

**Climate Change Education in Universities:  
Instructors' Perceptions of Risk, Motivations, and Barriers**

by Ashley Vedvig

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CLIMATE CHANGE EDUCATION IN UNIVERSITIES:  
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Doctor of Education

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## **Abstract**

Climate change is a pressing global issue that has a short window for action and mitigation. In this study, I utilized protection motivation theory (PMT) to examine relationships among tertiary-level instructors' perceptions of climate change risks and their inclusion of climate change education (CCE) in their curricula. The purpose of this study is to understand if instructors' perceptions of climate change might influence them to include CCE in their curricula and identify barriers and motivators for CCE in Institutions of Higher Education (IHEs). In a survey of 90 participating instructors, I found that 91% were reportedly alarmed or concerned about climate change, but only half of instructors reported including CCE in their curricula. Of the half that included CCE, over half of those participants reportedly only included it in 25% or fewer of their courses. When comparing threat and coping appraisal methods of PMT, 75% of participants had high threat appraisals with low coping appraisals, and only 21% had high threat appraisals with high coping appraisals. This study will add to the growing collection of CCE research and recommend avenues for future inclusion of CCE in IHEs. Recommendations include additional research on instructors coping appraisal methods, replicating this study on a larger scale, requiring a general education course on CCE, and increasing opportunities for resources, professional development, and time for instructors to include CCE in their curricula.

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**Dedication**

To my dear, sweet mother.



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## Chapter 1. Introduction

Climate change is a pressing global issue that has a short window for action and mitigation. Students in grades K-16 are more worried about climate change than ever before (Aksit et al., 2017), and often confuse it with other environmental issues (Huxster et al., 2015). Curricula should include Climate Change Education (CCE) at all levels, degrees, majors, and studies. UNESCO (n.d.) defines CCE as education that helps people understand and address the impacts of the climate crisis, empowering them with the knowledge, skills, values, and attitudes needed to act as agents of change. In this study, I investigated CCE at universities to seek evidence of risk perceptions on climate change and its relationships to instructors' implementations of CCE.

### Problem

Students rely on classroom lectures, labs, and course materials for accurate information (Stevenson et al., 2014), but most institutions of higher education (IHEs) have yet to fully incorporate climate related issues as part of their programs (Filho et al., 2019). Instructors' risk perceptions, worldviews, culture, and political affiliation, among other factors, influence their decisions on whether to include CCE in their curricula (Aksit et al., 2017; Kahan et al., 2012; Stevenson et al., 2014). In a study of climate literacy in an IHE, Aksit et al. (2017) showed that a semester-long introductory geoscience course resulted in statistically significant increases in students' risk perceptions and knowledge of climate change (p. 565). Suazo and Torress-Valle (2022) conducted a study to understand how risk perceptions and prior knowledge influence Honduras University faculty to include climate change content. They found that 41%

of professors included climate change content but only briefly and as part of other topics (pp. 153-155).

In IHEs, students are forming their own worldviews and opinions while they are away from their parents (Heberlein, 2012; Stevenson et al., 2014). IHEs can provide a trusted source of climate change information as students form their own opinions and risk perceptions about climate change (Aksit et al., 2017, Beck et al., 2013, Yapici et al., 2017). Educated graduates should enter the workforce and make climate-informed decisions, aiding in much needed pro-climate action and mitigation.

### **Purpose**

The purpose of this study is to understand instructors' perceptions of climate change, so we can reduce barriers and increase motivators for CCE in IHEs. In this mixed-methods study, I aimed to identify climate change risk perceptions among tertiary-level instructors. I have found scant information on instructors' risk perceptions, so I chose participants whose data would complement existing studies of student's perceptions of climate change risks. I sought to understand tertiary-level instructors' motivations and barriers to including CCE content in their curricula. I used a convergent mixed-methods design to collect qualitative and quantitative data in parallel, analyzed the data separately, and then merged the data for analysis.

First, I identified pertinent studies of climate change risk perceptions and why tertiary-level instructors chose to include CCE content in their curricula. Second, I used the Yale Program on Climate Change Communication's Six Americas segmentation method (Chryst et al., 2018) to survey tertiary-level instructors at two IHEs to designate their climate change risk perception levels. Third, I analyzed the data

connections among climate change risk perceptions and tertiary-level instructors who did and did not include CCE content into their curricula. This research will add to the growing collection of CCE research and recommend avenues for future inclusion of CCE in IHEs.

### **Research Questions**

In this study I addressed the following questions:

- What risks about climate change do tertiary-level instructors at universities reportedly perceive?
- What do tertiary-level instructors at universities report about climate change and its relation to CCE in curricula?
- Is there a relationship between instructors' reported risk perceptions of climate change and implementation of CCE in their curricula?

I measured tertiary-level instructors' risk perceptions of climate change using the Yale Program on Climate Change Communication's Six Americas Short Survey (SASSY) and asked open-ended questions about their inclusion of CCE in their curricula.

### **Theoretical Framework**

For this study, I used protection motivation theory (PMT) to analyze relationships among reported risk perceptions and implementing CCE content into tertiary-level curricula. PMT was created to assess how perceived threats influence behavior, specifically in fear-appeal messaging in the health field (Floyd et al., 2000, Kim et al., 2012). Fear-arousing communications are known for increasing the perceived level of fear in order to increase the acceptance of the proposed adaptive behavior or intentions (Floyd et al., 2000, p. 409). It has since been applied to other areas, such as

environmental beliefs and political actions, air pollution and reduced driving, etc., to understand how risk perceptions and actions correlate (O'Connor et al., 1999, p. 463).

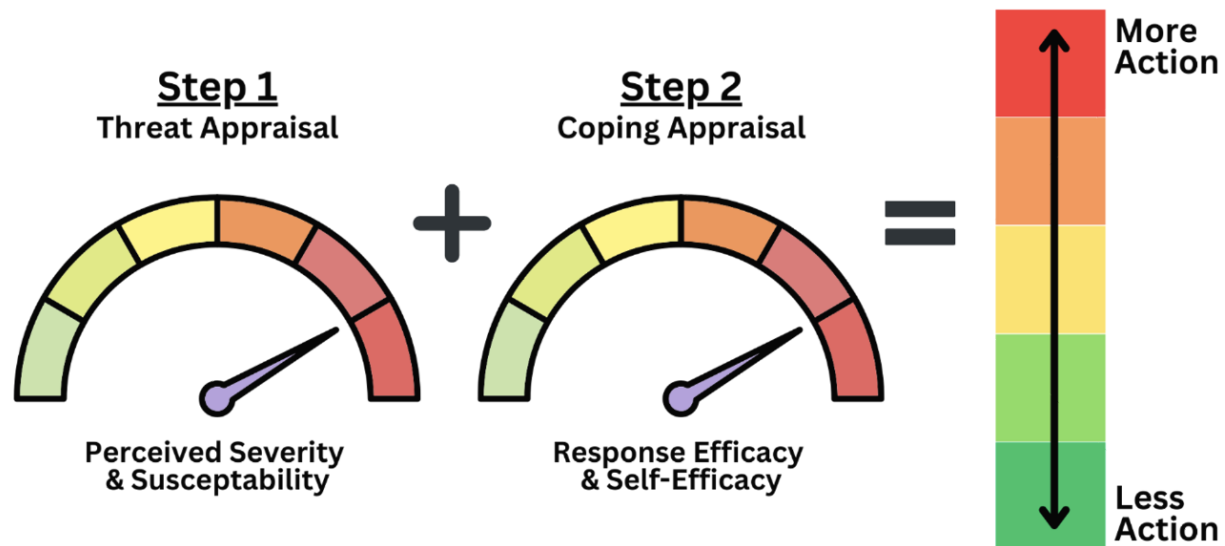
According to PMT, when a person is presented with a threat, they undergo two cognitive processes: threat appraisal and coping appraisal (Kim et al., 2012). A threat appraisal begins first as the person takes in the threat (e.g., climate change) and then evaluates the perceived severity (e.g., How severe are the negative consequences?) and their perceived susceptibility (e.g., How vulnerable am I to climate change?). The threat-appraisal process guides such adaptive responses as pro-environmental behaviors to mitigate climate change.

In PMT, when a threat appraisal is complete, then a coping appraisal begins. A coping appraisal includes evaluating response efficacy (e.g., How effective will my pro-environmental actions be at mitigating climate change?) and self-efficacy (e.g., Do I have the skills, knowledge, and confidence to engage in pro-environmental behaviors?) (Kim et al., 2012). A coping appraisal is similar to a cost-benefit analysis, in which a person weighs the cost of acting against the benefits of taking an action (Floyd et al., 2000). PMT predicts that a person with a strong coping appraisal is more likely to engage in adaptive behaviors toward a threat (Kim et al., 2012). The research Kim et al. (2012) conducted on American and Korean undergraduate students showed that self-efficacy and perceived severity were strong indicators of pro-environmental behaviors (p. 181). Floyd et al. (2000) claimed that the PMT framework helped to identify why attitudes and behaviors changed when participants were presented with threats. PMT is a framework for analyzing instructors' reported risk perceptions as threat

appraisals and their reported response in incorporating curriculum changes as coping appraisals (Figure 1).

**Figure 1**

*Protection Motivation Theory Framework*



In Step 1, a threat appraisal assesses perceived severity and susceptibility of a risk presented, such as climate change. In Step 2, a coping appraisal assesses response and self-efficacy. Higher combined levels of threat and coping appraisals lead to a higher chance of action taken against the threat. A higher threat appraisal of climate change, such as a high perceived severity and susceptibility to climate change along with a high confidence level of action, such as response efficacy and self-efficacy can lead to more pro-climate action and mitigation.

### **Significance**

This study will add to literature on CCE and help identify potential motivators and barriers to including CCE in IHEs. By understanding how climate change risk

perceptions influence tertiary-level instructors to include CCE, I can identify avenues for future training, professional development, and policy creation at IHEs.

### **Summary**

The window to act on climate change is rapidly closing and now more than ever we need CCE at all levels of education, especially in IHEs. However, risk perceptions and worldviews influence an instructor's inclusion of CCE into their curricula. The purpose of this study is to understand tertiary-level instructors' risk perceptions of climate change and its relationship with implementing CCE into curricula. In this mixed-methods study based on protection motivation theory, I hope to show ways to increase implementation of CCE in colleges and universities.



## **Chapter 2. Literature Review**

In this chapter, I examine the need for CCE in institutions of higher education (IHEs), and why instructors do or do not include it in their curricula. To understand these concepts, I address the world views of the “climate generation” and instructors, review studies of CCE in IHEs, risk perceptions, motivators, and barriers for CCE.

### **The Climate Generation**

Researchers (e.g., Beck et al., 2013, Yapici et al., 2017) have found that students are more exposed to climate change and environmental information in the media than in the classroom. As Aksit et al. (2017) specified, undergraduates born since 2000 have had exposure to climate change information via the media and school-based education, causing their risk perceptions of climate change to increase compared with the general public and previous generations (p. 550). Aksit et al. (2017) and Nerlich et al. (2010) have claimed that climate change has been a reality for most of their lifetimes, and information has been readily at their fingertips; labeling them as the “climate generation” (p. 102, p. 566). However, with all the information these students have and their increased risk perception, Huxster et al. (2015) and Wachholz et al. (2014) have shown that students are still unclear about what drives climate change and often confuse it with other environmental issues (p. 163, p. 128). CCE is needed to address the concerns of the climate generation.

### **Climate Change Education in Higher Education**

In IHEs, content about climate change most commonly occurs in curricula for science, technology, engineering, or mathematics (STEM) fields. Bhattacharya et al. (2021, p. 228) and Huxster et al. (2015, p. 163) found that students who choose majors

that were not in science or environmental studies were not receiving adequate CCE. Students in majors other than STEM make up the majority of post-secondary students, according to the National Center for Educational Statistics (2021). As Stevenson et al. (2014) said, without a basic understanding of climate change, it can be difficult for students and adults to "connect the dots" between the causes and impacts of climate change (p. 300). Without proper CCE, how can students and adults make informed decisions that could help mitigate climate change?

Orr (2004) said, "The truth is that without significant precautions, education can equip people merely to be more effective vandals of the Earth" (p. 5) In other words, if students are not taught how to make decisions with environmental impacts and climate change in mind, then how will we ever mitigate climate change? According to Aksit et al. (2017, p. 568) and Beck et al. (2013, p. 2), students trust university scientists and instructors to provide factual and essential climate change information so they can be informed citizens and decision-makers in political and social situations. Although students may be overwhelmed with climate change information, Bhattacharya et al. (2021) found that students valued formal classroom settings and found them to be one of the most trusted sources of information (p. 229). Aksit et al. (2017, p. 550) and McNeal et al. (2014, p. 665) claimed that, by incorporating CCE into STEM and non-STEM-based courses, students increased their climate change knowledge and their related risk perceptions.

Yapici et al. (2017) found that, with increases in higher risk perceptions and a better understanding of climate change, students were more likely to participate in environmental activities (p. 7). According to Beck et al. (2013) CCE has been linked

to conceptual and attitude changes, potentially causing shifts in habits (p. 2). Kolenatý et al. (2022) found that CCE can positively influence student's self-efficacy and their willingness to act, demonstrating that knowledge is a key driver for climate action (p. 1). The Yale Program on Climate Change Communication has found that Americans who reported climate distress were much more willing to take pro-climate action and were motivated to participate in proactive behavior to cope with the problem (Ballew et al., 2023). IHEs are ripe with the opportunity for CCE and thus have the potential to create educated and informed graduates who will take CCE information into their work, home, and communities and create opportunities for pro-climate action.

Studies by Aksit et al. (2017), Kahan et al. (2012), Stevenson et al. (2014) have shown that adults' worldviews, peer relationships, and political ideologies have considerable control over their climate change risk perceptions and acceptance or denial of climate change information (p. 567, p. 734, p. 293). At the tertiary level, Heberlein (2012) claimed that students are away from their parents and exploring their identity and values for the first time, making them particularly susceptible to information from their instructors (p. 51). Studies (e.g., Aksit et al., 2017, Libarkin et al., 2018, Stevenson et al., 2014) have shown that worldviews are still forming during childhood and adolescence and do not fully form until their mid-twenties; thus, these audiences are more receptive to climate change information (p. 567, p. 295, p. 416). Bhattacharya et al. (2021) found that students with a foundational level of climate literacy increased their risk perceptions and decreased their polarization of political affiliation around the topic of climate change (p. 229). Tertiary-level education provides opportunities for

students to form their worldviews about climate change, which they can carry into adulthood.

Reimers (2021) explained that IHEs are ideal places for CCE because they have instructors with disciplinary expertise to develop high quality CCE curricula, help students understand climate change in broader senses of poverty reduction and sustainability, and can prepare prospective teachers to include CCE in K-12 curricula (p. 35). Stevenson et al. (2014) reported that tertiary-level students spent large amounts of time in classrooms, learning from instructors and gaining information reviewed by experts rather than from media news sources (p. 301). Libarkin et al. (2018) claimed that, by including CCE in IHEs, students increased their skills in evaluating scientific evidence and the credibility of sources, all valuable skills that graduates should possess (p. 405).

During a semester-long introductory geoscience course that included CCE, Aksit et al. (2017) showed that STEM and non-STEM majors increased their knowledge and risk perceptions of climate change (p. 566). Lombardi & Sinatra (2010) also demonstrated that CCE helped mitigate students' misconceptions about short-term weather events and the scientific evidence of human-induced global climate change (p. 212). Liu (2022) showed that CCE promoted systems thinking competencies in students when addressing climate change problems, a necessary skill for future climate change mitigation (p. 1791). Reimers (2021) explained that by helping students engage in problem-based learning, they can learn to dismantle systems that contribute to climate change and change them for a more sustainable future (p. 35). However, Tolppanen et al. (2022) claimed that CCE needs to have a strong emphasis

on climate mitigation, not just climate science, in order to overcome the “knowledge-behavior gap” (p. 7).

In the following section, I review studies of risk perceptions, barriers, and motivators for CCE in IHEs.

### ***Risk Perception***

As defined by O'Connor et al. (1999), risk perception is an understanding of a problem and acknowledgment that it is occurring, the understanding of the negative impacts on one's self and others, and an understanding of the causation of the problem (p. 462). Libarkin et al. (2018) added that environmental beliefs, cultural cognition, knowledge, values, worldview, demographic, and identity determine a person's risk perception of climate change (p. 403-404).

Suazo and Torress-Valle (2022) argued that, regardless of whether a person is a tertiary-level instructor or outside academia, the social construct of vulnerability indicates that everyone perceives risk on a personal and global level via social, physical, and economic constructs (p. 148). Other researchers (e.g., Kahan et al., 2012, p. 734; Leiserowitz, 2005, p. 1434; Weber, 2015, p.125; Yapici et al., 2017, p. 1) have claimed that a persons perceived climate change as a higher risk than others are due to such considerations as follows:

- age,
- gender,
- educational status,
- income,
- religious beliefs,

- worldviews,
- culture,
- experience with disaster,
- self-reliability,
- environmental beliefs,
- personal viewpoint,
- peer relationships,
- affect and emotion,
- trust,
- values,
- experience with extreme weather events,
- effects of psychological distance of climate change, and
- political ideology.

Sauer et al. (2021) reported that university educators are increasingly more politically liberal and less religious than the general population (p. 5796). However, Leiserowitz et al. (2021) concluded that people from differing backgrounds with differing perceptions would have different perceived risk levels regarding climate change (p. 97). Thus, instructors' risk perceptions of climate change are unpredictable due to many variables.

As reported by Stevenson et al. (2014), risk perceptions of climate change are important because participants were more likely to act if they believe there are real and present risks to themselves and others (p. 294). Filho et al. (2019) reported progress in public perceptions of climate change and stated the value of perceptions by

university instructors because they educate a large student base (p. 9). Thus, instructors' perceptions of CCE are worthy of further study.

### **Barriers**

A second consideration in implementing CCE in IHEs are personal and institutional barriers to including CCE in tertiary-level curricula, such as follows:

- mixed reviews on the relevance of the topic (Bhattacharya et al., 2021; Winter et al., 2022);
- institutional and political restraints (Reid, 2019; Seroussi et al., 2019; Winter et al., 2022);
- confidence or expertise to teach on the subject (Beck et al., 2013; Bhattacharya et al., 2021; Dal et al., 2014; Li, 2013; Suazo & Torress-Valle, 2022);
- lack of formal or informal training (Filho et al., 2021; Li, 2013; Suazo & Torress-Valle, 2022; Veron et al., 2016);
- lack of time to develop adequate materials (Bhattacharya et al., 2021; Li, 2013);
- inconsistent policies (Li, 2013);
- insufficient professional development (Beck et al., 2013; Bhattacharya et al., 2021; Reid, 2019); and
- lack of responsibility (Li, 2013).

Veron et al. (2016) found that many instructors that wanted to include CCE, sustainability, or environmental education content in their curricula needed to be self-taught (p. 47). These barriers to implementing CCE require much work to overcome.

**Motivators**

A third consideration in implementing CCE in IHEs are the motivators that influence an instructor to include this content in their curricula. Three studies (Beck et al., 2013; Veron et al., 2016; Winter et al., 2022) have addressed motivators for including CCE in tertiary-level curricula, such as follows:

- solid personal belief about the importance of the material (Winter et al., 2022),
- wanting to increase scientific literacy and educate the future decision-makers (Veron et al., 2016),
- greater concern about climate change (Beck et al., 2013),
- comfort level in teaching the material (Beck et al., 2013), and
- feeling a sense of responsibility for teaching these topics (Beck et al., 2013).

These findings and further research could help identify whether risk perceptions are strong enough to overcome personal and institutional barriers to including CCE and motivate more instructors in IHEs to include CCE content in tertiary-level curricula.

**Summary**

In this chapter, I reviewed studies on the so-called climate generation and CCE in IHEs. Students are unclear about climate change and receive most of their information on climate change from the media. IHEs provide an excellent opportunity for CCE but it's important to understand how risk perceptions, barriers, and motivators influence instructors to include CCE.



### **Chapter 3. Methods**

In this explanatory convergent mixed-methods study, I examined relationships among instructors' reported risk perceptions of climate change (i.e., threat appraisal) and implementation of CCE in their curricula (i.e., coping appraisal). I conducted a survey of threat appraisals using the SASSY Survey (Chryst et al., 2018) and assessed coping appraisals with qualitative analysis based on a framework of PMT theory. In this chapter I outline the research design, methods, and analysis used to help answer these research questions.

- What risks about climate change do tertiary-level instructors at universities reportedly perceive?
- What do tertiary-level instructors at universities report about climate change and its relation to CCE in curricula?
- Is there a relationship between instructors' reported risk perceptions of climate change and implementation of CCE in their curricula?

#### **Design**

For the design of this study, I chose convergent mixed methods to bring together quantitative and qualitative data for a comprehensive analysis of the research questions. Through mixed methods, I was able to expand the depth of insight gathered from my participants to collect rich data, showing how CCE is or is not included in curricula (Sandelowski, 2000).

#### **Setting**

The setting for this study was two public, four-year universities in Wisconsin that ranked as an M1 and M2 according to The Carnegie Classification of Institutions

of Higher Education (American Council on Education [ACE], 2023). These designations mean that these universities awarded at least 50 master's degrees with fewer than 20 doctoral degrees each year and rank as medium and large in size (ACE, 2023). I chose these two universities because they offered a variety of instructors from various disciplines to survey (i.e., business, economics, arts, communication, education, sciences, mathematics, natural resources).

Also, according to the Yale Program on Climate Change Communication's 2023 Climate Opinion Maps, 50-72% of adults surveyed in Wisconsin counties were worried about global warming (Howe et al., 2015). Both Universities are located in counties with 59-60% of adults who were reportedly worried about global warming (Howe et al., 2015). I purposely chose these two universities located in counties with lower reported concerns over global warming to see how the instructors risk perceptions compared to the general public residents within their counties.

### **Participants and Sample**

At these two sites, I contacted a convenience sample of participants. Convenience sampling is nonrandom sampling where participants are selected due to certain criteria, such as proximity, accessibility, or willingness to participate (Etikan et al., 2016). Potential participants were tertiary-level instructors working at these universities who were chosen due to their proximity and accessibility. This convenience sample did not represent the population of all instructors at IHEs.

### **Procedures**

Upon approval by the University of Wisconsin-Stevens Point and University of Wisconsin-Whitewater Instructional Review Boards and the Yale Program on Climate

Change Communication (Appendix A), I emailed all instructors at both universities a link to an anonymous online survey. At the beginning of the survey, I explained the purpose of the study, requested their participation, provided informed consent forms (Appendix B), and gave opportunities to opt out. I assured participants that risks are minimal, that I had no conflicts of interest, and that I would not use inducements, coercion, or deception. All data and forms are stored on UWSP password protected servers for seven years after publication.

### **Instrumentation**

I used a two-part instrument (Appendix C) to collect data from instructors at both universities. Instruments included both quantitative and qualitative items to assess participants' threat and coping appraisals.

#### ***Threat Appraisal***

Part one of the survey replicated the Global Warming's SASSY study by Chryst et al. (2018, p. 1109) to understand climate change risk perceptions of instructors. For clarity, the National Oceanic and Atmospheric Administration (NOAA) defines climate change as any significant change in the measures of climate for extended periods of time, usually over decades or longer (2016). NOAA explains that global warming is one aspect of climate change, specifically relating to the recent and ongoing rise in global average temperatures near Earth's surface. This survey instrument is on participants' feelings and risk perceptions of global warming, but it can also be used to extrapolate respondents' risk perceptions of climate change. Leiserowitz et al. (2021) stated that "The Global Warming's Six Americas analysis segments the U.S. public into six distinct audiences who each respond differently to the issue of climate change" as follows:

- alarmed,
- concerned,
- cautious,
- disengaged,
- doubtful, and
- dismissive (p. 97).

SASSY is a subset of four items that can categorize an individual's responses with a 70% accuracy, including the following:

- global warming risk perceptions,
- worry,
- impact on future generations, and
- personal importance (p. 1109).

As Chryst et al. (2018) have shown, the SASSY survey is designed to reflect meaningful differences in risk perception and decision making (p. 116). Thus, this survey can quantify the instructors risk perceptions of climate change into six segmentations for accurate analysis of their threat appraisal.

The Yale Program on Climate Change Communication made recommendations that I add questions to the survey regarding instructors' estimations of how many Wisconsin residents thought global warming was happening and how many were worried about it. These questions would identify if instructors were over or underestimating Wisconsin residents and their thoughts on global warming.

### ***Coping Appraisal***

In Part 2 of the survey, I utilized open-ended items (Appendix C) to collect data on instructors' coping appraisal. These items addressed participants' response efficacy, self-efficacy, barriers, and motivators, and whether they felt there is a need for CCE in curricula.

### **Analyses**

I conducted the following convergent analyses.

#### ***Quantitative***

I entered data collected from Part 1 of the survey into the SASSY Group scoring tool (Chryst et al., 2018) provided freely by the Yale Program on Climate Change Communication to determine participant's risk perception group (i.e., alarmed, concerned, etc.). The SASSY group scoring tool categorized data that I used to interpret participants' threat appraisal of climate change.

#### ***Qualitative***

Following Saldaña's (2021) instructions, I read through the responses from the survey to gain an understanding of emerging codes and potential themes. Then, for my first cycle of qualitative analysis, I utilized In Vivo coding. In Vivo coding uses words or short phrases from the participants own language in the data record as codes (Saldaña's, 2021, p. 365). After I generated In Vivo codes, I sorted and grouped responses into similar categories for pattern construction and to identify possible interrelationships within the data (Saldaña, 2022). In my second cycle of qualitative analysis, I determined code frequency to identify and scale the categories importance. To visualize the code frequency, I used code landscaping to display the categories, in which more frequently mentioned categories appeared in larger text than others. Then, I

organized the categories according to text size to visualize the data. Upon finalizing the code landscaping, I drew themes from codes and categories. My codebook is in Appendix D.

### ***Comparison***

I used tools of exploratory data analysis (EDA) to compare the two data sets and develop a rich mental model of the data. EDA is a data-driven conceptual framework that uses a bottom-up approach, focusing on the initial exploration of data, using a broad range of methods to develop a deeper understanding of the data, generate new hypotheses, and identify patterns in the data (Pertl & Hevey, 2012, p. 2). To create a summary of descriptive statistics I utilized Pertl & Hevey (2012) “four Rs”, as follows:

- Revelation: using different ways to describe the data to understand patterns and avoid being fooled by unwarranted assumptions (p. 3).
- Residuals: careful examination of residual plots for any additional patterns (p. 4).
- Re-expression: scaling data appropriately so the phenomena can be represented meaningfully (p. 5).
- Resistance: minimizing the influence of extreme or unusual data (p. 5).

By using exploratory data analysis, I was able to look for patterns, differences, inconsistencies, and limitations with the data to draw conclusions about instructor’s climate change risk perceptions and why they included CCE in their curricula (Downey, 2015).

## **Measures of Quality**

The Yale Program on Climate Change Communication has validated the SASSY instrument (Chryst et al., 2018) through a two-stage process of training a classifier algorithm to learn a specific pattern of category classification, then that algorithm was evaluated against test set data to ensure accuracy (p. 1112-1113). In addition, multinomial-logistic regression models were used, providing a minimum 70% true positive rate in classifying the six segmentation categories for the SASSY instrument.

I administered a pilot survey to establish content validity, provide insight into internal consistency, and to help improve questions, format, and instructions. Also, a trusted colleague analyzed the qualitative responses to ensure that my coding was reliable.

## **Summary**

I used explanatory convergent mixed methods to answer my proposed research questions. I collected data from a convenience sample of instructors at two public, four-year universities. I first collected survey data and analyzed them in accordance with the Six Americas segmentation classification (Chryst et al., 2018). I then used descriptive statistics to analyze quantitative data and used previously tested and accepted methods to code and seek themes in qualitative data.

## Chapter 4. Results and Findings

For this study, I sent an online survey to instructors at two public, four-year universities that rank as an M1 and M2 according to The Carnegie Classification of Institutions of Higher Education (ACE, 2023). The survey was open for three weeks, with multiple reminder emails asking for participation. I received 107 responses. Thirteen participants did not complete the survey, and four were not instructors, as defined in the survey as “anyone who teaches students at an Institution of Higher Education. Such as adjuncts, lecturers, professors, etc.” The remaining 90 responses met the criteria of this study.

Between the two universities, the responses were almost evenly split, with 50 responses from one university, and 40 responses from the other. Upon further analysis, data from both universities had strong similarities between their demographic, climate change risk perceptions, and inclusion of CCE in curricula. Due to this strong similarity in responses, I did not break down the data into individual universities for the purpose of this study. Table 1 shows the sources of survey responses from participating instructors, who represented a wide variety of departments, majors, and backgrounds from seven colleges within the two universities.



**Table 1***Sources of Survey Responses*

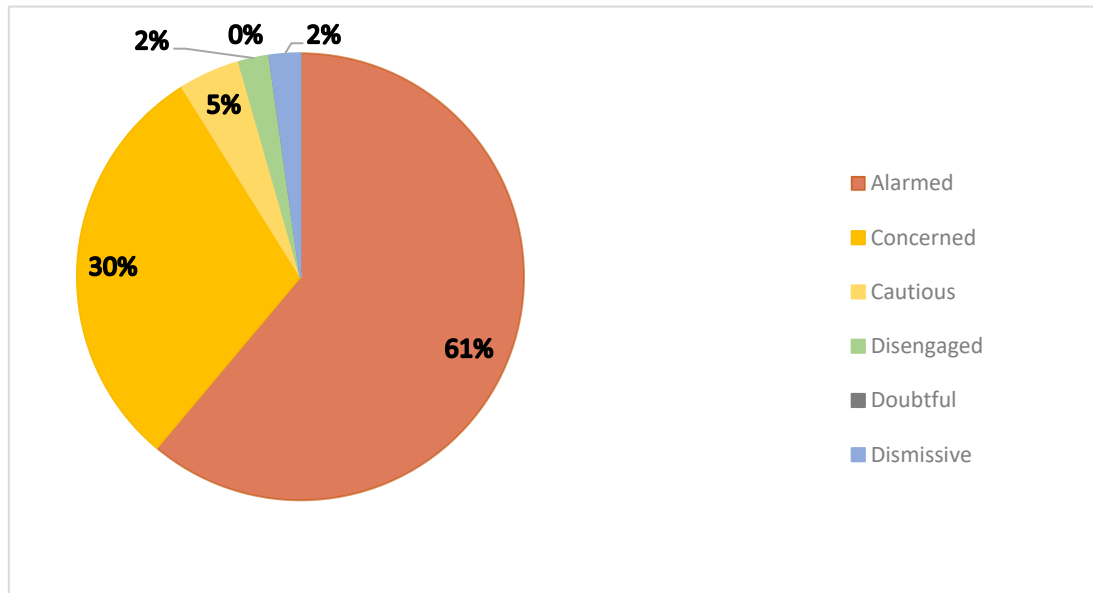
Response	<i>n</i>	%
College of (Fine) Arts and Communication	3	3
College of (Education) Professional Studies	25	27
College of Letters and Science	34	38
College of Natural Resources	12	13
College of Business and Economics	12	13
College of Integrated Studies	2	2
University College	2	2

*Note.* *N* = 90. Total percentages ≠100 due to rounding.

Appendix E shows demographic information for participants in this study. Over half (59) of the participants had been teaching for 11 or more years. Also, over half (56) of the participants were 45 years or older in age. Over half (52) of participants were female. A vast majority (74) of participant's ethnic backgrounds were White. When asked their political viewpoints, none of the participants identified as slightly or very conservative. Ten participants identified their political viewpoint as neutral or neither, 33 as slightly liberal, 32 as very liberal, six preferred to self-identify and nine preferred not to say. In the following sections, I present quantitative results, qualitative findings, and comparisons that used the tools of EDA.

### **Quantitative Results**

I used the Yale Program on Climate Change Communication's Global Warming's SASSY to answer my research question, what risks about climate change do tertiary-level instructors at universities reportedly perceive? Figure 2 shows a distribution of reported responses (*n* = 90) to climate-change risk.

**Figure 2***SASSY Results*

These results showed that a vast majority of instructors 91% (82) were alarmed or concerned about climate change. Table 2 shows the comparison of the participating instructors climate change risk perceptions compared to the Yale Program on Climate Change Communication Global Warnings Six Americas findings from 2023 (Leiserowitz et al., 2023). My sample of participating instructors reported higher risk perceptions of climate change than a sample of the American public.

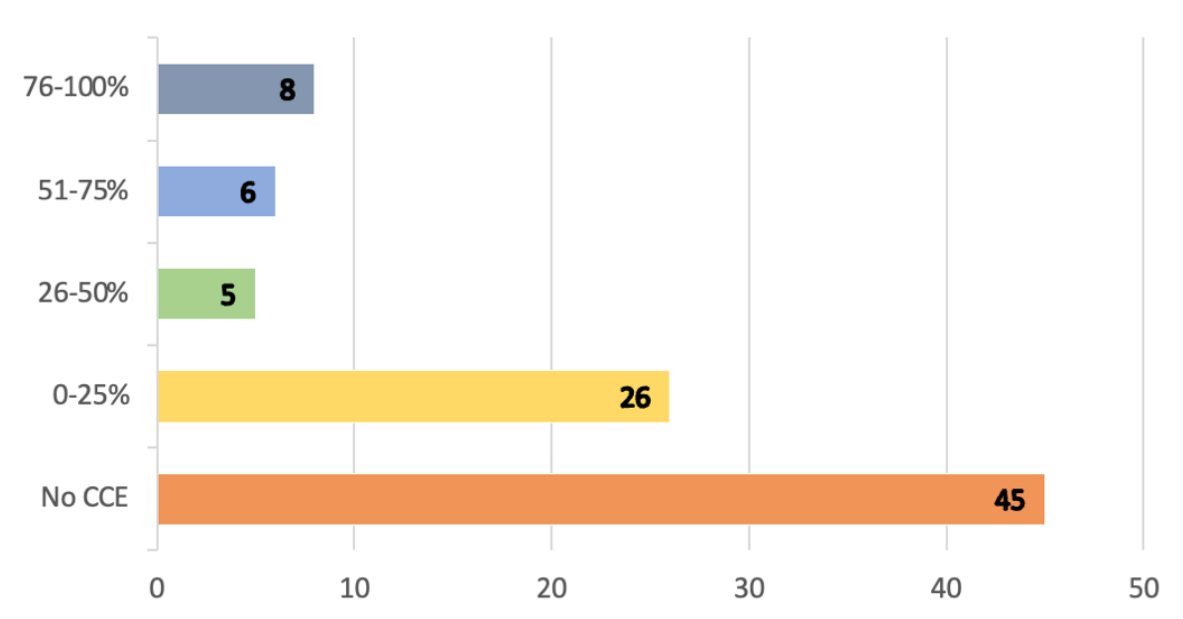
**Table 2***Global Warming Six Americas Comparison*

Response	% of Instructors (n= 90)	% of Americans (n = 1,033)
Alarmed	61	28
Concerned	30	29
Cautious	5	15
Disengaged	2	6
Doubtful	0	11
Dismissive	2	11

When I asked whether participants included CCE in their courses, only half (45) of respondents reported “yes.” Of the 45 respondents who were teaching CCE, over half (26) reported teaching CCE in only 25% or less of their courses. Figure 3 shows the breakdown of all participant responses and the amount of CCE they reportedly included in their curricula.

**Figure 3**

*CCE in Curricula*

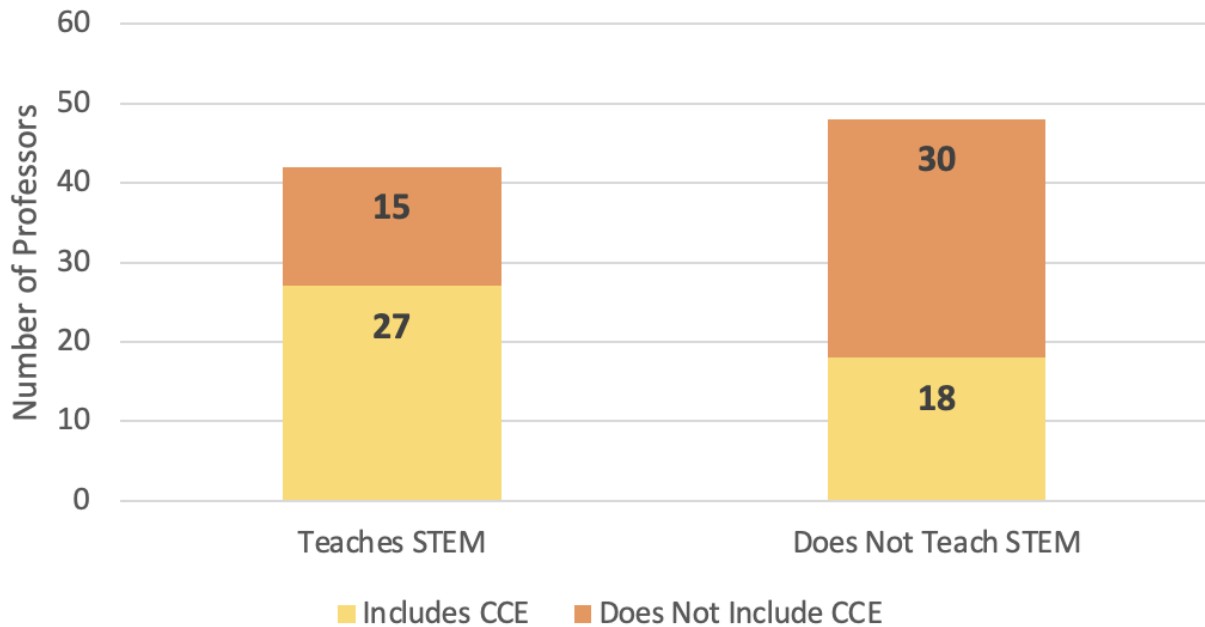


Furthermore, when I asked whether participating instructors teach in science, technology, engineering, mathematics (STEM) fields, 42 responded “yes”. Over half (48) of participants did not teach in a STEM field. According to the participating instructors who responded to the survey, CCE was reportedly included in more STEM courses than non-STEM courses. Twenty-seven participating instructors who included CCE taught in a STEM field, but only 18 of the instructors who included CCE taught

in a non-STEM field. Figure 4 compares data from participating instructors who taught in STEM and non-STEM fields and those who included CCE in their courses.

**Figure 4**

*STEM versus Non-STEM and CCE Inclusion*



In these results I found a disconnect between an instructors' climate change risk perceptions and their inclusion of CCE in their curricula.

### **Qualitative Findings**

In this section, I report my findings from my qualitative analysis data on risk perception and inclusion of CCE in curricula to help answer my research questions: What do tertiary-level instructors at universities report about climate change and its relation to CCE in curricula, and, is there a relationship between instructors' reported risk perceptions of climate change and implementation of CCE in their curricula? I analyzed 90 responses and placed data in the following four categories:

- thoughts on climate change,

- need for CCE,
- CCE included,
- CCE not included.

### ***Thoughts on Climate Change.***

When I asked participating instructors to share their thoughts on climate change ( $n = 90$ ), they mentioned 31 times that climate change was real, it's happening, and humans are the cause. Participants mentioned 23 times throughout their responses that they are feeling "worried," "depressed," "helpless," "powerless," "concerned," or "scared", and one suggested that it felt like a "sword hanging over our heads."

Participating instructors only mentioned three times that recent years had encouraged them, but there were six mentions that said they recognized that climate change is out of their immediate control. One participating instructor stated that they had "fallen into the irresponsible habit of trying not to think about it."

Of 90 respondents, only one participating instructor stated that climate change was a hoax, and only two participants stated that they thought climate change was a natural occurrence. There were seven mentions of climate change being inevitable, and that participants will be dead before it affects them. However, there were seven responses expressing concerns for future generations, their children's future, and addressing their children's concerns about climate change.

In their responses, participants stressed the likelihood of increased severe weather, limited resources, wars, inequity, injustice, health impacts, economic repercussions, with overall negative impacts on humans, plants, and animals. One

participant said, “the world is on fire literally and figuratively.” Among many participants who described negative impacts from climate change, one said, “for privileged people (like University Instructors) it’s immediate impacts are somewhat distant.”

Participants voiced 11 times that they are dissatisfied with government action, or lack thereof. They stated that the government should be doing more, along with industry and corporations. They voiced their frustration with politicians and think the current international efforts are not enough to curb climate change. Participants mentioned the urgency for fast action in courageous policy making, and how they were unsatisfied with the current slow pace of action 20 times throughout their responses. Only two participants mentioned they were unsure of proposed solutions and that it was too late to act.

When I asked participating instructors to estimate what percentage of Wisconsin residents think global warming is happening, 72% (n = 65) of participating instructors underestimated Wisconsin residents’ views. According to the Yale Climate Opinion 2021 Maps (Howe et al., 2015), 69% of Wisconsin residents think global warming is happening. Only 28% (n = 25) speculated correctly, stating they thought 61-80% of Wisconsin residents thought global warming was happening.

When I asked participating instructors to estimate what percentage of Wisconsin residents were worried about global warming, 98% (n = 88) of participating instructors underestimated Wisconsin residents’ concerns. According to the Yale Climate Opinion 2021 Maps (Howe et al., 2015), 62% of Wisconsin residents are worried about global warming. Only 2% (n = 2) were correct, stating they thought 61-80% of Wisconsin residents were worried about global warming. Table 3 displays the responses

from instructors on their estimates about Wisconsin residents and their thoughts on global warming.

**Table 3**

*Instructors' Estimates for Wisconsin Residents*

Response	Instructors estimates for WI residents who think global warming is happening ( <i>n</i> = 90)	Instructor estimates for WI residents who are worried about global warming ( <i>n</i> = 90)
0-20%	5	16
21-40%	19	38
41-60%	41	34
61-80%	25	2
81-100%	0	0

When asked if this information surprised them, I obtained 52 mentions that it was surprising to them, 29 mentions that it was not surprising, and three mentions that they were in line with their expectations. I obtained four mentions that they were happy to see the percentages as high as they were and thirteen mentions saying they didn't think people were worried about global warming because it seems that nobody is talking about it. One participant wrote, "I assumed that fewer people thought about climate change or were aware of it at all mainly because no one talks about it or acts like it's happening." From the 90 participating instructors, I obtained 24 mentions about the political state of Wisconsin, and how polarized climate change has become. One participant stated, "Wisconsin is a politically divided state and I believe that thoughts on climate change are split along party lines."

***Need for CCE***

When I asked the 90 participating instructors whether they felt there is a need to include climate change content in their courses, a majority of the participants said

yes. There were an overwhelming 70 comments from participants that believe there was a need to include CCE. Many participants said that they felt that students were interested in the topic, that students needed to understand how it will impact them and their future employment, and that this topic was too important to ignore. One participant reported, "There is no requirement for me to do so but I do feel it is important for students to learn this information and I worry based on what they know coming in the university that their K-12 education on the topic has not been sufficient." Another participant stated, "I don't think I would be equipping students with the critical thinking skills they need to be leaders if I don't include climate change."

To the contrary, I found 31 comments from participants stating that they did not feel there was a need to include CCE in curricula. Most said that it did not relate to their course topics. One participant said, "It is not what the students sign up to learn when they take my classes so it is disingenuous to make the course about it." Another participant reported that they thought it might negatively impact their student evaluations, while another stated "it is viewed differently politically I fear it may come across as further 'indoctrination' of students."

Three participating instructors reported that they were unsure whether there was a need to include climate change content, while four others stated that they hoped students were learning about climate change in other courses that better suited the topic. One participant stated, "I hope students will learn about climate change in other courses where the content makes more sense." There were three comments from participants mentioning that they would need additional support to include CCE. One respondent wrote "I have thought about doing so and I've felt guilty for not doing so."



These responses from participating instructors demonstrated that there is a need for CCE in tertiary-level education.

### ***CCE Included***

Half of participants ( $n = 45$ ) reported they included climate change information in their curricula. When I asked why they included CCE information in their courses, participating instructors mentioned 26 times that it was related to topics that they taught. From the participating instructors, I obtained 18 mentions about the importance of climate change when teaching such subjects as natural resources, health, nursing, economics, soil and water conservation, biology, and environmental justice. These participating instructors said that the topic was just too important not to talk about, stating, it's an "important ethical issue for future business leaders" and "one of the most significant issues of our time." Participants mentioned eight times how climate change provided real-world examples that they could use to educate their students. One said that climate change provided "real conditions and challenges the students will be facing during their careers [allowing instructors to] add that 'real world' component" into their curricula.

I obtained eight comments from participants who expressed their desire to prepare students for the future. One participant said that they wanted to "wake up" their students and get them to understand the impacts of their decisions, consumption, and food choices. Another participating instructor said they had "goals of producing an educated citizenry," and to do that "we must prepare the students." Instructors identified needs to teach students the difference between opinion and scientific facts, along with addressing what students hear in the media about climate change. In responses from these 45 participating instructors, I found common themes of strong connection

to curricula, addressing the important issue of climate change, and preparing students for the future.

**Barriers.** When I asked whether participating instructors encountered any barriers to including climate change content in their curricula, an overwhelming majority (34/45) reported no barriers. A minority (11/45) reported the following barriers:

- student resistance or lack of interest (3),
- lack of connection to topic (3),
- complexity of the topic (2),
- political polarization (2), and
- colleague opposition (1).

Only three of 45 participants who included CCE reported student-related barriers. One instructor experienced some students that were resistant to the topic, another reported “bored looks on student faces” and one instructor stated, “some of my students are climate change deniers but I think they are few and far between and I don’t let that stop me.” A few of the instructors found it difficult to connect their topic to climate change, while others reported the difficulty of including such a complex topic. Two instructors mentioned politics as barriers, citing Wisconsin politics as an issue and that “students don’t understand the difference between an instructor sharing scientific information (data) on the subject in comparison to ’being fed a political agenda.’” Lastly, one instructor reported opposition from a colleague who “believe that as business professors our job is to teach finance not climate science.”

Some participating instructors addressed how students are interested and care about this topic when asked about barriers to CCE. They stated that “students are

leading the charge to fight climate change” and “even those students who might be skeptical of the need for political solution to the issue are still willing to admit it is a real phenomenon influenced by human action.” Most participating instructors reported few barriers to including CCE in their curricula.

**Motivators.** When I asked the same participating instructors what their biggest motivators were for including climate change content into their course curricula, I obtained the following mentions:

- relevancy to course themes (12),
- strong belief in the importance of the topic (11),
- develop comprehension, understanding, and critical thinking skills (9),
- urgent nature of climate change (7),
- personal responsibility (7),
- education for the mitigation of climate change (6),
- impacts on students’ future employment and future generations (6),
- environmental concerns (3), and
- convenience (1).

In parallel to responses from participating instructors about including climate-change content, they reportedly felt motivated to include CCE because it connected strongly with their curricula and it’s an important issue that needs to be addressed. Participants commented nine times that teaching students about the wicked problem of climate change helped students think critically about the issue, think big picture, and develop strong analysis and comprehension skills. Participating instructors were

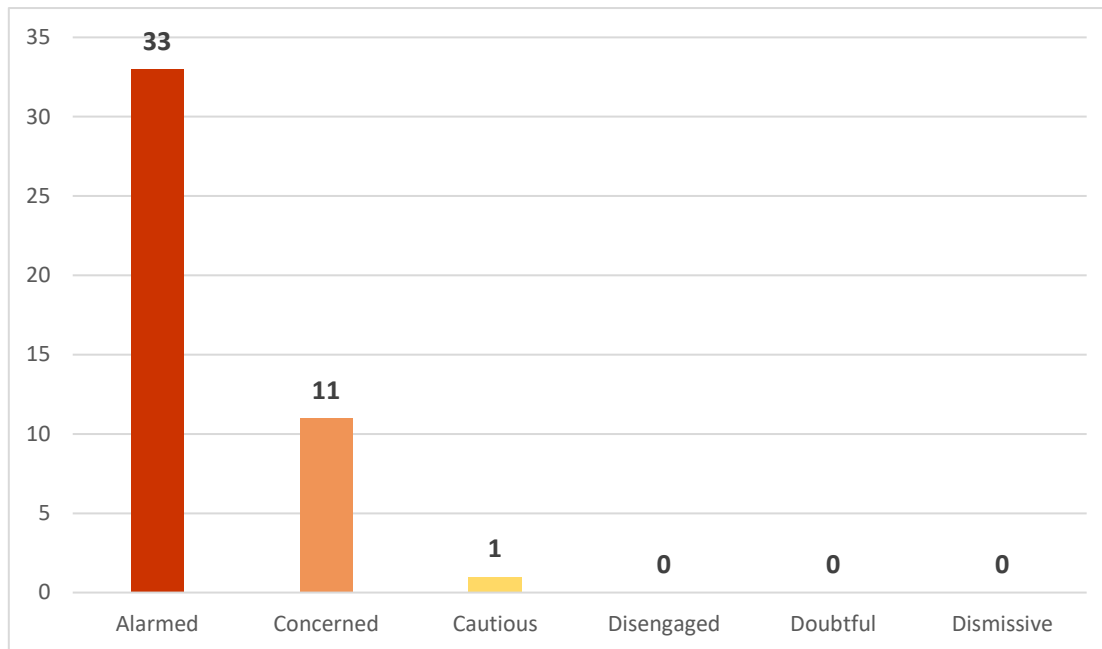
reportedly motivated by a strong sense of urgency and personal responsibility to address climate change. As one stated, “I care about it and so do my students.”

Participating instructors said that they were motivated to include CCE because they understood that education is a powerful tool to mitigate effects of climate change. One said that students “can’t solve problems if they aren’t aware they exist.” Participants mentioned six times in their responses that they understood the impacts climate change will have on students’ future employment and lives and said that they were motivated to prepare students for these changes. There were only three comments from participants that they were motivated by their own environmental concerns, such as their concern over polluted water systems, increased frequency of extreme weather, and impacts of chronic disease and illness on Black, Indigenous, and People of Color (BIPOC) communities. One participant mentioned that they were motivated because of the convenience that CCE “content is included in my textbook.”

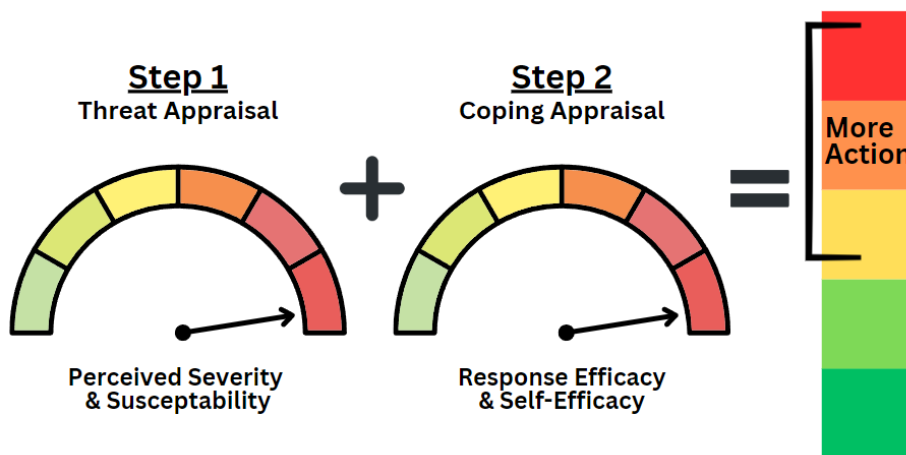
***Protection Motivation Theory.*** I used PMT to assess the threat appraisal and coping appraisal to determine a level of action that a respondent might take to mitigate a threat. For this study, I used SASSY survey data to understand threat appraisals and risk perceptions of climate change. Figure 5 displays my findings from respondents who included CCE in their curricula. Of 45 respondents, 44 (98%) reported that they were either alarmed or concerned about climate change and 1 (2%) was cautious. According to PMT, these scores correspond to a high threat appraisal of climate change.

**Figure 5**

*Threat-Appraisal Scores for Participants Who Included CCE*



Next, I assessed coping appraisals of instructors who included CCE. I analyzed data on their motivations for including CCE, and identified high levels of response efficacy and self-efficacy. For example, one respondent said that they wanted to make “individuals feel empowered to make a difference.” Another said, “educating the engineers of the future can help reduce climate change impacts.” Figure 6 displays heat maps that show high threat appraisals of climate change and high coping appraisals among participants who reportedly included CCE in their curricula.

**Figure 6***PMT Appraisals among Participants Who Included CCE****CCE Not Included***

Half of participants ( $n = 45$ ) reported they did not include climate-change information in their curricula. When I asked them why they did not include this information in their courses, participants reported 31 times that it was not relevant to the topic they taught. Participants made 12 comments that they did not have enough time to include CCE, or said that it was hard to include new material, or that they lacked the knowledge and materials to include it in their curricula. Two participants reported that they never thought to add this kind of content to their curricula, and another said that climate change was too complex to grasp. One participating instructor said that they tried to incorporate CCE but “my students don’t seem to be interested.” Another participating instructor said, “I currently have examples that work relatively well and sadly are less controversial.” Participants made nine comments that stated that while they did not teach it, they should or could add it to their curricula. They mentioned that they would be willing to incorporate CCE if they found ways to relate it to their topic.

Next, I asked participants whether they would like to include CCE in their curricula, and the responses were mixed. Participants mentioned 22 times that they would like to include CCE. They mentioned how important climate change is and that it would be good for students to learn more about the issue. There were nine comments from participants mentioning that they might potentially include CCE if they could find ways to connect climate change to their topic with relevant examples.

Just over half of participating instructors said that they did not want to include CCE in their curricula. Participants commented that climate change is not relevant to their topic, and it would feel forced to include it. These participating instructors reported that it would be better for students to learn CCE in other courses or independently. One participant stated, "I want to make sure the correct courses are covering the topic and that it is not repetitive."

Five participating instructors reported that including CCE could be controversial. Two instructors said that they would be "injecting personal political opinion," or that "it verges on propaganda" by including CCE in their courses. Another said that including CCE would be "more controversial than I would be comfortable with." One participant stated that "since climate change isn't directly related to the course topic I'm concerned that my covering may not be protected by academic freedom."

A subset of participating instructors indicated that they lacked expertise and time to include CCE. Participants made seven comments stating that they already had difficulty fitting in their required material and did not have time to add another topic such as climate change. Participants made six comments saying that climate change lay outside their area of expertise and that they do not feel educated enough on the

topic to talk about it. One participant said that students would be better off learning from experts in the climate change field as it is not one of their strengths.

When I asked these participating instructors if they felt confident in their climate change knowledge that they could include CCE in their curricula if they wanted to, just over half ( $n = 26$ ) said that they did not feel confident they could include CCE. These participants stated they would not feel comfortable talking about climate change, had limited knowledge and would need to learn more. They said they would not feel confident in handling possible questions or challenges from students on the topic. Participating instructors made five comments on how including CCE is irrelevant because “I am not trained or hired to teach this material” or that it’s “not a matter of wanting or not wanting to include climate change it is a matter of it being appropriate to the subject being taught.”

Just under half of participating instructors ( $n = 19$ ) reported that they knew enough about climate change to include it in their curricula if they wanted to. One participant stated that they were “about 70% confident in their current knowledge but 90% confident in their ability to learn.” Another said they would include CCE, “but it would be to show that science doesn’t support it.” One participant stated that they were unsure if they were confident enough to include CCE.

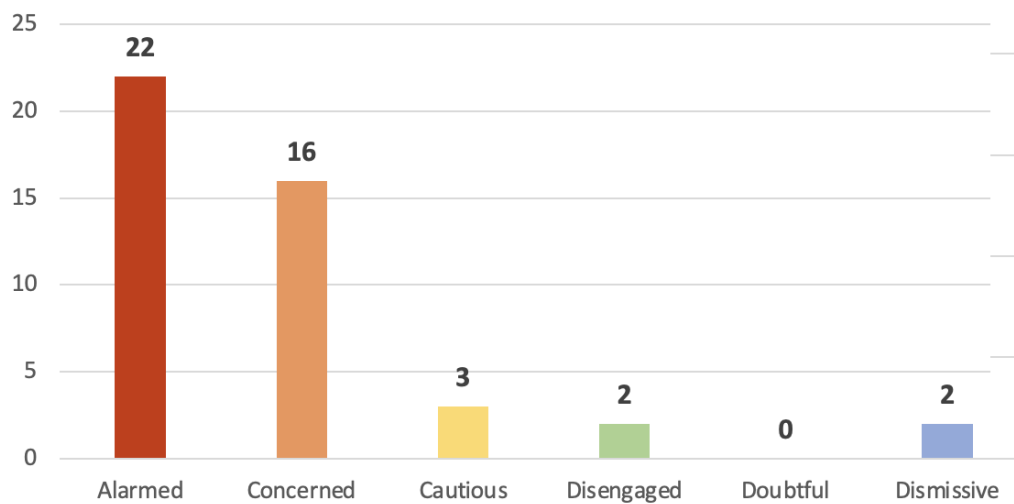
***Protection Motivation Theory.*** I used PMT to assess coping and threat-appraisal scores among participating instructors who did not include CCE in their curricula. Figure 7 displays threat appraisal scores from participating instructors who did not include CCE in their curricula. Thirty-eight (85%) of these participants who did not include CCE in their curricula reportedly were either alarmed or concerned about



climate change; three (6%) reportedly were cautious, two (4%) reportedly were disengaged, and another two (4%) reportedly were dismissive. Using PMT, I assessed these scores as a moderate threat appraisal of climate change.

### Figure 7

*Threat-Appraisal Scores for Participants Who Did Not Include CCE*



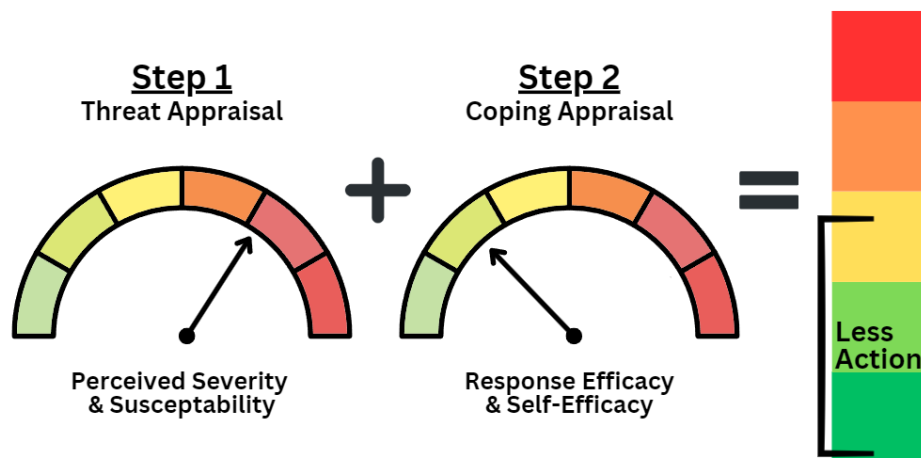
Threat-appraisal scores by this subset were lower than those by the subset of instructors who did incorporate CCE (Figure 5). These slightly lower threat-appraisal scores are shown within the PMT framework in Figure 8.

Next, I assessed coping appraisal scores from participating instructors who did not include CCE. I found that these participants had a low response efficacy as they did not find connections between climate change and their curricula. They reported low self-efficacy scores, showing that they lacked resources, knowledge, and expertise to talk about climate change. Twenty-six of these participants reportedly lacked confidence to talk about climate change. Combining the low response efficacy and self-efficacy of these instructors, it yields a low coping appraisal for PMT as seen in

Figure 8, a display of heat maps that show that a moderate threat appraisal along with a lower coping appraisal, was related to less action in the form of CCE in curricula.

**Figure 8**

*PMT Appraisals among Participants Who Did Not Include CCE*



### Comparisons

Employing the re-expression tool of EDA, I compared SASSY responses with percentages of including of CCE in curricula. I developed four categories from this cross comparison. I grouped SASSY responses identified as “dismissive,” “doubtful,” or “disengaged” into a category of “low threat appraisal.” From SASSY responses that I identified as “cautious,” “concerned,” or “alarmed,” I categorized them as “high threat appraisal.” I identified respondents as having low coping appraisals if they reportedly taught 25% or less of CCE. Conversely, I identified respondents who reportedly included CCE in more than 26% their curricula, as “high coping appraisal.” I then grouped respondents into the following four categories:

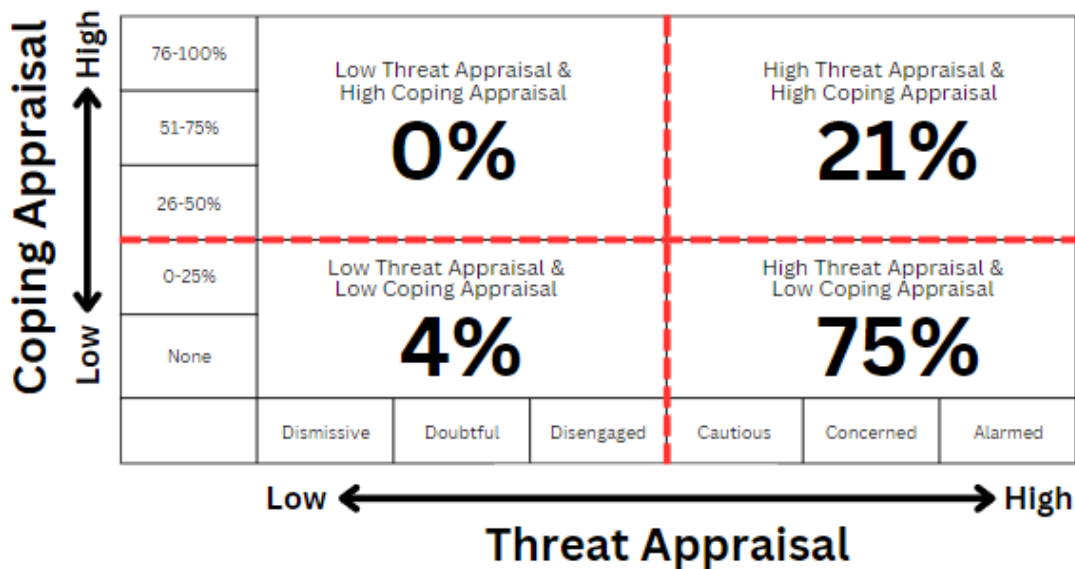
- low threat appraisal & low coping appraisal (4%),
- low threat appraisal & high coping appraisal (0%),
- high threat appraisal & low coping appraisal (75%),

- high threat appraisal & high coping appraisal (21%).

Figure 9 is a display of these categorizations in a Johari-window matrix.

**Figure 9**

*Matrix of Coping & Threat Appraisals*



This cross-comparison shows that a vast majority of respondents reported high threat appraisals of climate change risks and over three quarters of respondents have low coping appraisal. This low coping appraisal shows that the participating instructors are uncertain how to take action against climate change in the form of curriculum adjustments.

### Summary

In this chapter, I showed that 91% of participating instructors whom I surveyed were either alarmed or concerned about climate change. Participants acknowledged that climate change was real and that something needs to be done about it. Only half of participating instructors reportedly included CCE in their curricula, and over half of those participants reported including it in less than 25% of their courses. When

comparing threat and coping appraisal methods, 75% of participants had high threat appraisals with low coping appraisals, and only 21% had high threat appraisals with high coping appraisals. This research demonstrates that the majority of participating instructors are alarmed or concerned about climate change, but they do not know how to take action via their curriculum with their low coping appraisal.

## Chapter 5. Conclusion

In this study, I surveyed 90 instructors at two different public four-year universities that ranked as M1 and M2 according to The Carnegie Classification of Institutions of Higher Education (ACE, 2023). To understand their climate change risk perceptions and whether they were teaching CCE in their curricula, I collected and analyzed two sets of data to address my three research questions:

- What risks about climate change do tertiary-level instructors at universities reportedly perceive?
- What do tertiary-level instructors at universities report about climate change and its relation to CCE in curricula?
- Is there a relationship between instructors' reported risk perceptions of climate change and implementation of CCE in their curricula?

To answer the first question, I replicated the Global Warming's SASSY study by Chryst et al. (2018, p. 1109) to understand climate change risk perceptions of instructors. This SASSY study allowed me to categorize my participants into six distinct groups who reportedly perceived climate change differently. My survey results were that 91% of participating instructors were alarmed or concerned about global warming. The remaining participants were reportedly cautious (5%), disengaged (2%), or dismissive (2%) about global warming.

When I asked participants to share their thoughts on climate change, most responded that it was real and demanded action. When I asked participants what percentage of Wisconsin residents thought global warming was occurring, instructors underestimated the percentage by 72%. When asked what percentage of Wisconsin

residents were worried about global warming, instructors underestimated the percentage by 98%. Instructors most likely are underestimating Wisconsin residents due to instructors not hearing or seeing anyone talking about climate change or expressing concerns about it.

When asked if there was a need for CCE in curricula, roughly 75% agreed. However, only 50% of respondents reported including CCE in their curricula, and over half of those respondents only included it in 25% or less of their courses. Participating instructors who did not include CCE reported that they did not consider it relevant to their course topics or that they did not have enough time, knowledge, or resources to add it.

Using PMT, I asked about relationships between participating instructors' risk perceptions of climate change and their implementation of CCE in their curricula. These findings indicate that there was not a strong relationship between climate change risk perception and implementation of CCE in curricula. Just because an instructor is concerned about climate change does not mean they are more likely to include CCE. The coping appraisal is more important for assessing whether climate change risk perceptions might influence an instructor to include CCE in their curricula than threat appraisal. I found that an instructor must indicate confidence in their response efficacy and self-efficacy, to include CCE in their curricula, regardless of if they are alarmed or concerned about climate change. I conclude that an instructor must indicate a strong coping appraisal to connect climate change with their topic, have the knowledge to teach climate change, and devote resources and time to include it.

## Discussion

Students attending IHEs are concerned about climate change. They have been exposed to climate change in the news and media for most of their lives, labeling them as the “climate generation” (Aksit et al., 2017), but seem to still not understand the drivers of climate change and often confuse it with other environmental issues (Bhattacharya et al., 2021, Huxster et al., 2015). Of the 90 instructors whom I surveyed, only half taught climate change, and over half of them reportedly presented it in 25% or less of their classes. These results demonstrate that students are not receiving uniform or consistent CCE across their courses.

The results of this study accord with those by Bhattacharya et al. (2021) and Huxster et al. (2015), who found that students in STEM fields receive more CCE than students in other fields, even though the non-STEM students make up the majority of post-secondary students according to the National Center for Educational Statistics (2021). Without uniform and consistent CCE, students may continue to struggle with understanding the causes and effects of climate change. A motivator for faculty that include CCE is the hope that through education, students can help mitigate climate change. Including more CCE in tertiary-level curricula could potentiate effective education for mitigation.

As Aksit et al. (2017) and Beck et al. (2013) showed, students trust university scientists and instructors to provide factual and essential climate change information (p. 568, p. 2). In my study, I found evidence that participating instructors were motivated to earn that trust. Participants made nine comments in their responses about

their motivation to help students increase their critical thinking skills, evaluate scientific evidence, and distinguish opinion from fact.

In analyzing my findings on risk perception, as defined by O'Connor et al. (1999), I found that a majority of participating instructors acknowledged that climate change was occurring, was one of the biggest problems humans face, was human-caused, and will have real and direct consequences. I found that 61% of participating instructors were reportedly alarmed about climate change with another 30% reportedly concerned about it. In comparison with the national average of alarmed citizens, 28% (Leiserowitz et al., 2023), these participants were twice as alarmed about climate change.

A majority of participating instructors who include CCE reported no barriers to including CCE. The following three barriers were mentioned by participants:

- mixed reviews on the relevance of the topic (Bhattacharya et al., 2021; Winter et al., 2022);
- confidence or expertise to teach on the subject (Beck et al., 2013; Bhattacharya et al., 2021; Dal et al., 2014; Li, 2013; Suazo & Torress-Valle, 2022);
- lack of time to develop adequate materials (Bhattacharya et al., 2021; Li, 2013).

In this study, I did not find the following five barriers reported by other researchers:

- institutional and political restraints (Reid, 2019; Seroussi et al., 2019; Winter et al., 2022);
- lack of formal or informal training (Li, 2013; Suazo & Torress-Valle, 2022; Veron et al., 2016);
- inconsistent policies (Li, 2013);



- insufficient professional development (Beck et al., 2013; Bhattacharya et al., 2021; Reid, 2019); and
- lack of responsibility (Li, 2013).

In this study, I found the following four barriers that were not found in previous studies of instructors who include CCE:

- student resistance or lack of interest,
- complexity of the topic,
- political polarization, and
- colleague opposition.

I found motivators for including CCE in curricula that mirrored studies by Beck et al. (2013), Veron et al. (2016), or Winter et al. (2022). Among these motivators were the following five:

- strong connections to course themes,
- beliefs in the importance of topics,
- desires to educate future decision-makers and improve student skills,
- concerns for climate change, and
- personal responsibilities.

A motivator that I did not find in my review of literature but identified in my research was the desire to educate students on how CCE would impact their future employment and lives.

## **Implications**

From this study, I make two implications. First, my findings imply that CCE could successfully be implemented in IHEs if instructors had a better understanding

of how climate change impacted their field of study. Using PMT, my study showed that many instructors reported strong threat appraisal of climate change. However, I found a disconnect when participating instructors did not see how climate change was relevant to their curricula or instructional time. This finding implies that these instructors have a weak coping appraisal, leading to less climate action in the form of education.

A second implication is that, as a researcher on CCE in IHEs, I should direct future efforts toward implementations of CCE for instructors who have low coping appraisals.

### **Limitations**

This study had the following three limitations: a small non-random sample, a controversial topic, and a simplified construct of climate change risk perceptions. First, I surveyed instructors from only two public, four-year universities that ranked as an M1 and M2 according to The Carnegie Classification of Institutions of Higher Education (ACE, 2023). Ninety participants in the survey represent an estimated 10-15% of the total population of instructors from these universities. This sample was not representative of the population all instructors at IHEs.

Second, in my request for email participation, I explained that “I am conducting a study on climate change risk perceptions and inclusion of climate change education in curricula.” This statement might have caused instructors to disregard my survey. Climate change can be a contentious topic, and some instructors may have chosen to not take my survey if they had strong feelings about climate change, or did not understand how it connects to their field of study.

Third, the SASSY instrument is an excellent tool for using a small number of items to capture a snapshot of someone's climate change risk perceptions. However, this instrument was limited to four items on personal importance, worry, personal harm and harm for future generations, a simplified construct of climate change risk perceptions. As other researchers (e.g., Kahan et al., 2012, Leiserowitz, 2005, Weber, 2015, Yapici et al., 2017) have shown, there are many considerations for climate change risk perceptions. Although I used SASSY to capture and categorize risk perceptions in relation to climate change, other instruments could be used to capture more detailed information on instructors' climate change risk perceptions.

### **Recommendations**

For future research, I offer four recommendations. First, this research should be conducted on a larger scale. Expanding this to more universities both state and nationwide would provide a more robust sample size and offer the opportunity to confirm or re-examine the findings from the study. There is also the potential to expand this research into the population of K-12 educators, to gain a better understanding of their coping appraisals, risk perceptions of climate change, and their motivators and barriers to including CCE.

Second, I would like to conduct research to test methods for improving coping appraisal. This project would entail using this survey instrument as a pre and post exercise combined with educational material for tertiary-level instructors who do not incorporate CCE into their curricula to test methods for improving coping appraisal.

Third, I recommend creating a general education course requirement on climate change that would be beneficial for both students and instructors. Such courses

would ensure that all students receive consistent and uniform CCE, so that instructors in all fields of study could build on students' basic knowledge of climate science and demonstrate how climate change connects to all facets of life without having to be an expert in climate science.

My fourth recommendation is to create resources, time, and opportunities for instructors to learn more about how climate change connects to their course topics. Professional development opportunities, curriculum development, and collaboration among disciplines could increase instructors' coping appraisals. For example, offering workshops to learn about climate change and how it can be incorporated into their courses and across disciplines. Introducing resources from organizations like Climate Reality Project, En-Roads, UNESCO, Project Drawdown, and many others could help instructors identify ways to incorporate CCE in their curricula. Instructors need support, time, and resources to include CCE in their curricula.

### **Summary**

Climate change is one of the most pressing issues humankind will ever face. Tertiary-level education is an opportune time to educate the future workforce on how to make climate-smart decisions. In this study, I utilized PMT to examine relationships among tertiary-level instructors' climate change risk perceptions (i.e., threat appraisal) and their inclusion of CCE (i.e., coping appraisal) in their curricula.

In my survey of 90 participating instructors, I found that 91% were reportedly either alarmed or concerned about climate change, but only half of them reported including CCE in their curricula. Of the half that included CCE, over half reportedly only included it in 25% or fewer of their courses. Roughly two thirds of instructors

underestimated how many Wisconsin residents thought global warming is happening, and 98% underestimated how many residents are worried about global warming.

When comparing threat and coping appraisal methods, 75% of participants had high threat appraisals with low coping appraisals, and only 21% had high threat appraisals with high coping appraisals. I recommend that more research needs to be conducted on instructors' coping appraisal methods to increase CCE in curricula. I also recommend replicating this study on a larger scale, utilizing this survey to research ways to increase coping appraisal, requiring general education courses on CCE, and increasing opportunities for resources, professional development, and time for instructors to include CCE in their curricula.

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## Appendix A. Approval



Institutional Review Board

Exempt Protocol Approval

Date 11/7/2023

Principal Investigator: Henry St. Maurice  
 Co-Principal Investigator: Ashley Vedvig  
 Protocol Number: 2023-62  
 Protocol Title: Climate change education in universities: Perceptions of risk  
 Protocol Approval Date: 11/7/2023  
 Protocol Expiration Date: 11/6/2028  
 Review Category: 2  
 UWSP FWA: 00017591

Dear Henry,

The above-referenced human-subjects research project has been approved by the University of Wisconsin-Stevens Point Institutional Review Board (IRB) Committee. This approval is limited to the activities described in the approved [protocol](#), and extends to the performance of these activities at each applicable site identified in the application for IRB review. In accordance with this approval, the specific conditions for the conduct of this research are listed below, and informed consent from subjects must be obtained as indicated. Additional conditions for the general conduct of human-subjects research may be detailed below.

#### Additional Conditions:

All individuals engaged in human-subjects research are responsible for compliance with all applicable UWSP Research Policies. The Principal Investigator is responsible for assuring all protocol personnel review and adhere to applicable policies for the conduct of human-subjects research.

The IRB maintains an official protocol file for each study to meet the University's regulatory obligations for record keeping. Principal Investigators are responsible for maintaining all records related to the [protocol](#), and are required to share with the IRB. The IRB is not responsible for maintaining study documents for researchers.

Your project approval expiration date is listed above. Exempt protocols have an automatic 5-year approval period. As a courtesy to you, and to reduce administrative burden, the IRB will request an annual update from the Principal Investigator on the status of this study. It is your responsibility to inform the IRB if the project is complete or still in operation. If the study needs to remain open after year 5, you must submit a new protocol. Lapses in approval should be avoided to protect the safety and welfare of enrolled subjects. When you plan to close your study, submit a Protocol Closure Form to [irb@uwsp.edu](mailto:irb@uwsp.edu).

No changes are to be made to the approved protocol or study documents (i.e., consent forms, surveys, etc.) without prior review and approval of the IRB. To modify an existing protocol, complete the Protocol Modification Form and submit to [irb@uwsp.edu](mailto:irb@uwsp.edu).

If there are any injuries, problems, or complaints from participants, you must notify the IRB at [irb@uwsp.edu](mailto:irb@uwsp.edu) within 24 hours.

If you have any questions, please contact me. Good luck with your project.

Sincerely,

David Barry, Ph.D.  
 IRB Chair  
[dbarry@uwsp.edu](mailto:dbarry@uwsp.edu)



Climate Change <Climatechange@yale.edu>

To: 📧 Vedvig, Ashley M

Cc: Fine, Eric <eric.fine@yale.edu>



Thu 7/7/2022 9:33 AM

**CAUTION:** This message came from an EXTERNAL source. Do not reply to this message or follow any links in it unless you are certain they are not part of a phishing attack.

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Good morning Ashley,

Thank you for your interest in our work. It sounds like you are interested in using the [Six Americas Super Short Survey](#) (SASSY), no? Yes, feel free to incorporate the four questions into your survey. Besides checking for a correlation between the professors' perceptions and whether they're teaching about global warming, it could be interesting to ask them what they think their students or people in Wisconsin think about climate change and see if this correlates with whether or not they're teaching about the issue.

Here is some related research of ours - [Americans Underestimate How Many Others in the U.S. Think Global Warming is Happening](#). If the professors are underestimating the extent to which their students understand that global warming is happening, is human caused, and they're worried about it, they may be less likely to teach about it. Here is a related case study you may find interesting - [Alliance for Climate Education Recruits Teachers by Leveraging Social Norms in Facebook Ads](#).

As for other folks conducting similar research, there is a professor at Prescott College whose doctoral students have integrated SASSY and the Global Warming's Six Americas framework into all kinds of different research. I can introduce you to him if you like.

Sincerely,  
Eric Fine

## Appendix B. Consent

Dr. Henry St. Maurice and doctoral student Ashley Vedvig from the University of Wisconsin-Stevens Point would appreciate your participation in a research study designed to determine if a relationship exists between instructors' climate change risk perceptions and their likelihood of including climate change content into their curricula. You are being asked to complete an anonymous survey that should take no more than 15 minutes of your time. Your participation is completely voluntary. The benefit of this study is a better understanding of instructor perceptions towards climate change and possible motivations and barriers to including climate change education at Institutions of Higher Education.

We anticipate no risk to you because of your participation in this study other than the inconvenience of the time to complete the survey. You could, however, experience some discomfort or stress when thinking about the effects of climate change.

While there is no immediate benefit to you as a result of your participation in this study, it is hoped that we may gain valuable information about climate change education that could benefit future students.

While this information could be obtained by interviewing you, we feel that the survey is the quickest and easiest method for obtaining this information. You may also choose not to participate as an alternative.

The information that you give us on the questionnaire will be recorded in anonymous form. We will not release information that could identify you. All completed surveys will be kept on a password protected device and will not be available to anyone not directly involved in this study.

Your participation in this study is completely voluntary. If you want to withdraw from this study, at any time, you may do so without penalty or loss of benefit entitled. Only anonymous information provided will be retained. All identifiable information will be removed from the study and deleted.

Once the study is completed, you may receive the results of the study. If you would like these results, or if you have any questions in the meantime, please contact:

Ashley Vedvig

School of Education, University of Wisconsin-Stevens Point

Stevens Point, WI 54481

[Avedv564@uwsp.edu](mailto:Avedv564@uwsp.edu)



If you have any complaints about your treatment as a participant in this study or believe that you have been harmed in some way by your participation, please call or write:

David Barry, PhD  
IRB Chair  
Associate Professor, Sociology  
2100 Main St.  
Old Main 208  
University of Wisconsin, Stevens Point and Extension  
Stevens Point, WI 54481  
715.346.3799  
[irb@uwsp.edu](mailto:irb@uwsp.edu)

Although Dr. Barry will ask your name, all complaints are kept confidential.

I have read and understand the information provided to me; that my participation is voluntary and I may withdraw at any time.

## Appendix C. Instrumentation

**Content Warning:** This survey explores aspects of climate change. This topic can be stressful. Please proceed with caution and you may withdraw from this survey at any time.

### Climate-Change-Risk Perceptions

1. How important is the issue of global warming to you personally?
  - a. Extremely important
  - b. Very important
  - c. Somewhat important
  - d. Not too important
  - e. Not at all important
2. How worried are you about global warming?
  - a. Very worried
  - b. Somewhat worried
  - c. Not very worried
  - d. Not at all worried
3. How much do you think global warming will harm you personally?
  - a. A great deal
  - b. A moderate amount
  - c. Only a little
  - d. Not at all
  - e. Don't know
4. How much do you think global warming will harm future generations of people?
  - a. A great deal
  - b. A moderate amount
  - c. Only a little
  - d. Not at all
  - e. Don't know
5. What percentage would you estimate that Wisconsin residents think global warming is happening?
  - a. 0-20%
  - b. 21-40%
  - c. 41-60%
  - d. 61-80%
  - e. 80-100%

6. What percentage would you estimate that Wisconsin residents are worried about global warming?
  - a. 0-20%
  - b. 21-40%
  - c. 41-60%
  - d. 61-80%
  - e. 80-100%
7. According to the Yale Program on Climate Change Communication, 69% of Wisconsin residents think that global warming is happening, and 62% of Wisconsin Residents are worried about global warming. Does this information surprise you? Why or why not?

### **CCE Curricula**

1. Tell me about your thoughts on climate change.
2. Do you include any climate change content in any of your courses curricula? Yes or No
  - a. If yes, what percentage of your courses would you say you include climate change content?
    - i. 0-25%
    - ii. 26-50%
    - iii. 51-75%
    - iv. 75-100%
  - b. If yes, describe the kind of climate change content you include and how you connect it to your course topic?
  - c. If yes, why did you include climate change content in your course curricula?
  - d. If yes, what would you say were your biggest motivators for including climate change content in your course curricula?
  - e. If yes, have you encountered any barriers to including climate change content into your course curricula? If so, describe them.
  - f. If yes, where did you learn the information about climate change to include for your course(s)?
  - g. If no, why don't you include climate change content into your course curricula?
  - h. If no, would you like to include climate change content into your course curricula? Why or why not?
  - i. If no, do you feel confident in your climate change knowledge that you could include it in your course curricula if you wanted to?
  - j. If no, In general, where did you learn information about climate change?

3. Do you feel there is a need to include climate change content in your courses? Why or why not?
4. Is there anything else you would like to share on this topic?

**Demographics**

1. What college do you teach in?
2. Within what department do you teach?
3. How long have you been teaching?
  - a. 0-2 Years
  - b. 3-5 Years
  - c. 6-10 Years
  - d. 11+ Years
4. How would you describe your gender?
  - a. Female
  - b. Male
  - c. Non-Binary
  - d. Prefer not to answer
  - e. Other (Blank Entry Field)
5. What is your age?
  - a. 18-24
  - b. 25-34
  - c. 35-44
  - d. 45-54
  - e. 55+
  - f. Prefer not to say
6. What is your ethnic background?
  - a. Asian – Eastern
  - b. Asian – Indian
  - c. Hispanic
  - d. African-American
  - e. Native-American
  - f. Mixed Race
  - g. White/Caucasian
  - h. Other (Blank Entry Field)
  - i. Prefer not to say
7. What is your political viewpoint?
  - a. Very conservative
  - b. Slightly conservative
  - c. Neutral/Neither conservative nor liberal
  - d. Slightly liberal
  - e. Very Liberal
  - f. Prefer not to say

## Appendix D. Codebook

Tell Me Your Thoughts on Climate Change	Mentions	Why did you choose to include CC?	Mentions
Real/Happening	24	Relevant to Topic	26
Severity of Impacts	18	Important	18
Worried/Concerned	15	Preparing Students	8
Act Now	11	Real World Example	8
Gov/Corps need to do more	11	Educated Citizenry	8
Human-caused	7		
Too Late/Inevitable	7		
Lifestyle Changes Needed	7		
Out of my control/Back of mind	6		
Impacts to Life on Earth	6		
Scared/Terrified	5		
Worried about their kids	5		
War Impacts	5		
Policy Changes Needed	5		
Problem is happening now	5		
Facts/Scientific Evidence	4		
Injustice Impacts	4		
Not Doing Enough	4		
Can see it happening	3		
Powerless feeling	3		
Encouraged/Hope feeling	3		
Embarrassed/Disgust feeling	3		
Educate Children	3		
Economy impacts	3		
Weather impacts	3		
Shift from Individual to System Changes	3		
Worried for future generations	2		
Resources	2		
Distant Impacts	2		
International Efforts Lacking	2		
Natural Evolution/Normal Changes	2		
Hoax	1		
Not Panicked	1		
Health impacts	1		
Too Late for Action	1		
Unsure about proposed solutions	1		

Motivators to include CCE?	Mentions	Barriers to include CCE?	Mentions
Relevant to Topic	12	None	34
Important	11	Student Barriers	3
Develop Student Skills	9	Lack Connection to Topic	3
Urgency	7	N/A	3
Passionate/Responsibility	7	Complexity	2
Education for Mitigation	6	Politic Polarization	2
Impacts in Employment	6	Peer Employee Barriers	1
Future Generations	6		
Environmental Motivators	3		
Convenience	1		

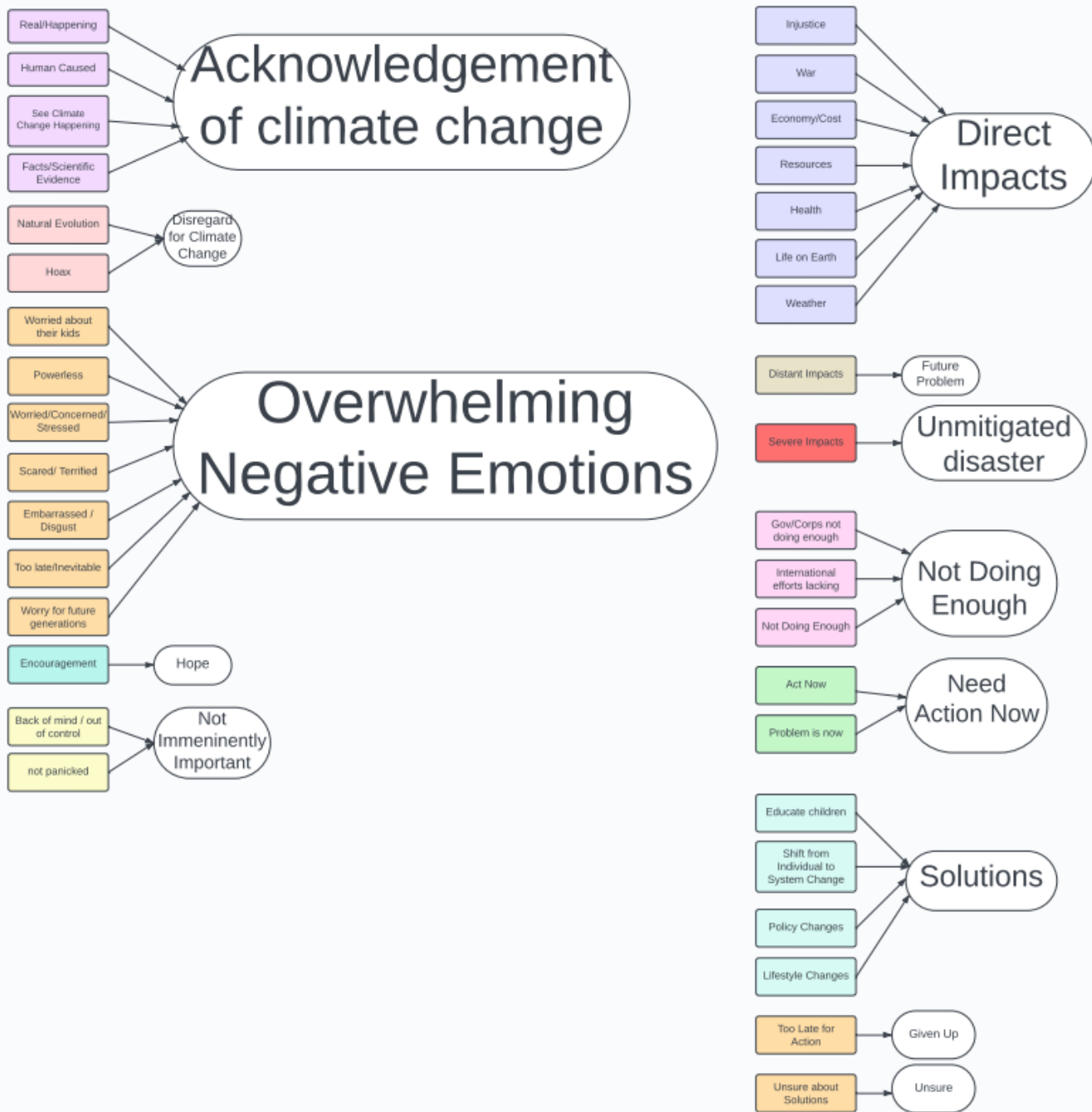


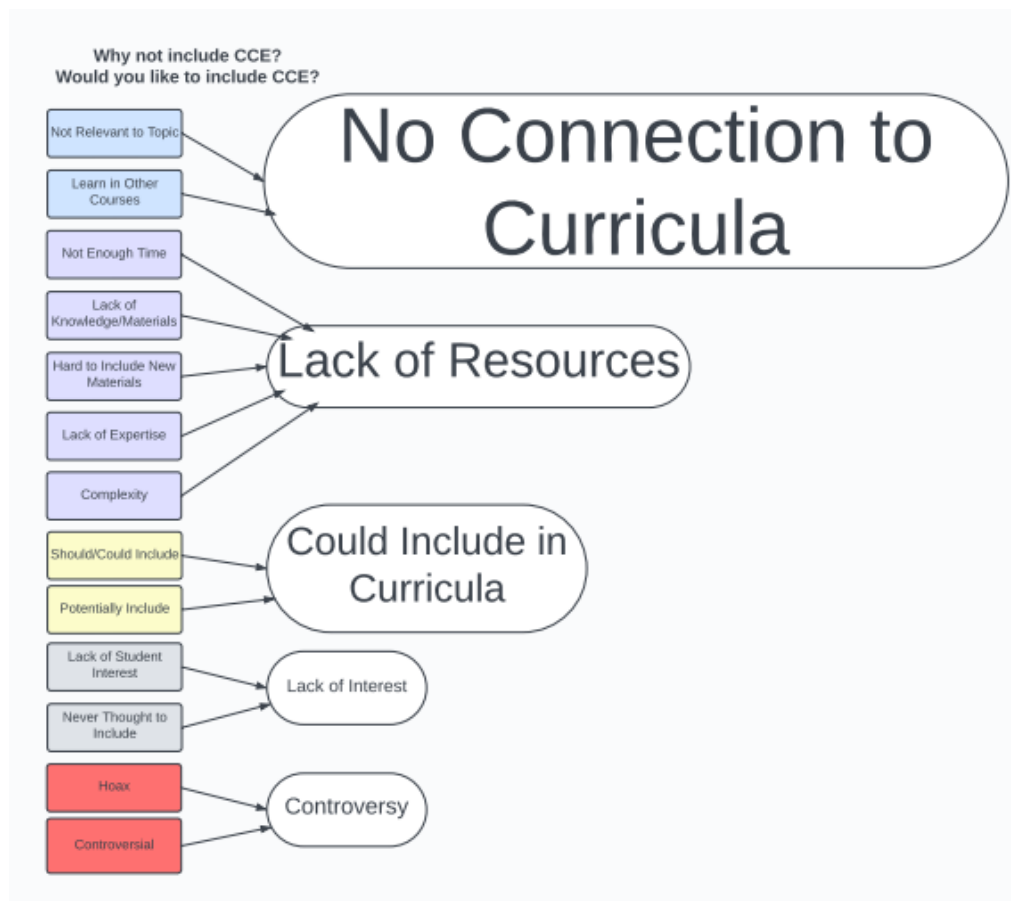
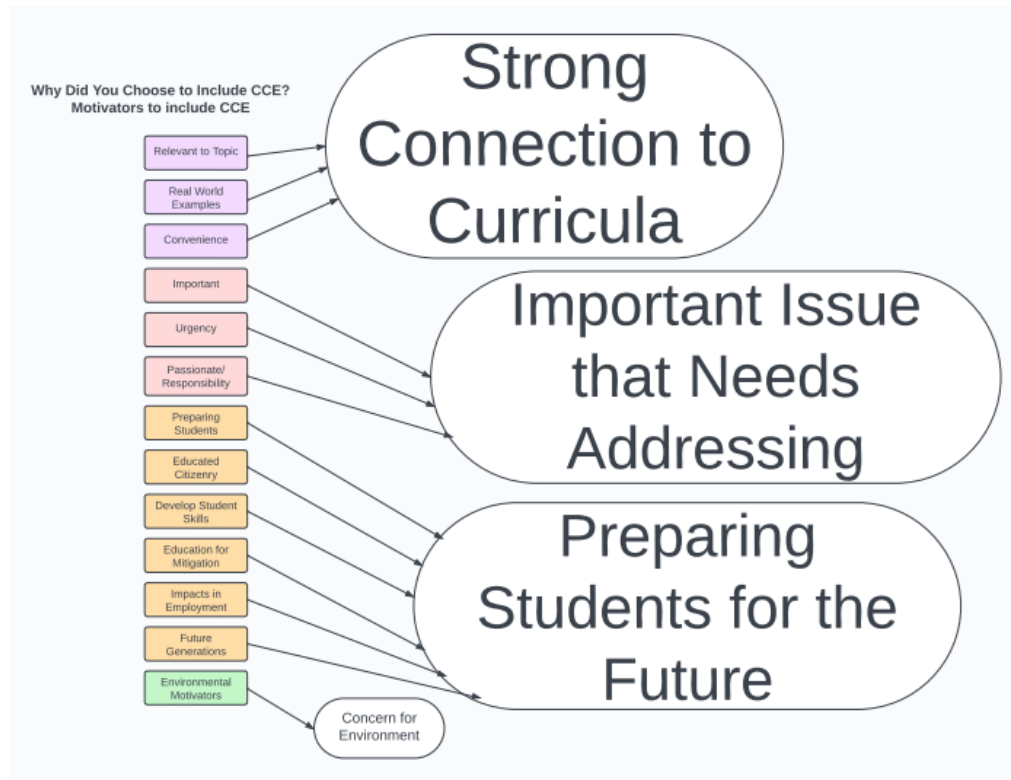




According to the Yale Climate Opinion Maps (Howe et al., 2015), 69% of Wisconsin residents think global warming is happening, and 62% of Wisconsin residents are worried about global warming. Does this information surprise you? Why or why not?	Mentions
Yes, it surprises me	52
No, it does not surprise me	29
Politic Polarization	24
No one talks about it	13
Happy about numbers	4
Neutral	3

### Thoughts on Climate Change





## Appendix E. Demographic Data

Response	<i>n</i>	%
<i>Years Teaching</i>		
0-2	6	6
3-5	9	10
6-10	14	15
11+	59	65
Prefer not to say	2	2
<i>Age</i>		
18-24	0	0
25-34	8	9
35-44	20	22
45-54	22	24
55+	34	38
Prefer not to say	6	6
<i>Gender</i>		
Male	28	31
Female	52	58
Non-Binary	2	2
Prefer not to say	8	9
<i>Ethnic Background</i>		
Asian-Eastern	2	2
Asian – Indian	3	3
Hispanic	1	1
African American	1	1
Native American	0	0
Mixed Race	2	2
White	74	82
Prefer to self-identify	1	1
Prefer not to say	6	7
<i>Political Viewpoint</i>		
Very Conservative	0	0
Slightly Conservative	0	0
Neutral/Neither	10	11
Slightly Liberal	33	36
Very Liberal	32	36
Prefer to self-identify	6	6
Prefer not to say	9	10

Note: N=90.

Total percentages ≠100 due to rounding.