping students cope with climate change (Maier et al., 2018).

This affective piece of environmental education is at risk of being overlooked in favor of factual knowledge. For example, the NAAEE standards for K-12 environmental education do not explicitly mention affective knowledge (Simmon et al., 2010). The standards do address civic engagement and responsibility but operate under the assumption that "environmentally literate citizens are willing and able to act on their own conclusions about what should be done to ensure environmental quality" (Simmon et al., 2010). However, emotional responses to environmental issues like solastalgia, ecoparalysis, and eco-anxiety prove that having environmental knowledge does not necessarily translate into a willingness or ability to act. Fostering self-efficacy is essential to fostering change, and this cannot be done without teaching emotional resilience (Nolet, 2016). Just as climate knowledge has shown to positively relate to climate change concern, climate hope positively relates to environmental engagement (Stevenson et al., 2018).

Additionally, an inability to manage strong emotions can be detrimental to environmental education itself. Studies have shown that anxiety disrupts cognition, reduces reflective thinking, and creates a sense of isolation. These effects contradict the goals of environmental education, which seek to encourage reflection and collective agency (Wallace,

Greenburg, & Clark, 2020). Anxiety and despair impact educators and students alike, and the failure to talk openly about the emotional effects of climate change can cause both students and teachers to feel as if they have to put on a façade. Educators may feel pressure to show that they are knowledgeable about the subject and that it is unprofessional to express fear or sadness. Students, in turn, feel isolated in their emotional response to what they learn in class because they may feel that their professors and peers do not feel the same way (Wallace et al., 2020). Bringing an affective element into environmental education can improve the way this subject is taught, making the classroom a more open and honest place that is conducive to learning.

### *Contemplative Practices in Environmental Education*

Contemplative practices are one strategy for integrating an affective element into environmental education. As discussed previously, climate knowledge is not enough to encourage action. This statement, however, is based on a narrow, typically Western view of what knowledge is. When we talk about climate knowledge, we are often referring to tangible information – the cold hard facts and figures of climate change. Using contemplative practices in environmental education recognizes that knowledge is not just intellect, it includes "intuitive flashes of insight, emotional upwellings, inarticulate but expansive senses of awareness, and compassionate sensitivities" (Wapner, 2016). Academia often ignores this aspect of knowledge, and while contemplative practices are not a complete solution to this institutional issue, they are effective ways of promoting emotional resilience in environmental education.

Contemplative practices are "techniques for self-reflection and concentration" (Wapner, 2016). This includes activities like journaling, meditation, and yoga that encourage an individual to look inside themselves and get in touch with their emotions without drowning in them.

Contemplative practices do not seek to rid a person of their anger, despair, or sadness but rather teach them to slow their reaction to the emotions they feel. Practices like journaling and meditation force people to self-reflect on their inner workings, which can help them understand their motivations for climate action or the roadblocks preventing them from feeling like they can make a difference. These practices can also help re-frame environmental activism and reduce the sense of urgency that often causes activist burnout by helping people recognize that "environmental engagement is not a series of battles but a way of life, and one filled with a combination of sorrow, joy, disappointment, and achievement" (Wapner, 2016). This way of thinking about environmental engagement is conducive to longevity by making the individual aware that their current emotional state is part of a larger whole.

While meditation, yoga, and journaling are the most obvious examples of contemplative practices, there are many ways to integrate contemplative practices into education. Professor Paul Wapner at American University, for example, asks his students to exercise three types of change as a way to integrate contemplative practices into his class. First, he asks students to make "external, institutional change," such as writing a letter to a congressman or state representative (Wapner, 2016). Second, he asks students to change their lifestyle in one way that aligns with their values, like eating vegetarian. Third, he asks students to change the way they view climate change solutions. The last practice is the most vague but tries to encourage students to self-reflect on how they can come to terms with the fact that they alone will not "solve" climate change (Wapner, 2016).

Contemplative practices can also be structured as more concrete assignments to better meld with an existing curriculum. Assigning activities like an environmental gratitude journal or a product life cycle activity can help foster gratitude in students. Gratitude plays a role in coping

with climate change by helping students focus on good things as well as the bad and become more resilient to disturbing information (Davies, 2017). Activities such as building a community map or doing a group project can foster a sense of place and community, preventing feelings of isolation or burnout (Davies, 2017).

Integrating affective education into environmental education is essential to fostering agency and action within students. This generation of young people are living in a reality that is overshadowed by climate change, making their ability to act crucial to the future of the planet. Acknowledging the role emotion plays in reacting to climate change is an essential component to the discourse surrounding climate change mitigation and environmental education.

**Objectives**

This research seeks to gain a deeper understanding of how environmental science (ENSC) and environmental studies (ENVS) students at UVM cope with the reality of climate change as they understand more about the complexities of the issue. UVM's Environmental Program has a near fifty-year history teaching undergraduates and is one of the top five majors on campus today. Addressing the psychological impacts that learning about climate change has on college-age students is essential, as they are part of a generation who is coming of age during a time when climate change mitigation is necessary to protect their future. The Environmental Program is well-positioned to tackle this issue and continue to make UVM known for the quality of its environmental education. My hope is that this research can be used as a resource for any educators or students who are interested in integrating an affective element into environmental education.

## Methods

### *Initial Design*

Development of this project began in the spring of 2020. During that semester I took ENVS 201: Research Methods and an Honors Enrichment Contract (HEC) that helped me develop my topic, research question, and thesis proposal. The HEC allowed me to research broad topics that I was interested in, such as intergenerational ethics, climate change and psychology, and environmental education. This preliminary research eventually led me to my topic of research, and I was able to compile an annotated bibliography of sources to help me write my literature review. I also explored autoethnography as a methodology since I was curious about how to navigate my positionality as a student researcher who is researching her own peers. I ultimately decided against using this methodology after learning that autoethnography should be used to give voice to marginalized or oppressed voices (Chawla & Atay, 2017). Since I did not feel like I represented a marginalized group within my chosen topic of research, I decided that using autoethnography would not add anything to this study.

ENVS 201 helped me fine tune my research question and prepare to submit my thesis proposal. I worked on my proposal during the spring and summer of 2020 and submitted it the following fall. During the development of my proposal, I also narrowed down my target populations, which were sophomores and seniors who were majoring in either environmental science or environmental studies. I decided to focus on sophomores because they had already gone through the introduction classes and therefore had a baseline understanding of climate change. I targeted seniors so that there was a large enough gap between the two ages to assume some growth in learning. Once my proposal was approved, I worked on getting IRB approval for my research since I was dealing with human subjects.

### *Data Gathering Methods*

I gathered my data through a survey and a focus group. I started by creating my survey questions and an analysis structure for the questions so I could ensure that I was not asking anything unnecessary. During this process I also looked at other environmental surveys, like the Six Americas study and an American Climate Perspectives survey to get a sense of how to phrase questions and how to visually present analysis (George Mason Univeristy Center for Climate Change Communication & Yale Program on Climate Change Communication, 2009; Speiser, Kobayashi, Lake, & Voss, 2019).

I designed my survey questions to measure the three main aspects of my research question: climate change understanding, coping mechanisms, and the psychological impacts of climate change. I also asked some demographic information, like year, major, and college so I could do further analysis. Due to the affective nature of my topic, I relied heavily on Likert scale questions in order to yield a wider range of responses. I refrained from asking any short answer questions due to the time it would take to code every individual response. Using a Likert scale or allowing students to pick more than one answer when applicable was the best way to strike a balance between getting accurate affective information and keeping the data analysis manageable. Once I had my questions solidified, I created the survey using Qualtrics survey software through UVM and started my data collection in November 2020.

Due to Covid-19, I did all my data collection remotely. Instead of asking people to fill out the survey in person, I dispersed the survey by using university email lists and reaching out to faculty in the environmental science and environmental studies departments to see if they would be willing to share my survey during classes. Since I decided to limit the population to seniors

and sophomores in both environmental science and environmental studies, I reached out to faculty and classes that had the most access to these groups. While distributing the survey online did not create any major roadblocks, conducting focus groups online was considerably more difficult.

Once I had collected my survey data, I started reaching out to participants to see if they were interested in participating in a focus group. In my survey, I gave participants the option to leave their email address if they wanted to be considered for a focus group. I used these emails to reach out to students to schedule meeting times and give them the information and consent forms they needed. I made another survey asking their availability and used that data to schedule two times for the focus groups. My target sample population was to have at least eight participants in each focus group, but I only ended up with four people in a single focus group. While not my original goal, the small focus group had some advantages over a larger focus group. Having four participants ensured that everybody had opportunities to speak and prevented the conversation from being dominated by a single participant. Small focus groups also have the benefits of creating a more intimate, comfortable space for participants and allowing for a more in-depth conversation to happen in a shorter amount of time (Peek & Fothergill, 2009). These were both important components to have in my focus group since I wanted to create a space where participants felt safe enough to talk openly about mental health without causing fatigue from a long conversation.

Because of the Covid-19 pandemic, I conducted the focus group online using Zoom. I opted for Zoom over Microsoft Teams because Zoom allowed participants to change their screen names more easily to stay anonymous. Anonymity during the focus group was the largest

advantage to using an online platform. Participants could change their screen names and keep their cameras off, giving them more privacy than an in-person focus group could allow. The drawback was a less personal feeling to the conversation, because participants could not see each other and unmuting the microphone to speak made the conversation flow less naturally.

I kept my focus group to half an hour because I did not want to fatigue participants with complex and potentially emotional questions. Additionally, I did not provide any incentive to participate in the focus group, so I wanted to be respectful of everyone's time. I started by asking some warmup questions about why students chose UVM and their majors to make them feel comfortable with the focus group setup before moving on to questions related to my research. I wanted my focus group to supplement my survey results, so I again asked questions related to climate change understanding, coping, and psychological effects. I made these questions more open ended than my survey questions so I could get more nuanced answers from participants.

### *Data Analysis Methods*

I kept my data analysis structure for the survey questions relatively simple. I found that calculating the frequency distributions of each subpopulation was an effective way to compare answers between years and majors. I also calculated the mean, median, and mode for the Likert scale questions but quickly realized that it did not provide me with any useful information. I therefore ended up relying on frequency distributions for those questions as well because it was the best way to compare between subpopulations. I also used cross-tabulations to compare two different variables. This was important to see if there were any connections between climate change knowledge and climate change emotions, and if there were any differences between

sophomores and seniors. I used a chi-square test on the cross-tabulations to determine whether there was any statistical significance to the results.

My original plan for the focus group data was to come up with a coding structure and code the transcript of the focus groups to look for mentions of eco-anxiety, different ways of coping, and climate knowledge. However, since I only ended up with one focus group instead of two, and there were half as many participants in that focus group as I would have liked, I did not feel that coding the focus group would yield anything significant. Instead, I decided to use the focus group as a source to pull quotes from to supplement my survey data. This method allowed me to use the focus group in the way I originally intended, as a complement to my survey data that could provide a more personal account of student experiences, without having to spend time doing formal analysis on an extremely minimal dataset.

**Results**

The data analysis of the survey questions showed that no significant overall conclusions could be drawn about whether understanding climate change affects the way students cope with their climate emotions. However, the data still provided some useful insights into climate change understanding, psychological effects, and coping mechanisms in students. The response rate of the survey was 25.41%. 106 responses were returned, and incomplete responses were still counted since most survey questions did not rely on previous answers. This explains the difference in sample size between some questions.

### *Climate Change Knowledge*

Figure 1 shows that many students get their climate information from class, with 42.73% of all participants choosing "in class" as an answer. Doing independent research, the news, and social media were other top responses. As environmental students, it makes sense that this population would get climate information from their studies, and it sets the stage for why focusing on affective preparedness in the classroom is important for this group.

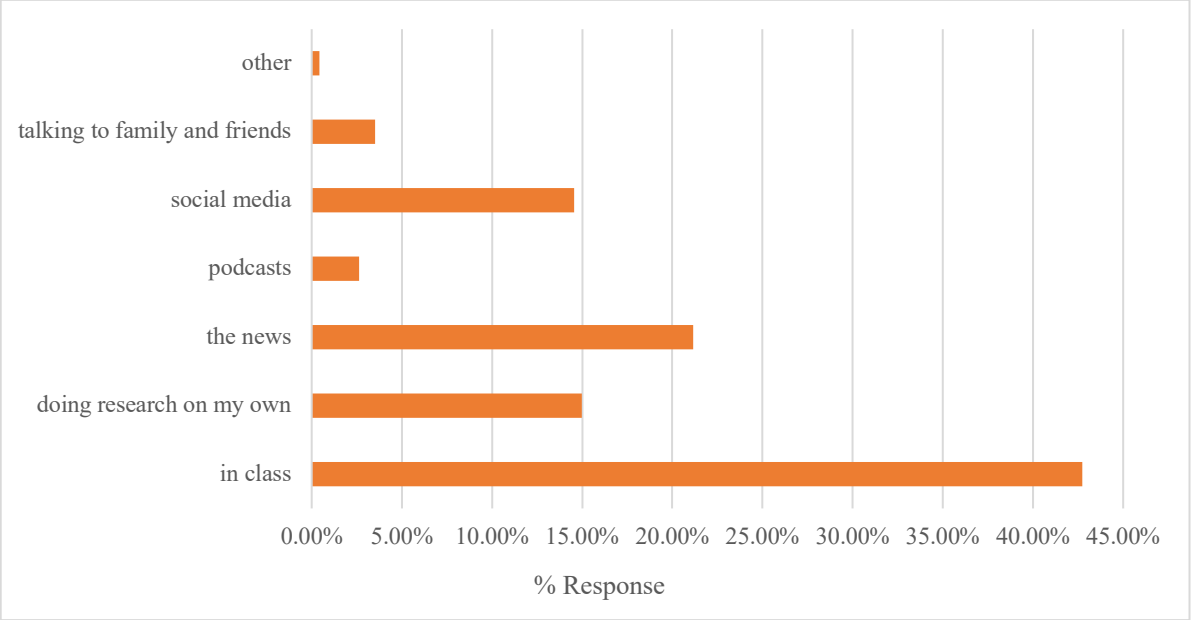


Figure 1: Most Common Sources of Climate Change Information for UVM Students, N = 106.

The question asking students to self-report their knowledge about climate change was also in line with their identity as environmental students. Of all students surveyed, 75.47% reported that they knew a lot about climate change and felt well-informed on the issue. This finding was supported by the focus group responses that showed an in-depth understanding of climate change. When asked to describe climate change to someone who had never heard of it before, a participant gave an answer that touched on the long-term timescale and physical

climate science while also talking about the human impacts. They also mentioned an existential component, saying “we have no idea what it's going to be like when the climate changes enough. Because we've never existed on a planet that has a different climate from what we're used to, from what we evolved out of.” This participant’s understanding of climate change goes beyond a basic understanding of the climate science and shows that they are grappling with more abstract components of climate change like current and future social impacts across time.

Separating the data for this question by grade level shows a difference in self-reported knowledge with time. In sophomores, 63.93% reported feeling that they are well informed about climate change and 34.43% reported that they know a fair amount about climate change. Seniors, on the other hand, had 91.11% of students saying they felt well informed about climate change while only 8.89% felt they knew a fair amount. While most students feel well informed about climate change, a larger majority of seniors report having a high level of climate knowledge than sophomores. This suggests that, as expected, there is a difference in climate knowledge across grades with seniors feeling more knowledgeable than sophomores.

### *Psychological Effects*

When it comes to how climate change affects students emotionally, the survey data showed that students are being negatively affected. When students were asked to pick the top three emotions they feel when they think about climate change, most answers were negatively connotated emotions, like angry, anxious, alarmed, and overwhelmed (see Figure 2.1). Both seniors and sophomores report similar response frequencies for these top answers, indicating that there is no real difference in the emotional response to climate change between years (Figure 2.2).

The focus group responses supported the sentiment of anxiety and despair that was reported in the survey. Participants reported feeling overwhelmed and "a lot of fear and anxiety." In another student's own words, "[climate change is] not a tangible problem, so I guess it's hard for people to care about, since it's not super immediate. But for [environmental students], because we learn about it and we care about it -- it really just makes me feel overwhelmed and numb." Feeling overwhelmed by despair and fear is a common response to climate change among this population of students.

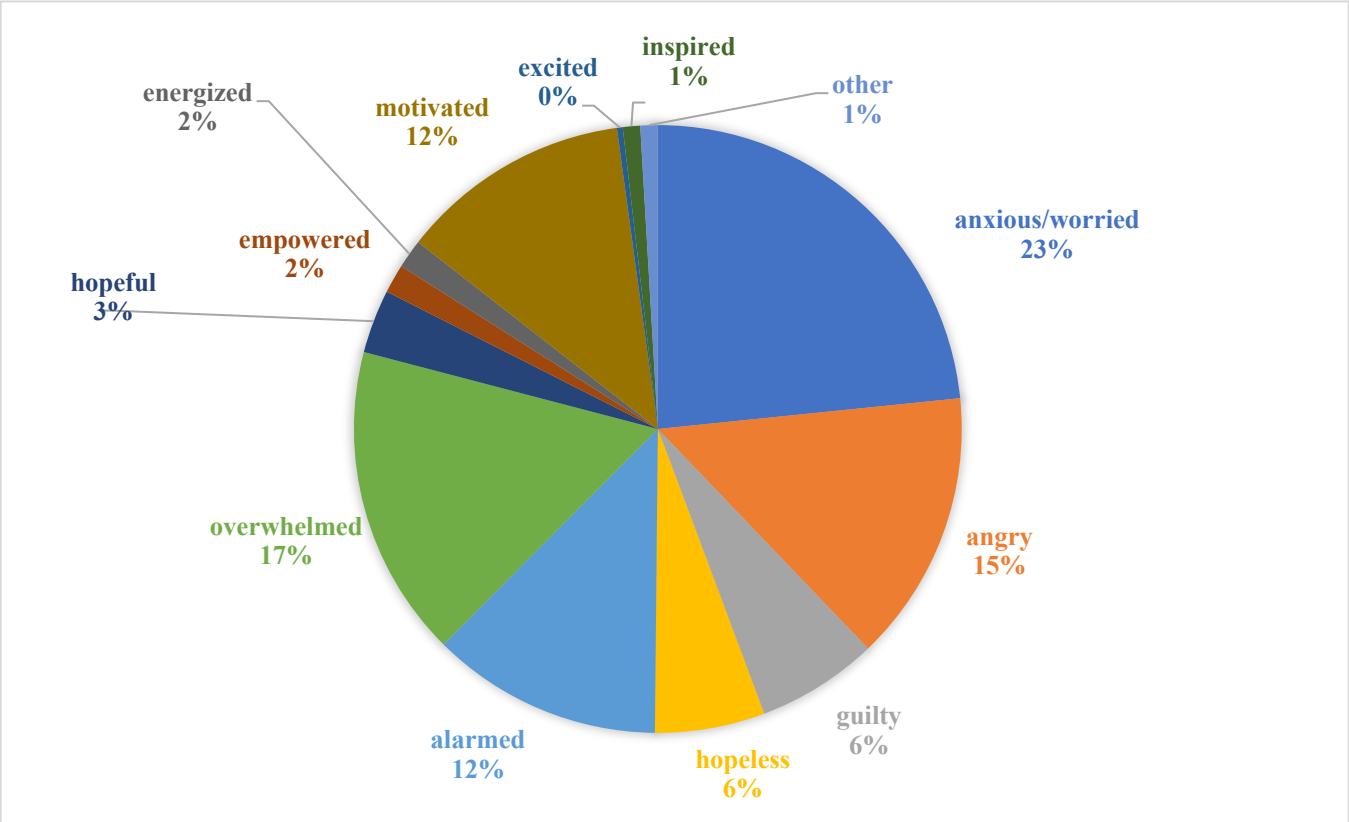


Figure 2.1: Top Emotions in Response to Climate Change, N = 103. Participants were asked to choose the three most prevalent emotions they felt about climate change. This pie chart shows response percentages of the whole survey population.

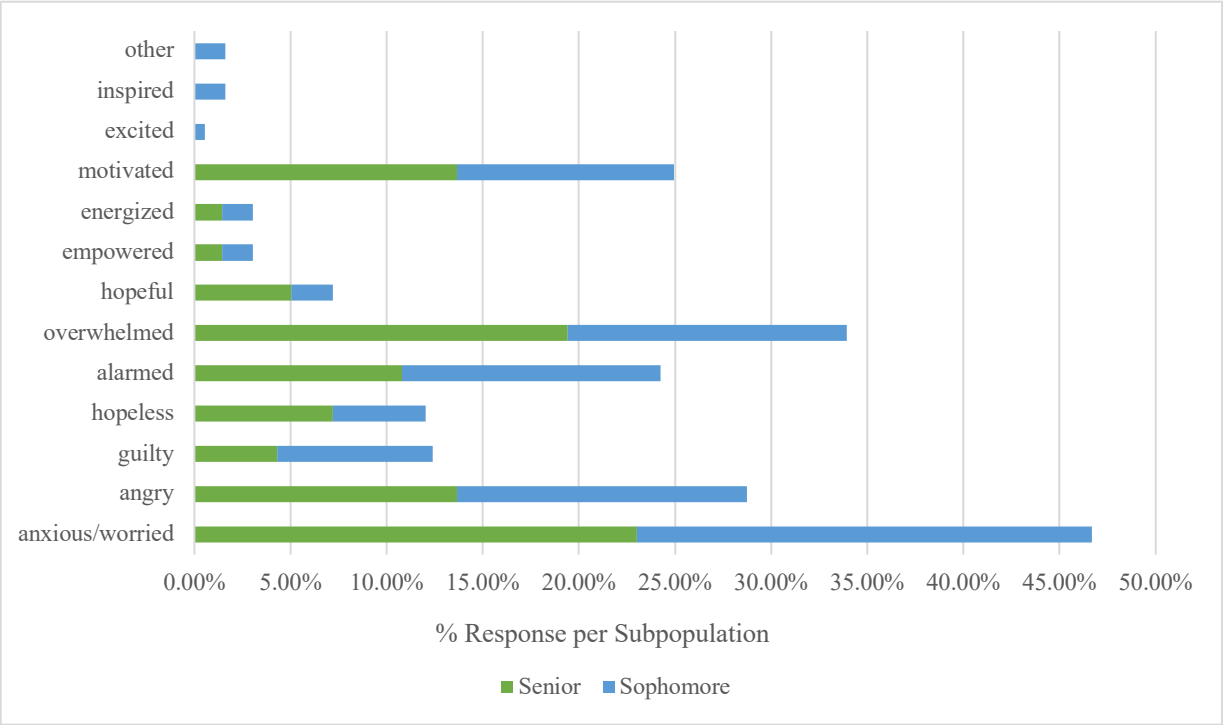


Figure 2.2: Top Emotions in Response to Climate Change, N = 103. Participants were asked to choose the three most prevalent emotions they felt about climate change. No significant difference is shown between sophomore and senior responses.

This question also showed some interesting differences between subpopulations. More environmental studies seniors, for example, reported being overwhelmed more than any other group, with 23.08% choosing that emotion while the other three subgroups reported between 12-17%. Environmental science seniors reported being motivated more than the other subpopulations. In ENSC seniors, 19.67% choosing "motivated" as one of their top three emotions while response percentage of the other subpopulations was only 8-12%. While these discrepancies are not statistically significant, they could hint at differences between majors that could be further explored.

Survey results also showed that students felt that their emotional response to climate change affected their mental health. Using Likert scale questions asking students to rank how

much they agreed or disagreed that their climate emotions impeded their schoolwork, social life, and mental health, respondents agreed that their mental health was affected but disagreed that their schoolwork and social lives were affected. Of all student answers, 63.81% fell on the strongly disagree-somewhat disagree side of the scale when asked if climate emotions impeded their ability to do their schoolwork, and 78.85% of student answers disagreed when asked if climate emotions impacted their social life negatively. In contrast, only 24.04% of students chose strongly disagree-somewhat disagree answers when asked if their emotional response to climate change impacted their overall mental health and 65.38% of them agreed to varying degrees (see Figure 3).

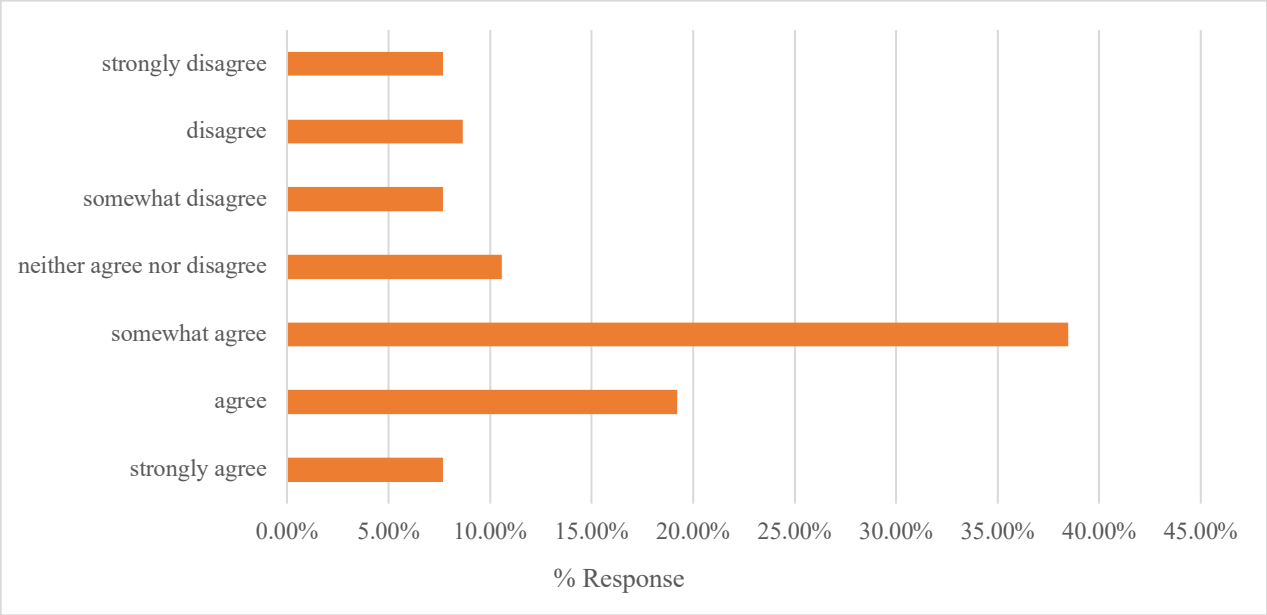


Figure 3: Emotions Associated with Climate Change Inhibit Mental Health, N = 104. Participant responses to the statement "The emotions I feel surrounding climate change negatively impact my overall mental health."

The survey question asking if students felt that their classes prepared them emotionally to face climate change yielded more varied responses than other questions dealing with the

psychological effects of climate change. Looking at the sample population as a whole, strong responses such as strongly agree and strongly disagree are not as common, and responses seem to be more evenly distributed among the rest of the answers. However, looking at sophomores and seniors separately shows a difference between the two grades. In seniors, 60.47% disagreed to some degree that their environmental classes affectively prepared them to deal with climate change, while 25.58% agreed to some degree and 13.95% were neutral. Alternatively, 34.43% of sophomores disagreed to some degree while 49.18% of them agreed to some degree and 16.39% were neutral. While the overall distribution of answers appears to be more even than previous questions, responses indicate that seniors feel differently than sophomores about how their classes prepare them to deal with the emotional aspect of climate change.

One focus group participant, an ENVS senior, spoke to this same issue, saying "in the intro level courses, it's like, 'Oh yeah, climate change is obviously happening, but you guys are the future, and you can solve it.' And then in my 200 level classes, it's like, 'Let's just read a bunch of really depressing books.'" The student went on to explain that "as the picture gets more complex, I think it gets a little bit more depressing." This speaks directly to how deeper understanding of climate change can make negative emotional responses stronger and harder to deal with.

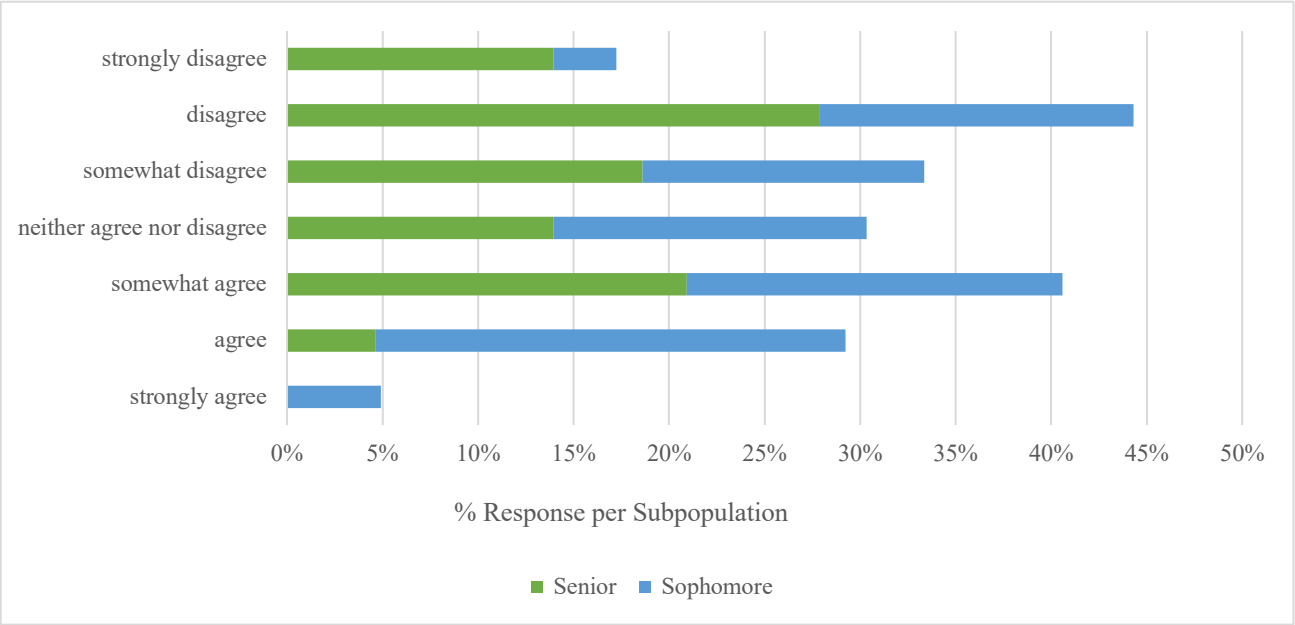


Figure 4: Environmental Classes Prepare Students Affectively, N = 104. Participant responses to the statement "Environmental classes at UVM prepare me to deal with the emotional response I may have when learning about climate change."

### *Coping*

Students reported varied answers regarding their ability to cope with climate change. Participants generally agreed with the statement, "given what I know about climate change, I feel hopeful that the climate crisis can be mitigated" (Figure 5). However, the most popular response from both sophomores and seniors was "somewhat agree," which does not necessarily indicate strong hope for the future. Students appear to be more cautiously optimistic than completely convinced. Nonetheless, cautious optimism is a good sign that students do not feel completely beaten down by their knowledge of climate change.

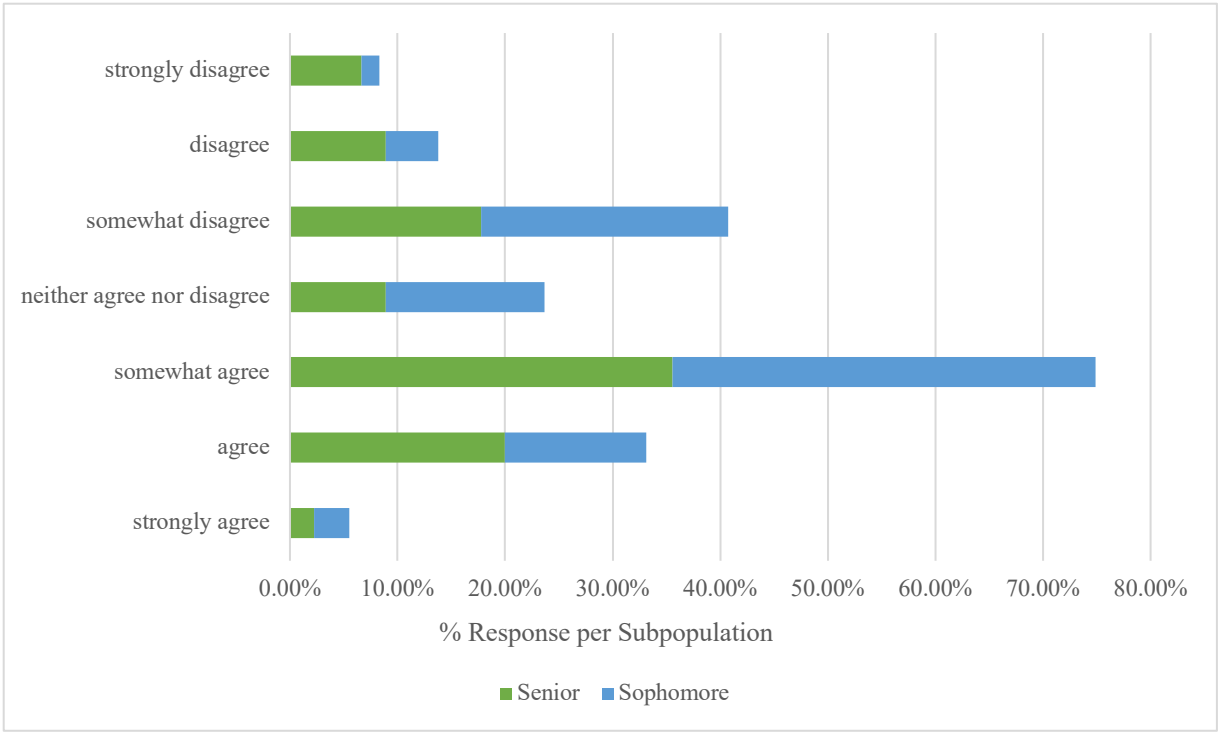


Figure 5: Hope for Climate Mitigation in UVM Students, N = 106. Participant responses to the statement "Given what I know about climate change, I feel hopeful that the climate crisis can be mitigated."

Denial and disavowal were not present in this population of students. When asked to agree or disagree with the statement "I think climate change is exaggerated to be a bigger problem than it really is," participants overwhelmingly disagreed. This was true of both seniors and sophomores, with 77.78% of seniors and 73.77% of sophomores strongly disagreeing with the statement. No participants agreed to any degree with the statement. This response is unsurprising coming from a group of students who have voluntarily chosen to study the environment in college, but it is hopeful to see that students still felt this way after learning about climate change and are not sinking into disavowal to cope.

Instead of turning to disavowal or denial, survey responses about being able to cope with climate change were mostly distributed towards the agree end of the scale, indicating that both sophomores and seniors generally feel like they have healthy coping mechanisms (Figure 6).

Interestingly, this response is challenged in the focus group, with many participants expressing that they did not know how to cope with climate emotions. In one student's own words, "sometimes I just block it all out, just to deal with the stress of thinking about climate change, which probably isn't the best coping mechanism." Another participant said their ways of coping were the "same as coping with other anxiety – exercise, chocolate, ignoring, or overwhelming feeling – I don't really have good coping mechanisms yet." A third participant described feeling desensitized to climate change because it does not feel possible to react appropriately to every depressing piece of information they learn.

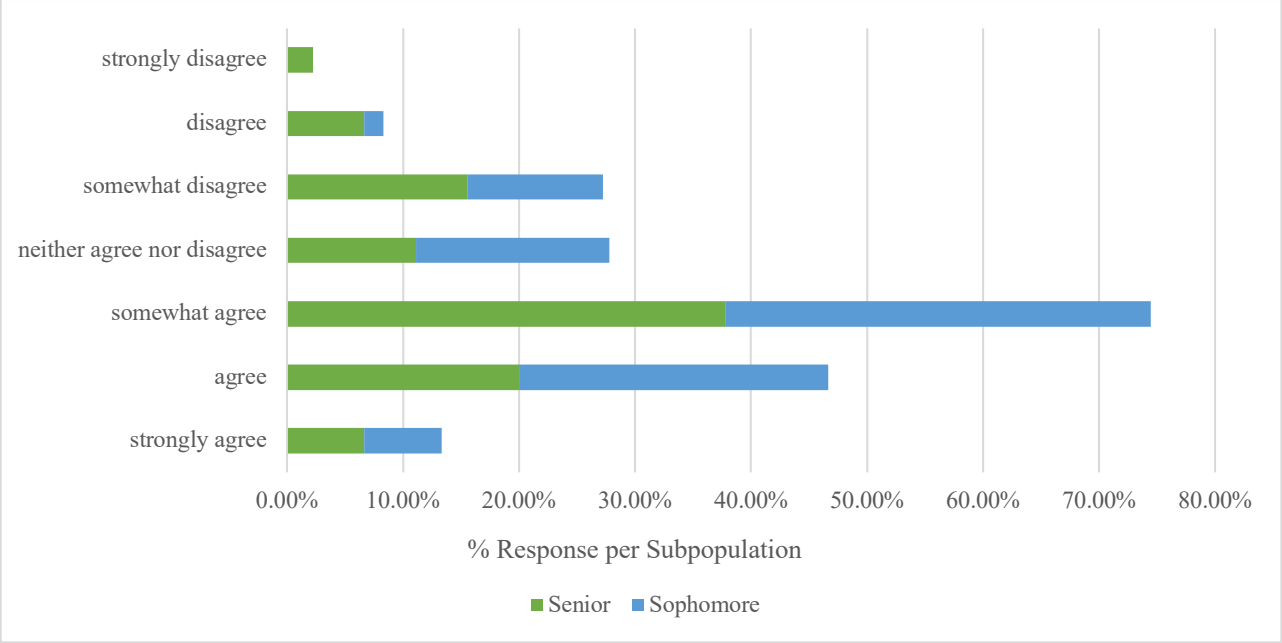


Figure 6: Student Ability to Cope with Climate Change, N = 105. Participant responses to the statement "I feel able to manage the emotions I feel surrounding climate change in a healthy way."

The last coping related question the survey asked was designed to differentiate between the emotion-focused coping and problem-focused coping that Maria Ojala described in one of

her studies on coping with climate change (Ojala & Bengtsson, 2019). Participants were asked what they do when they feel stressed about climate change and were given choices that demonstrated emotion-focused coping, like distracting themselves in some way, or problem-focused coping, like learning more about the problem. Overall, there was not a big difference between emotion-focused coping and problem-focused coping responses. Students who chose the emotion-focused coping response were asked to give a specific example of something they do to take their mind off climate change. Figure 8 shows a word cloud of key words from these responses, with larger words indicating a higher number of responses. Going outside, spending time with friends, and solitary activities like reading or watching TV were common responses.

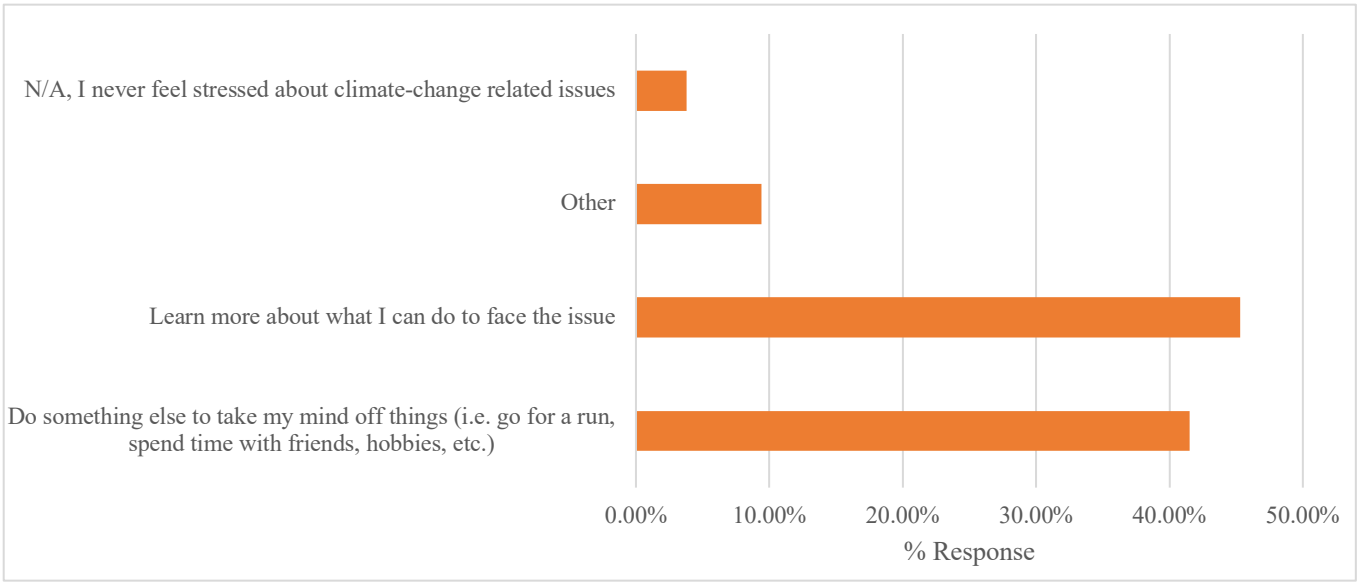


Figure 7: Measuring Emotion-Focused Coping and Problem-Focused Coping in UVM Students, N = 106. Participants were asked to complete the statement "If I feel stressed about an issue related to climate change, I prefer to…"

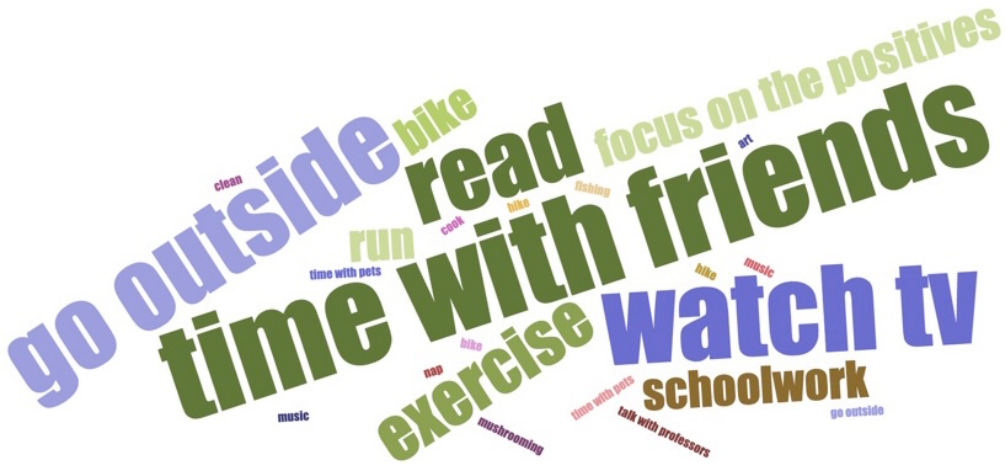


Figure 8: Word Cloud of Emotion-Focused Responses, N = 39. Bigger words indicate a higher response frequency.

### *Cross-Tabulations*

Most of the chi square tests on the cross-tabulations did not describe any statistically significant findings. No relationship was found between hope for mitigation and year, major, or self-reported knowledge, for example. There was also no relationship between top climate emotions and year or major, nor between year and ways of coping. However, a chi square test on the results of the cross-tabulation on year and the responses to the question "Environmental classes at UVM prepare me to deal with the emotional response I may have when learning about climate change" did yield statistically significant results, $X^2 = 0.034$, $p<.05$. More seniors disagreed with the statement than agreed, while more sophomores agreed with the statement than disagreed. This means that the older students get, the more likely they are to feel that the classes they are taking are not preparing them to cope with their climate emotions.

| Classes prepare me to cope | Senior | Sophomore | Total |
|---|---|---|---|
| Strongly disagree | 6 | 2 | 8 |
| Disagree | 12 | 10 | 22 |
| Somewhat disagree | 8 | 9 | 17 |
| Neither agree nor disagree | 5 | 10 | 15 |
| Somewhat agree | 9 | 12 | 21 |
| Agree | 2 | 14 | 16 |
| Strongly agree | 0 | 3 | 3 |
| **Total** | 42 | 60 | 102 |

Table 1: Cross-Tabulation of Year and Affective Preparedness from Class, $X^2 = 0.034$, $p<.05$.

**Discussion**

Data from this study has shown that environmental studies (ENVS) and environmental science (ENSC) majors at UVM are affected psychologically by climate change, and that this emotional response is often a negative one. However, it is unclear whether this emotional response is solely due to increased climate knowledge. The data about climate knowledge showed that seniors are more knowledgeable than sophomores. This result is expected and sets the baseline that UVM environmental education is achieving its goal of increasing student knowledge with time. It does not, however, explain why both sophomores and seniors reported feeling primarily negative emotions about climate change (Figure 2). Climate knowledge may be a factor in feeling negative climate emotions but given that both years have a similar emotional response to climate change, it does not provide a complete picture.

The Covid-19 pandemic is also likely to be another factor in students' emotional states. While this study did not specifically ask about the emotional effects of the pandemic, living through a stressful global event like Covid-19 is highly likely to influence students answers about their emotional well-being. Covid-related stress could have compounded with climate emotions, making students more likely to have a negative emotional response to climate change as they are simultaneously having to cope with another global threat.

Motivation is another interesting point of ambiguity in the climate emotions that students feel. When asked to choose the top three emotions they felt about climate change, "motivated" was another top response by students and the only positively connotated answer to receive a lot of responses (Figure 2). However, motivation can come from a variety of places, including emotions which are not necessarily positive. One can be motivated by their anger or fear just as much as they could be motivated by hope and inspiration. Because of the ambiguity of the term, it is hard to say definitively if students feeling motivated comes from a healthy place or if it comes from a place of desperation.

One place where this study did show statistically significant data was in the chi square test of year and responses about classes affectively preparing students to deal with climate change (Table 1). Seniors more strongly felt that their environmental classes did not affectively prepare them, while sophomores felt that their classes did. This could be because seniors are more aware of the complexity of climate change but are not being affectively educated about how to deal with that complexity. Sophomores may not be as aware of the bigger picture, causing them to feel more hopeful about climate change. They see their classes as affectively preparing them because they have not yet had to grapple with the more complex, emotionally demanding aspects of climate change. In this respect, affective education does not appear to be

growing alongside climate knowledge as students progress further through an environmental curriculum.

The data from this study also produced instances of conflicting information. When asked if they felt able to cope with climate emotions in a healthy way, participant responses in the survey and in the focus group told two different stories. While survey responses indicated that students felt able to cope, focus group participants expressed not having healthy coping mechanisms (Figure 6). While the focus group was only four students and not a representative sample of the population, the conflicting responses could also be due to focus group participants feeling more comfortable with being honest about their mental health. Survey participants, on the other hand, may have felt shameful of unhealthy coping mechanisms which could have caused them to skew their answers towards a more "positive" answer.

Another instance of survey data not painting a complete picture is concerning the three questions asking if students felt that their climate emotions negatively impacted their schoolwork, social life, and mental health (Figures 3-5). Survey participants only felt that climate emotions impacted their mental health, but worsening mental health has its own set of widespread impacts. Not performing as well in school and having trouble making or maintaining strong social relationships are two ways in which mental health issues can affect an individual. In this way, schoolwork and social life could be indirectly impacted by negative climate emotions, even if students do not make the connection themselves.

### *Survey Distribution*

There are several reasons why this study did not provide clear answers. There were many of variables at play, for example, in the distribution of the survey. Because the survey was voluntary and there was no incentive to take it, the response rate was lower than expected.

Each subpopulation had a different number of survey participants, and this was largely due to survey distribution. Since the survey was sent out to email lists and specific professors, individual students were not contacted directly, and some subpopulations could have been more encouraged to take the survey than others. For example, professors asking students to take the survey as an in-class activity would yield a higher response rate for those subpopulations than those who did not have to take the survey as a part of class. If not taken in class, survey participation relied on students checking their email and taking the initiative to take the survey on their own. At a time when online learning is more prevalent, students may have been feeling fatigued by the constant stream of emails and online content they must interact with, making them less likely to voluntarily interact with an online survey.

### *Self-Reporting and Mental Health Stigma*

Another problem with the survey data is that it is entirely self-reported. It is therefore hard to discount that some participants may have not been entirely honest with their responses. The stigma surrounding mental health may have been a barrier for students, who could feel shame or embarrassment about their own emotional state. While the survey was anonymous to try and minimize this pressure, talking about mental health and admitting that you are struggling are difficult things to do, especially in a culture that still has a notable stigma surrounding the issue. The fear of being singled out as different from the rest is strong, and students may have

unconsciously skewed their answers to be in line with what they felt was socially appropriate. Unfortunately, given the introspective and personal nature of mental health, there is not a great alternative to self-reporting that could have been used.

The focus group was meant to mitigate some of these survey issues by giving students a space to talk more personally about mental health. Since I ran the focus group and I am also a student, it was my hope that participants would feel safe enough to be open about their emotional response to climate change and how they cope with it. Creating a personal atmosphere was challenging since the focus group had to be run remotely, but the conversational tone of the focus group could be a factor in the focus group responses about coping being different from the survey responses about coping. Unfortunately, the focus group was not conducted with enough participants to be an accurate reflection of the entire population, so their responses cannot speak for the group as a whole; rather, they provide accounts of individual experiences.

Along with mental health, climate change knowledge was another self-reported variable. Because knowledge was self-reported, it is hard to say definitively if students truly had as much climate knowledge as they thought they did. Sophomores may feel like they are well-informed about climate change, for example, but realize retrospectively that they were not as they continue their education. In this way, the survey could have been improved by asking questions that gave more of a formal assessment of climate change knowledge. However, creating a formal assessment would require time, resources, and knowledge that were beyond the scope of this study.

### *Climate Narrative Versus Climate Knowledge*

The distinction between climate knowledge and climate narratives are yet another gray area in this study. In some cases, the facts of climate change alone can be depressing. As one focus group participant explains, “I don't think it's the classes themselves [that affect me], it's just what I'm learning that impacts my mental health and emotions.” In this case, climate knowledge itself is causing emotional suffering to students. But both in and out of the classroom, climate knowledge is influenced by the narrative that is used in the spread of information. Other than in class, survey participants reported getting climate information primarily from social media, the news, and doing their own research (Figure 1). In a time when information is readily accessible in vast amounts, students are naturally exposed to a variety of climate narratives. The most dominant one today is one of “gloom and doom,” where climate change is presented as an insurmountable challenge and an existential crisis. This overarching narrative begs the question of whether it is purely the informational knowledge that is causing negative emotional responses in students, or if it is the way that information is presented that makes it difficult to cope with.

### *Eco-Anxiety and White Privilege*

The space this study occupies in the wider context of the environmental movement, environmental justice, and racism must be recognized. Mental health is closely tied to privilege by means of who has access to treatment or open conversations about mental health. In a recent opinion piece in Scientific American, Sarah Jaquette Ray argues that the emerging conversation about climate anxiety is becoming a primarily white space. In other words, while communities of color are shown to be disproportionately affected by climate change and are the most concerned about it, it is primarily white people who are responding to the concept of eco-anxiety (Ray,

2021). In this way, eco-anxiety runs the risk of being a reflection of white fragility as people come to terms with an existential threat for the first time. As Ray explains, "the prospect of an unlivable future has always shaped the emotional terrain for Black and brown people, whether that terrain is racism or climate change" (Ray, 2021). People who normally live with an extraordinary amount of privilege, on the other hand, are having to reconcile this idea for the first time.

The conversation around eco-anxiety and race requires a delicate balance of not favoring white experiences over BIPOC experiences while also not shaming white students for their reactions to eco-anxiety. Eco-anxiety and other climate emotions can lead to inaction and be damaging to the environmental movement but talking about it without acknowledging the underlying structures of racism in the U.S. runs the risk of coddling white fragility. White students need to recognize that their experience is not the only one or the most important.

The University of Vermont is a predominantly white school, with 82.4% of undergraduates at UVM identifying as white (UVM Office of Institutional Research, 2021). College students also generally have significant economic privilege to afford enrollment at a university. While the survey did not ask any racial or economic information, it can be assumed that this study inevitably targets a privileged white population of students. The generalizations made from these data do not speak for the experiences of marginalized groups that are not largely represented in the demographic makeup of environmental students at UVM.

Creating affectively prepared students is still important, even within a population of predominantly white students. Affective preparedness must include teaching students how to use their privilege to lift others up and how to acknowledge their ignorance and grow from it. The emotional response to climate change should not be used to pit groups against each other but

should be framed as a space where we can find common ground. Sarah Jaquette Ray illustrates this sentiment, saying "We need to channel grief toward collective liberation" (Ray, 2021). Thus, discussions around eco-anxiety in the classroom must go hand in hand with critical conversations about who experiences climate change in what ways. The classroom should encourage white students to reflect upon where their own emotions are coming from and build empathy, not guilt.

## Recommendations

### *Considerations for Professors*

While this study was entirely based around a student positionality and therefore cannot recommend specific teaching methods, it does bring up questions for environmental professors to consider. What narratives are students given about climate change in the classroom? How much control do educators have over those narratives? How can professors foster hope and resilience in the classroom without compromising the gravity of the information? These questions can help bridge the gap between students' affective experiences and the practical side of teaching material.

Another issue for professors to consider is the amount of responsibility they have in creating affectively prepared students. Professors are not mental health professionals and should not be expected to take on a therapist role for students who are really struggling. There is especially pressure on female educators to take on this caretaking role due to the gender norms that are imposed on women (Ray, 2018). Instead of taking full responsibility for students' mental health, professors can support students by de-stigmatizing mental health and promoting resources that are available to students. Simply opening the conversation to include emotional responses and talking about mental health in the classroom can make strides towards reducing the shame

people feel about struggling with mental health. Letting students know about counseling resources that are available to them, both within the university and in the community, can help assure that they reach out to the correct people when they need to.

### *Further Studies*

There are many future studies that could be done from the results of this research. Questions of equity and social justice could be tied in by studying how gender or race affect one's psychological response to climate change, for example. Are women more likely to feel negative climate emotions because of the caretaker role society forces them into? Do BIPOC people report higher numbers of climate anxiety than white people? These questions can help further the conversation about climate anxiety and give a voice to groups who may not currently have a seat at the table.

This study also sets groundwork for further research about the effect of climate knowledge on psychological responses to climate change. Studying the difference in climate emotions between environmental students and students in other majors can give information about how climate anxiety affects those who have not committed themselves to environmental work. Expanding the sample population in this way could answer questions of whether climate anxiety is a barrier for people who are not involved in environmental work at all.

Studying how students cope with emotionally demanding information in other disciplines could also help gain a more interdisciplinary perspective on affective education. Students in other social sciences who learn about human rights violations, for example, are also dealing with information that comes with an emotional cost. Learning about how these students are coping

with their mental health or ways that other disciplines are lacking affective education is a step towards creating large-scale change in our higher education system.

The difference between self-reported knowledge and tested knowledge about climate change could also be explored more. Self-reported knowledge has a layer of self-perception built into it that tested knowledge does not. Testing the correlation between different ways of reporting knowledge and climate emotions can teach us more about the influence of self-perception on climate knowledge and emotions.

Finally, studying the effect that climate narratives have on emotional response is an important topic to continue research on. Do different narratives about the same topic change how students feel about the information? Climate narratives in the classroom are an important element to the psychological response students have to climate change and learning more about their effects can give educators a better idea of how to frame climate change in a way that fosters resilience and hope.

**Conclusion**

The way that environmental students cope with climate information is essential for their growth into active, motivated climate advocates. If affective education is not taught alongside climate information, student's climate knowledge is incomplete. Not knowing how to deal with fear, grief, and hopelessness does unseen damage to the environmental movement as it prevents action. The data from this study recommends taking a more holistic view of education that can create well-rounded, resilient students. Their college education must prepare them in every way possible to take on the enormous climate responsibility that dictates their futures.

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## Appendices

### *Survey Questions*

1. What year are you?
2. What is your major or majors?
3. What college are you in (make multiple selections if applicable)
    a. Agriculture and Life Sciences
    b. Arts and Sciences
    c. Business
    d. Education and Social Services
    e. Engineering and Mathematical Sciences
    f. Rubenstein School of Environment and Natural Resources
    g. Nursing and Health Sciences
    h. College of Medicine

4. Did you take any classes in high school that introduced you to climate change and taught you about the natural science behind the issue?
    a. Yes
    b. No
    c. Unsure
5. Where are you most likely to get information about climate change?
    a. In class
    b. Doing research on my own
    c. Media
    d. Social media
    e. Talking to family and friends
    f. Other: _____
6. When I think about how much I know about climate change (the science, international climate policies, health effects, economic effects), I feel that…
    a. I know a lot about climate change and feel well-informed on the issue
    b. I know a fair amount, but lack a deeper understanding of the complexities of the issue
    c. I am unsure about a lot
    d. I don't know much at all
7. Given what I know about climate change, I feel hopeful that the climate crisis can be mitigated.
    a. Strongly agree
    b. Agree

c. Somewhat agree

d. Neither agree nor disagree

e. Somewhat disagree

f. Disagree

g. Strongly disagree

8. I think that climate change is exaggerated to be a bigger problem than it really is.

a. Strongly agree

b. Agree

c. Somewhat agree

d. Neither agree nor disagree

e. Somewhat disagree

f. Disagree

g. Strongly disagree

9. What are the 3 prevalent emotions you feel when you think or talk about climate change?

a. Alarmed

b. Angry

c. Anxious/worried

d. Empowered

e. Energized

f. Excited

g. Guilty

h. Hopeful

i. Hopeless

j. Inspired

k. Motivated

l. Overwhelmed

m. Other: ____

10. I feel able to manage the emotions I feel surrounding climate change in a healthy way.

    a. Strongly agree

    b. Agree

    c. Somewhat agree

    d. Neither agree nor disagree

    e. Somewhat disagree

    f. Disagree

    g. Strongly disagree

11. If I feel stressed about an issue related to climate change, I prefer to…

    a. Do something else to take my mind off of things (go for a run, spend time with friends, hobbies, etc.)

        i. Please give an example: _____

    b. Learn more about what I can do to face the issue

    c. N/A, I do not feel stressed about climate-change related issues

    d. Other: _____

12. The emotions I feel surrounding climate change inhibit my ability to succeed in my classes and schoolwork

    a. Strongly agree

    b. Agree

c. Somewhat agree

d. Neither agree nor disagree

e. Somewhat disagree

f. Disagree

g. Strongly disagree

13. The emotions I feel surrounding climate change prevent me from having the social life that I want

    a. Strongly agree

    b. Agree

    c. Somewhat agree

    d. Neither agree nor disagree

    e. Somewhat disagree

    f. Disagree

    g. Strongly disagree

14. The emotions I feel surrounding climate change negatively impact my overall mental health

    a. Strongly agree

    b. Agree

    c. Somewhat agree

    d. Neither agree nor disagree

    e. Somewhat disagree

    f. Disagree

    g. Strongly disagree

15. Environmental classes at UVM prepare me to deal with the emotional response I may have when learning about climate change.
    a. Strongly agree
    b. Agree
    c. Somewhat agree
    d. Neither agree nor disagree
    e. Somewhat disagree
    f. Disagree
    g. Strongly disagree

***Focus Group Questions***

1. Why did you come to UVM?
2. Why did you choose to study ENVS or ENSC?
3. In your own words, explain climate change to someone who has never heard about it before.
4. When you think about climate change, what are the primary emotions that you feel?
    a. Do these emotions affect your everyday life? How?
    b. How do you cope/deal with these emotions?
5. What do you think of the environmental classes you have taken at UVM?
6. How have your environmental classes impacted your emotions about climate change?