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The College of Wooster

Educating for hope: Building climate change resilience
in the middle school classroom

by

Cambry J. Baker

Presented in Partial Fulfillment of the
Requirements of Senior Independent Study

Supervised by

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Abstract

Children increasingly express feelings of anxiety and hopelessness about climate change. Recent research has shown that cultivating hope in climate change education can increase young people's emotional resilience and environmental behavior. This study asks: How does middle school teachers' engagement with climate change and climate change emotions impact students' hope? And how do students' climate anxiety, self-efficacy, and connection to nature affect their environmental behavior and climate change hope? Data were collected in October 2020 through an online survey of middle school students (n=96) in Ohio. On average, students experienced low climate anxiety, moderate constructive hope and low-moderate hope based in denial. Students perceived moderate support from their teachers for taking their negative emotions seriously, which was associated with decreased hope based in denial. Students with greater connection to nature, self-efficacy, and climate change anxiety experienced greater constructive hope. Additionally, students who had classes that gave pathways towards environmental behavior and teachers who positively framed climate change were more hopeful. Classroom experiences associated with greater constructive hope were also associated with greater environmental behavior. This study recommends teachers provide students with opportunities to connect with their climate change emotions, with nature, and with others who are taking environmental action.

Gratitudes

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Introduction

Climate change is one of the most serious threats that humanity is facing today. Responding to climate change requires shifts in how our social, economic, and political structures function; beyond technical advances, this requires educating the public on behavioral changes. Environmental education works to spread awareness about climate change, educate the public on its effects, and encourage sustainable behavior changes we ought to make. While this approach has led to increased awareness, enumerating the effects of climate change—sea-level rise, extreme weather events, aridification, loss in food production ability, etc.—can leave even the most resilient of us feeling overwhelmed. Children, who are inheriting our uncertain future, are aware of the environmental challenges we face and are disproportionately affected by these sources of worry. Children increasingly express feelings of anxiety, grief, or fear that reflect this reality (Tucci et al., 2007; Chiw & Shen Ling, 2019). Because youth will be most affected by the consequences of climate change, and are the future decision-making leaders of society, it is vital to understand how climate change education efforts can provide children with hope for a better future. To enable youth to respond to climate change with action, rather than overwhelm, educators must help children cultivate tools to meet the climate crisis with resilience.

There exist plausible reasons why some children respond to climate change awareness with apathy rather than action. One hypothesis is that climate change's magnitude and complexity can leave children, who culturally have less agency and power than adults, feeling helpless to respond. Therefore, while children may be concerned about their future, they are unable to act. Other researchers suggest that when climate change education presents objective knowledge, it may not effectively motivate children. Recent research has shown that knowledge

does not automatically translate to action and may require emotions, such as an emotional attachment to the natural environment being affected, to act as a catalyst towards environmental behavior (Carmi et al., 2015; Li & Monroe, 2017; Lundholm, 2019). Therefore, when climate change education appeals only to human's rationality and neglects to address children's capacity for feeling, it transfers knowledge but fails to address the personal barriers to change within us. Since climate action does and will require humans to change how they live their daily lives, working through personal barriers to change, in this case mental and emotional barriers, is vital.

Slowly, environmental education research is shifting to acknowledge the role emotions play in climate change education. Some of the most common emotions regarding climate change are so called 'negative' emotions, such as anxiety, fear, or sadness, but there also exist positive emotions like hope, passion, and love for the natural world. Climate psychologist Susan Clayton argues climate anxiety should not be considered solely a problem, but also a sign of increasing concern (2020). Similarly, I argue that reframing emotions such as anxiety, grief, or fear as more than 'negative' emotions allows us to look also at their potential for igniting change. In this paper I will also refer to 'negative' emotions as 'challenging emotions' to express the complexity of anxiety, grief, and fear. Both challenging and positive climate change emotions have different implications for well-being and action and will be discussed later. Promising early literature suggests that one emotion, hope, plays a critical role in fostering climate action among youth and may help protect against challenging climate change emotions (Ojala, 2012a, 2012b; Stevenson & Peterson, 2015). Still, there is much about climate change hope we do not yet understand. Where does climate change hope come from? Does hope help guard against worry? How can climate change education teach children what they can do in a way that is empowering, not overwhelming? Younger generations will by and large be responsible for addressing the climate

crisis. Climate change education has the potential to provide youth with the support and tools they require to meet climate change with emotional resiliency. Reorienting climate change education to acknowledge and strengthen children's emotional response to it will help sustain them through these demanding times.

Literature Review

Children's emotional responses to climate change

Climate change impacts young people's mental well-being in multiple ways. Climate change can impact children's mental health and well-being through increased risk of experiencing PTSD, depression, anxiety, phobias, sleep disorders, and attachment disorders, along with academic and cognitive decreases (Clayton & Karaszia, 2020; Clayton & Manning, 2018; Garcia & Sheenan, 2016; Gibbs et al., 2019; Sanson et al., 2018). Children, due to the vulnerable period of their psychological development, are more likely than adults to experience adverse effects of climate change anxiety, increasing their risk of mental illness (Wu et al., 2020). These challenging climate change emotions and mental health disorders stem from either direct experience of climate-induced extreme weather events such as wildfires or arise from psychological experiences of climate change not directly related to a climate event (i.e., books, news) (Wu et. el., 2020). Anxiety, in particular, is one emotional response to the global climate crisis that is an increasingly common experience for youth. This type of anxiety can be referred to as 'climate change anxiety' (Clayton & Karaszia, 2020).

The current generation of school children are growing up with an awareness of climate change and many express concerns about its impact on their lives. For example, in-depth interviews in the United States revealed that 82% of 10- to 12-year-olds shared climate change feelings of anger, sadness, and/or fear (Strife, 2012). A significant amount of research about young people and climate change has been conducted in Australia. In 2014, a study found 60% of 16-17-year-old Australians agreed that climate change was a serious threat (Tranter & Skrbis, p. 1646) and a more recent study of Australians aged 7-24 found that 96% of participants

considered climate change a serious problem, and 89% were worried about its effects (Chiw & Shen Ling, 2019; see also Abbott et al., 2019). A British study of 11- to 16-year-olds found 74% of them worried about how climate change would affect their future, and more than 70% wished the UK government would take more climate action (UNICEF, 2013). These studies paint a trend of heightened climate concern in younger generations that is consistent with a 2018 Gallup poll showing that 18- to 34-year-olds were more likely to be concerned about climate change (70%) than 35- to 54-year-olds (63%) and those older than 55 (56%) (Gallup, 2018; see also APA, 2018).

In light of children's emotional distress to climate change, instinct may be to shield children from more information about the issue. Yet, youth are increasingly exposed to climate change messages through school, their peers, and social media. Withholding climate change knowledge from children is counterintuitive to progress. Awareness is vital to action. Therefore, educators must consider how climate change education frames information and supports children's feelings.

When we are able to acknowledge the challenging emotions that climate change engenders, only then are we able to be open to the possibility of hope and move forward to envision positive alternative futures (Hicks, 2014, p. 69). If educators, for example, redirect children who express fear, anger, or anxiety about climate change by changing the subject or pacifying them, they contribute to a "culture of denial" by avoiding negative feelings rather than engaging in them (p. 69). The tendency to avoid conversations about negative emotions makes sense; socialization has taught us to feel ashamed if we publicly share negative emotions, and it can be seen as "uncool" to do so (p. 70). In order to help children heal from their anxiety and channel it into positive action, educators must encourage them to engage with their emotions and develop

“emotional literacy” (p. 70). Emotional literacy is defined by Antidote as “the practice of thinking individually and collectively about how emotions shape our actions, and of using emotional understanding to enrich our thinking” (2003, p. 13). Antidote argues that emotional literacy, a skill that allows people to think about what they are feelings and communicate it, serves as a link between the cognitive and affective domains of our brain. I have primarily focused on challenging emotions in this discussion because those are children’s most frequently experienced responses to climate change; however, as Hicks suggests, engaging with challenging emotions which are more readily accessible to us may serve as a pathway to recognizing and cultivating the positive emotions, such as hope, that also exist within us (2014).

It should be noted that children culturally hold less power to act on their anxiety and fear, and their sense of hopelessness may be amplified by the fact that youth feel their voices are not heard (Harris, 2010). In the Chiw and Shen Ling study, only 55% of children felt their opinions and worries on climate change mattered, and feelings of disempowerment were significant, with 70% of participants feeling that others would not take their opinions on climate change seriously (2019, pp. 14-15). Unfortunately, since older generations express less concern about climate change, children’s feelings are less likely to be shared or understood by traditional role models such as teachers, parents, family friends, and other leaders who have the power to support them. Thus, it is important to show teachers the importance of, and the practical steps towards creating spaces in school where children feel heard, are able to cultivate emotional literacy, and are presented with opportunities to act and hope for a better future

Coping with climate change

As trends of increasing anxiety, worry, and grief mount in adolescents, psychologists and environmental educators have begun questioning how children cope with climate change and its

implications for action. In 2012, Maria Ojala, a Swedish psychologist, worked to develop a theory of climate change coping for children. Her work, building from Lazarus's well-known 1984 coping theory, proposed three types of coping strategies young people engage in when threatened by climate change: emotion-focused, problem-focused, and meaning-focused. Emotion-focused coping strategies center around the need to escape challenging emotions invoked by stressful situations, leading to avoidance, denial, or distancing. Problem-focused coping strategies involve engaging directly with the source of stress by finding out more information about the problem and working to solve it. In meaning-focused coping, individuals work to buffer challenging emotions by intentionally activating more favorable ones; this activation of positive emotions occurs with full awareness of the challenging feelings. In practice, to engage meaning-focused coping and activate hope that climate change will get better, individuals may positively reappraise the situation (i.e. climate change will force society to change in ways that also help address social inequality and human exploitation), find benefits within challenging situations, place trust in societal actors, or turn to spiritual beliefs for comfort (Ojala, 2012). Due to the emotive nature of meaning-focused coping and its reliance on trust, it is closely related to hope and is perhaps the most interesting and complex form of coping to study.

From almost a decade of study, Ojala has identified unique benefits and costs of each coping strategy to both the individual and sustainability. In a study with 12-year-olds, she found that children who engaged with emotion-focused coping experienced less negative affect, but as a consequence of avoidance, children were less likely to engage in pro-environmental behaviors or believe they could make a difference. Children who relied on problem-focused coping expressed the highest overall pro-environmental behavior and environmental efficacy while simultaneously experiencing more anxious, depressive thoughts and only a small amount of

optimism towards climate change (Ojala, 2012). On the other hand, high levels of meaning-focused coping provided children with greater well-being and optimism about the future, but a moderate level of pro-environmental behavior (Ojala, 2012). In this age group, problem-focused coping is important to cultivating environmental engagement, but action alone is not enough to guard children against despair and give them hope for the future. In response to this dilemma, the study identified that “the meaning-focused strategies, trust and positive reappraisal, as well as optimism concerning climate change, work as buffers,” protecting highly problem-focused children from negative affect (Ojala, 2012, p. 231).

Children’s development of effective coping strategies can be positively (and negatively) influenced by how others communicate about societal and environmental issues (Ojala & Bengtsson, 2019). A study of high school students found that the more youth perceived those close to them “as communicating in a positive, solution-oriented manner,” such as taking them seriously, encouraging positive shifts in perspective, and supporting personal action, “the more inclined they were to cope in a meaning-focused and problem-focused way” (Ojala & Bengtsson, 2019, p. 926). Conversely, when youth perceived others as “communicating in a negative manner, neglecting or dampening negative emotional reaction as well as reacting in a gloom-and-doom way, the more likely they were to use emotion-focused strategies.” (Ojala & Bengtsson, 2019, p. 926). It follows that teachers’ own attitudes towards and communication about climate change affect children’s emotional responses to it due to their daily impact on students’ lives. Therefore, when teachers talk about climate change in the classroom, they should emphasize positive thinking and trust in an honest way, while helping children imagine hopeful alternative narratives about the future.

Nature connection

A related stream of research on the benefits of nature connection suggests that connecting children to nature, particularly from a young age, can also act as a coping mechanism that increases their resilience to climate change. The benefits of connection to nature for children's mental, physical, and emotional well-being are well-established (Berrera-Hernandez et al., 2020; Chawla, 2015; Tilmann et al., 2018; and Whitten et al., 2018). As our environment changes, our understanding of how connection to nature can be a source of resilience is expanding. In 2017, Larson et al. explored how nature connection positively benefits middle school students in South Carolina and found that greater connection to nature predicted that youth were more likely to believe in a hopeful future. Connection to land as a coping strategy can also be seen in another culture; interviews with Inuit youth aged 15-25 who are already experiencing disruptive environmental changes said that they found solace in spending time outside on their land (McDonald et al., 2015). Therefore, cultivating a sense of connection with nature in children may complement other forms of coping.

In a recent review of youth's nature connection, Louise Chawla notes that connection to nature is generally described as a positive experience (2020). She challenges this conception by arguing that because children's experiences with the natural world increasingly include environmental loss, feelings of environmental anxiety, grief, and worry also express connection to nature. Chawla explains that children who voice challenging emotions about the environment "acknowledge their interdependence with the natural world, recognize shared vulnerability of people and nature, and feel empathy for other living things" (2020, p. 620). Thus, unlike engaging in the denial and 'looking away' of emotion-focused coping, a connection to nature can be a sign of engaging with the environment and its destruction. Chawla ultimately argues that

when considering how to support children through environmental changes (i.e. climate change), we can benefit from asking how to integrate positive and negative experiences with nature. Helping children understand climate change to hold both challenging and positive qualities, and to see their worries as reaffirming their connection to the natural world may help them receive the positive benefits of hope, well-being, and resilience nature has to offer.

The role of affect in climate change education

The idea that climate change education (CCE) is essential for preparing youth to respond to the climate crisis is widely accepted (UNFFC, 2016), and while experts and educationalists agree on its necessity, there is less consensus on what should and should not be taught in CCE (Reid, 2019). Hermans summarizes many researchers by stating that “the ultimate aim of CCE should be to effect personal change and societal transformation with positive impact on the climate.” (2016, p. 390). Thus, in practice, educators must move beyond equipping students with knowledge about climate change, to enabling them to adapt and change their behaviors towards the environment.

Though nearly two decades have passed since the United Nations established the importance of teaching climate action in educational sectors, “provision of CCE nationally, regionally and internationally is found wanting in many regards” Reid, 2019, p. 770; see also McKenzie, 2019). In Ohio, Science Education Standards do not include climate change in middle school, and only include brief mentions of it in high school (Ohio Department of Education, 2018). When climate change is taught in American schools, it traditionally occurs in science classrooms where a cognitive approach to climate change is taken that favors the technological aspects of solving climate change over the emotional, social, economic, and political dimensions that are intertwined in the issue. One such example is U.S. Next Generation Science Standards

(NGSS). The NGSS were created in 2013 to prepare middle and high school students with an active, comprehensive understanding of scientific concepts, including global climate change and human sustainability, that are essential to our current time (Feinstein & Kirchgasser, 2015). However, while this curriculum has been adopted by over 20 states as of today (though not in Ohio), and does acknowledge the role of humans in climate change (National Science Teaching Association, 2020), there is concern that how the NGSS teaches sustainability may not inspire youth to behave more pro-environmentally due to its emphasis on scientific and technological solutions (Feinstein & Kirchgasser, 2015).

Concerningly, an emphasis on science and technology in curriculum may not allow for students to explore and understand how their relationship to climate change, including their emotions and behaviors, affect society's ability to address the climate crisis. Mainstreaming climate change education throughout formal education systems, through standards like the NGSS, "can be one of the most important and effective means of developing capacities for addressing the climate crisis" (Stevenson et al., 2017, p. 1). Yet, standards such as the NGSS also raise the concern of how climate change education is being taught, and the dangers of relying on a cognitive understanding of climate change. Research has shown that although informal and formal CCE efforts to date have undoubtedly increased youth's awareness of climate change, as evidenced by children's concern, knowledge about climate change is not enough to maintain children's attention or motivate them to act (Armstrong et al., 2018; Li & Monroe, 2017; Brandtner, 2012; Dijkstra & Goedhart, 2012; Markowitz, 2012). For example, while a strong relationship exists between believing in anthropogenic climate change and *intending* to take climate action, the relationship between climate change belief and actual pro-environmental behavior is weaker (Armstrong et al., 2018). Research suggests this is due to the psychological

distance between the physical issue and its effect on the individual, its non-immediacy, and its complexity (Carmi et al., 2015; Corner, 2015). When making decisions relating to uncertainty, individual's affective processing system overrides their cognitive (Carmi et al., 2015, p. 196). Therefore, effective CCE must activate affective processing by translating children's knowledge about climate change into emotions that impact their behavior.

There are compelling reasons to support that activating our emotions is important for transforming knowledge to behavior (see Carmi et al., 2015; Li & Monroe, 2017; Lundholm, 2019). For example, in 2015 Carmi et al. surveyed the objective and subjective environmental knowledge of undergraduate students (n=1014) in Israel as well as their environmental engagement and emotions. The objective knowledge scale tested students factual understanding of environmental and ecological processes and the subjective scale tested whether students felt they understood the reasons for and solutions to environmental issues (p. 190). Environmental behavior (EB) was assessed through questions about participants' lifestyle. Environmental emotions were operationalized in three parts. The first construct used Shultz's (2002) Inclusion in Nature scale to measure how integrated one feels with nature, the second measured to what extent individuals felt concerned for the biosphere (i.e. flora and fauna), and the third measured how committed individuals felt to the environment (i.e. how they see their well-being connected to environmental well-being and how strongly they feel linked to the natural environment) (Carmi et al., 2015, pp. 190-191). Additionally, the study controlled for the effect that gender, environmental attitudes, environmental social norms, and perceived behavioral control would have on participants' environmental behavior.

Carmi et al. found that neither objective nor subjective knowledge had a significant direct effect on EB. However, knowledge, particularly subjective knowledge, affected behavior

indirectly, meaning knowledge influenced behavior only when mediated by emotions. Remarkably, environmental emotions alone had a significant direct effect on behavior, accounting for 29.7% of the variance in EB. Ultimately, Carmi et al. suggest that environmental education should be more emotionally rather than cognitively based because how people felt about the environment was a greater predictor of behavior than what they knew about it. While this study was undertaken with undergraduate students, the relationship found between knowledge and behavior has implications for how educators teach environmental knowledge to younger students.

One explanation for environmental emotions' significant effect on behavior may be that the distress environmental issues evoke in us initiates a psychological and behavioral response to try to eliminate challenging emotions (Kollmuss and Agyeman, 2002). As environmental distress increases, acknowledging emotions in climate change education becomes not only more important for behavior change, but necessary for students' mental health and well-being. For a thorough discussion on integrating eco-anxiety and environmental education see Panu Pihkala's work (2020) Alongside Pihkala (2020), I argue that climate change education research would benefit from asking how research on coping with climate change, which offers knowledge on how to support children's challenging climate change emotions, can be integrated into climate change education. Fortunately, an increasing number of guides, recommendations, and programs addressing how to support children psychologically through their climate change emotions are available (see: Baker et al., 2020; Chawla, 2020; Trott, 2019; Stevenson et al., 2017; Winograd, 2016; and Hicks, 2014). These guides share both discussion-based activities and hands-on embodied processes that can be incorporated into climate change education to increase its emotional nature and help bridge the knowledge-behavior gap

It is a challenging integration, but it is possible for CCE to span disciplinary and cognitive boundaries to creatively prepare youth for an uncertain future. Stevenson et al. recommends facilitating a learning process that is “inquiry-based, reflexive, creative and participatory” to support learners to develop skills that are transferable to new and uncertain situations (2017, p. 2). For example, they suggest creating CCE spaces in school gardens, climate action clubs, and through community partnerships where students’ participation and ability to imagine the future are valued over their objective climate change knowledge. Ojala says that in all discussions of climate change, imagining alternative futures, brainstorming solutions to get closer to there, and taking action are key methods of counteracting youth’s feelings of despair, and igniting their creativity and hope for the future (2015). Recommendations by Baker et al. suggest educators also create space for challenging emotions and remain honest about the reality of climate change while still emphasizing solutions and what can be done (2020). Integrating recommendations for coping with climate change into climate change education helps activate youth’s emotional domain and inspire environmental behavior.

One emotion in particular, hope, has received a lot of attention for its potential to positively activate youth’s affective domain and promote pro-environmental behavior (Ojala 2012b; Stevenson & Peterson, 2015). Hope offers a useful bridge for connecting climate change education and climate change coping research and practice. Understanding hope in the face of climate change can give educators the tools to engage children to be active participants in creating their future. While this task is not easily accomplished, it is an important one to begin now as the need for hope becomes more salient in light of children’s concern and despair. Reaching the potential for climate change education in American schools requires imagining a climate change narrative that is hopeful.

Climate change hope

Hope, most simply, is the feeling that things are not all well as they are, but there exists a possibility for them to get better (Harré, 2018). Given the role adolescents necessarily play in climate change action and their vulnerability to feelings of anxiety, despair, and helplessness (Wu et al., 2020), supporting children to feel hopeful about climate change ought to be a specific focus for educators (Ji Lie & Monroe, 2017; Hicks, 2014; Stevenson & Peterson, 2015; Ojala, 2017). Hicks suggests conversations between educators and students about climate change can both honor the present and imagine a hopeful future:

[As educators] we need to acknowledge the enormity of environmental problems, and share our feelings of frustration, anger, sadness, fear, and hopelessness. We need to create spaces and opportunities to help kids explore and share their own feelings. We also need to move beyond the narratives of ‘doom and gloom’ toward more hopeful narratives grounded in resiliency, well-being, happiness, and health (2014, p. 24).

As Hicks intimates, an overly optimistic response to the immensity of these challenging emotions may not be appropriate; in fact, critics of hope have argued that it may lead to disillusioned optimism and reduced pro-environmental behavior. Recent research has illuminated why sometimes hope works and other times it does not. Hope appears to take two very different forms. The less helpful type of hope, defined as hope based in denial, is created by dismissing or downplaying the severity of climate change and can lead to disillusioned optimism. However, Hicks, like others, argues for cultivating a more constructive form of hope. Constructive hope is a form of hope that accepts the reality of climate change and places trust in humanity’s ability to solve it as a source of hope. Constructive hope can serve as a useful strategy for teachers to increase students’ climate change resilience and action (Hicks, 2014; Ojala, 2017). In a 2015 survey of Sweden high school students (n=624), Maria Ojala developed a hope scale with subscales differentiating between constructive hope and hope based in denial. She found that

students with hope based in denial were less likely to engage in environmental behaviors and had lower general self-efficacy, whereas students with higher levels of constructive hope had greater pro-environmental engagement and self-efficacy (Ojala, 2015). Therefore, how hope is conceptualized is essential to understanding its role in climate change education.

To be sure, hope is a multifaceted concept with emotional, cognitive, and action components that serve different functions and stem from multiple sources (Ojala, 2017). The most well-known psychological theory of hope is by Snyder who breaks the concept of hope into three components: goals—that which we want to happen, pathway thinking—the ability to determine routes to get there, and agency—the motivation to use those pathways (Snyder, 2000; Snyder et al., 2001). This theory of hope relies on one's ability to imagine an alternative future (goals). Additionally, it identifies self-efficacy or agency as necessary to connect what we desire or hope for to action steps towards achieving it. Since this definition of hope requires an individual to identify a future, pathways towards that future and the belief in one's ability to get there, it is a form of constructive hope. Because hope requires an ability to imagine something to work towards, climate change educators should provide children with opportunities to imagine and discuss alternative futures to cultivate hope. Snyder's theory of hope provides a framework for understanding constructive forms of hope (2000; Snyder et al., 2001). However, it was designed without the concept of climate change in mind. How do people hope for a goal like solving climate change that may not seem possible?

While the belief that humans will be able to solve climate change may not feel likely or easily achievable, the important point to make about hope in relation to climate change is that one need not feel optimistic about the future to practice hope (Lazarus, 1991; Ojala, 2017). Due to the uncertainty and complexity of a goal like solving climate change, climate change hope can

take on an existential dimension; by this I mean that it is formed not only through goal setting, but through a ‘basic trust’ in oneself, others, and that things will turn out fine in the end (Web, 2007). Trusting in others and ourselves is necessary to equip people with the strength to accept and endure climate change and choose to practice hope, believing that things will be okay, rather than falling prey to fatalism (Ojala, 2017). Alone, existential hope may appear surface level and like hope based in denial, but when combined with other aspects of hope outlined in Snyder’s theory, it contributes to our ability to engage in constructive climate change hope. Snyder may not have included the role of existential hope and trust in his theory, but I argue climate change’s magnitude necessitates additional factors to form hope, and these components of hope are complementary to Snyder’s framework.

Another aspect of constructive hope is that it must be grounded in reality. Constructive hope requires one to have a critical understanding of the current challenging situation, a realization that it is lacking, and an idea that things can be otherwise (Freire, 1992; Web, 2007). Having climate change hope requires one to accept the devastation of extreme weather events, food shortages, climate refugees, etc., and despite this reality, to choose to work and hope for a better future. The ability to make this choice to ‘hope for’ relies on the existential aspect of hope that encourages us to trust in ourselves, others, and the ‘basic goodness’ of life.

The realization that climate change posed a challenge larger than individuals felt equipped to solve on their own informed Maria Ojala’s numerous studies on the role of hope in motivating action and protecting youth from challenging emotions associated with the threat (2012a; 2012b; 2013a; 2013b; 2015; 2017; and 2019). If we think about it, the components of constructive hope are similar to the strategies for meaning-focused coping; in both constructs there is a reliance on trust and optimism concerning climate change. Maria’s work expanded upon theories of hope

from Snyder (2000) and Lazarus (1991) to show that practicing climate change hope becomes possible when individuals feel they can trust others' ability to solve climate change, trust their own ability, and maintain a belief that doing so will be enough.

The emotion of hope, then, prevails in uncertainty and requires only that one believe in the *possibility* of change to activate hope and draw on its coping and motivational powers in negative situations (Lazarus, 1991). Therefore, as Macy & Johnson put it simply, constructive hope is not something we have, but something we do (Macy & Johnson, 2012). Going forward, when I refer to climate change hope in this study, I mean grounded and constructively practiced hope, rather than a disillusioned or passive hope.

Educating for hope

Understanding the psychological factors and experiences that contribute to climate change hope (CCH) informs teachers' ability to create educational experiences that cultivate children's well-being and climate action. Hicks conducted a research study utilizing focus groups with educators who regularly taught about global issues to determine how they managed to remain hopeful (1998). From these focus groups, Hicks suggests seven main sources of hope: the natural world, other people's lives and successes, collective struggles, visionaries, our sense of self, human creativity, mentors and peers, relationships, humor, and our roots to the past (1998; 2014). One underlying thread connecting these sources of hope I want to point out is the idea of connection. Connection to other people, the natural world, our past, and ourselves appears to act as a source of hope. While these sources of hope may appear intuitive, understanding where hope originates from can enable schools to structure in more hope-creating experiences.

Hope in relation to climate change can be better understood by studying it in relation to climate change emotions and behaviors we empirically know more about. For example, to understand the psychological forces that relate to hope, Stevenson & Peterson (2015) conducted a study with a representative sample of North Carolina middle school students (n=1486) and surveyed students' climate change hope alongside climate concern, despair, and pro-environmental behavior. Their CCH scale was informed by Snyder's theory of hope and its emphasis on pathways and agency. They characterized climate change despair by feelings of helplessness and lack of control and defined climate change concern as the belief that climate change poses a threat. These concepts helped capture both challenging and positive emotions of climate change.

Stevenson and Peterson found climate change hope and concern to be prevalent and both independently led to pro-environmental behavior. However, no significant interactions between hope and concern or hope and despair existed, suggesting that: 1) climate change concern may not dampen the positive effects of hope and 2) hope may not protect against challenging emotions. Therefore, since despair does not encourage pro-environmental behavior, and hope may not serve to buffer its effects, they argue it is important to address feelings of despair directly rather than interpreting them as a lack of hope (Stevenson & Peterson, 2015). Interestingly, Ojala found meaning-focused coping, which was shown to be closely related to constructive hope and to draw heavily on trust in oneself and others, to protect children from anxious and depressive feelings (2012). However, Stevenson & Peterson's concept of hope, which did not include an existential trust aspect, proved not to guard against despair. Therefore, trust appears to act as an essential element in building constructive hope.

If we return to Hick's origins of hope, we can locate the presence of trust in others in at least two sources: learning about other people's lives and how they live through challenging circumstances and having mentors (2014). Additionally, trust in self may come from a secure sense of who you are and what you are capable of, which Hicks calls 'sense of self' (2014). Factors such as concern, trust, and despair interact with and overlap the concept of hope and are all aspects of climate change education that are interconnected with cultivating hope for the future.

In a 2017 study, Li and Monroe sought to identify instructional strategies that cultivated climate change hope in order to design a climate change education program. To do so they surveyed the climate change concern, hope, and engagement opportunities of American high school students in Southern states (n=728). Climate change hope was assessed with three questions determining individuals' level of hope from trust in selves, trust in others, and perceived pathways. To assess factors that may lead to hopefulness, they drew on Kaplan's 2009 Reasonable Person Model (RPM) which helps describe the supportive environments that enable people to engage thoughtfully and helpfully in solving problems. The three factors of the RPM theory are (1) model building (ability to make sense of information), (2) meaningful action (perceive there are actions they can take), (3) being effective (believe that society and individuals have the ability to undertake actions to make a difference). Though hopefulness is not directly synonymous to reasonableness, they argue that hope, like reasonableness, involves an individual perception of personal change, as well as societal and community level problems (Li & Monroe, 2017). The RPM in this study focuses on how individuals' "perception of others' mental models, others' efficacy, and others' strategies" (p. 3) help build a personal sense of support and hopefulness; its focus on what others are doing is supportive of Ojala's research finding that trust

in others leads to hope. Alongside the three factors of the RPM, Li and Monroe studied participants' climate change concern, engagement opportunities, and hope.

Li and Monroe's results suggest that those who have environmental engagement opportunities (practice forest management, for example) and environmental role models (know a forester), have greater hopefulness (2017). One hypothesis is that those with environmental engagement opportunities like practicing forest management may be able to draw hope from their connection to the forest, being a part of a group of people working to protect the forest, and from feeling efficacious from taking environmental action (Li & Monroe, 2017; Hicks, 2014). However, it seems that even if you were not participating in foresting yourself, simply knowing someone who forested also served as a pathway to hope. This distinction is important because not all schools or schoolchildren have the resources or emotional energy to engage immediately in action. The use of guest speakers or google searches of environmental activists may serve as a more accessible way to introduce students to environmental engagement, particularly underserved youth in schools with limited resources. Providing students with role models could prove effective at planting seeds of constructive hope that may lead to action at a later time.

While Stevenson & Peterson found no relationship between concern and hope, Li & Monroe found a significant positive relationship between students' climate change concern and hope. This relationship was strongly mediated by being effective; students with greater concern about climate change experienced greater hopefulness only if they believed that society and themselves could solve the problem (Li & Monroe, 2017). The study found that when concern was coupled with avenues that created self- and collective-efficacy (i.e., practicing forest management and observing other foresters make a difference), students could place trust both in themselves and others—two powerful generators of hopefulness. Therefore, efficacy is another

essential ingredient educators can use to transform climate change concern into constructive hope.

Since constructive hope is linked both to greater engagement and well-being, it is important for climate change educators to consider which teacher behaviors encourage students' trust, efficacy, and hope. Teachers' own attitudes towards and communication about climate change affect children's emotional responses to it (Ojala, 2015). Therefore, a thorough understanding of hope could guide educators in facilitating more effective, emotionally engaged climate change education. To begin, educators who foster in children a sense that something can be done can help catalyze climate concern into hopefulness and action. Studies emphasize the importance of cultivating self-efficacy through empowering children and providing examples of collective efficacy (Li & Monroe, 2017; Stevenson & Peterson, 2015); this also works to build trust in oneself and others. Additionally, research suggests children are capable of processing the gravity of climate change and recommends that educational efforts remain honest, yet determinedly solutions oriented (Baker, Clayton & Bragg, 2020). Ultimately, teachers have the potential to create space in the classroom for challenging climate change emotions to be shared and positive emotions such as hope to be cultivated; this offers an effective path towards supporting children's well-being and motivating emotionally sustainable climate action.

Aims of the study

This study is directed by the following research questions: how do middle school children perceive their teachers to engage with climate change and climate change emotions? And how do these perceptions relate to students' environmental behavior and climate change hope? The first aim of this study is to explore the relationship between climate change anxiety, connection to nature, environmental behavior, self-efficacy, and climate change hope. The second aim of the

study is to compare students' climate change emotions to what is happening in their classrooms. This study has many similarities to Ojala's 2015 Sweden study on the relationship between high school students' climate change hope and teachers' perceived emotion communication style and futures orientation. Therefore, this study expects to replicate Ojala's findings that students who perceive that their teachers respect their negative emotions concerning environmental issues and have a future-oriented, positive, and solution-oriented communication style will experience greater constructive hope. Additionally, this study seeks to broaden the understanding of educating for hope by also exploring the relationship between students' inclusion of nature in self, climate change anxiety, and self-reported climate change emotions and hope. Ideally, by studying students' perceptions of teachers' climate change education style alongside a variety of climate change emotions, a fuller picture of how to educate students to be hopeful about climate change will emerge.

Informed by previous literature, I form the following hypotheses:

1. Students who perceive teachers as positively engaging with climate change in the classroom will have greater climate change hope and environmental engagement.
2. Students are more likely to have constructive hope if they: a) have high self-efficacy, b) see themselves as interconnected with nature and c) regularly spend time outside.
3. Levels of climate change hope and anxiety in students will overall be moderate-low.

Methods

This research received ethics approval (IRB Protocol #2020/04/1) from the College of Wooster Institutional Review Board on April 21st, 2020 and is valid through April 20th, 2021. Approval was granted to survey children. Throughout this research I was careful to uphold all ethical standards.

Procedure and participants

Data were collected through an online survey of middle school students in Ohio. To help administer the survey, Ohio middle school teachers were contacted through Camp Nuhop, an outdoor education center, and through the Environmental Education Council of Ohio (EECO) social media network and asked to give the survey to their students. Instructions for study participation, complete with links to a parental consent form and survey were housed on the EECO website. Surveys were collected from October 16th to October 30th and received (n=96) responses. Student anonymity was guaranteed. Participants were 41.7% male, 49% female, and 6.3% responded in the ‘other’ category. The students were evenly distributed across 6th (28.1%), 7th (38.5%), and 8th (30.2%) grade. Participants received no direct compensation for this study, though teachers who helped administer the survey were entered in a drawing to receive free registration to EECO’s Winter Conference and could elect to receive recommendations from the study on how to talk with kids about climate change.

Due to contacting teachers through environmental education networks, this sample may represent teachers who are more likely to be aware of climate change and this could have resulted in students with teachers who were more likely to talk about climate change. Though

care was taken to ensure representation of Ohio schools, this sample can be best described as a convenience sample.

Student survey measures

To determine appropriate measurement of participants' climate change hope, self-efficacy, environmental engagement, and climate anxiety, a thorough literature review was conducted. Due to the relatively new nature of this research topic, in many cases, only 1-2 measures were available to choose from that measured each of the desired psychological constructs. In instances when there were multiple scales capturing similar concepts, the most widely validated and accepted scale was chosen. Survey measures are presented here in the order they appear in the questionnaire:

Connection to nature was measured to determine how integrated one feels with nature because connection to nature is an environmental emotion that predicts environmental behavior (Carmi et al., 2015). It was measured using Shultz's well-known (2002) 1-item graphic Inclusion of Nature in Self scale (INS) for its simplicity in design and proven effectiveness. The scale consists of 7 sets of two circles labelled "self" and "nature". The circles range from entirely separate (1) to entirely overlapping (7) Participants were asked: "Choose the circle that best describes your relationship with the natural environment. How interconnected are you with nature?"

Self-efficacy was measured using a single item from Ungdomsstyrelsen (2010): "I have good opportunities to influence my own life-situation." The item was rated on a 7-point Likert scale from 0= "Strongly disagree" to 6="Strongly agree". Self-efficacy is an important predictor of action and hope and has been shown to transform climate change concern into hope (Li and Monroe, 2017; Ojala, 2012; 2015)

Environmental engagement was measured using a 5-item scale from Ojala (2015). Cronbach's alpha was .78. Participants were instructed: "Please select to what extent the following statements apply to you": (1) "If I had extra money, I would give some to protect the environment." (2) "I try to convince other people that nature is important." (3) "To save energy in the winter I make sure that the heat in my room is not on too high." (4) "To save energy, I always turn off the light in my room when I don't need it anymore." (5) "I try to save water by taking shorter showers or by turning off the water when I brush my teeth." The items were followed by a 5-point Likert scale: 0="Does not apply", 1="Doesn't apply so well", 2="Kind of applies", 3="Applies quite well" and 4="Applies perfectly well". This 5-point Likert scale was also used in the following two scales.

Teachers' positive or negative engagement with climate change emotions was measured using a scale with four items adapted from Ojala's (2015) *Teachers' accepting or dismissive attitudes towards negative emotions*. Participants were first asked "Do you ever express thoughts about climate change in the classroom?"; if participants responded "No, never", they were excluded from this question. Only those who answered "Yes, at least sometimes", were included to ensure student's perceptions of teachers accepting climate change emotions were based on the child's experience of talking about climate change. Participants were asked the stem question: "Think about how your teachers talk about climate change in the classroom. Please select to what extent the following statements apply." followed by four items: (1) "If I express negative emotions such as worry or anger about climate change, I have teachers who encourage me to say more about how I feel." (2) "If I wanted to share negative emotions like worry or anger about climate change, most of my teachers would not take me seriously." (reversed). (3) "If I wanted to talk about negative emotions about climate change, there are teachers who would listen to me

and take my emotions seriously.” and (4) “If I wanted to share negative emotions about climate change, most of my teachers would probably think I'm silly.” (reversed). Items 1 and 3 composed the positive emotions engagement scale and items 2 and 4 composed the negative emotions engagement scale.

Teachers' positive and negative framing of climate change was also measured using items adapted from Ojala (2015). Teachers' positive and solution-oriented outlook was measured by the following three items: (1) “I have teachers that talk about positive actions adults and other children are taking to help solve climate change.” (2) “I have teachers who talk about how you as a student can help solve climate change.” and (3) “I have teachers that talk about climate change in a way that makes me feel more positive.” And teachers' negative and hopeless outlook by: (1) “Most of my teachers focus on how hopeless everything is when they talk about climate change.” (2) “Most of my teachers paint a gloomy picture of the future when they talk about climate change.” And (3) “When it comes to climate change, most of my teachers talk about all the terrible things happening in the world.” The previous two scales used in Ojala's 2015 study showed that teachers with accepting and positive communication orientation were more likely to have engaged and hopeful students. These scales were adapted in this to specifically assess climate change education practices recommended by Baker et al. (2020).

Environmental behavior pathways in school was measured using slightly adapted items from Ojala (2015). The stem question: “How often have you had classes that talked about.....?” was followed by 3 items: (1) “What I can do to help our environment” (2) “What we together can do to help our environment” and (3) “How people are helping the environment in other parts of the world.” Respondents then rated each item: 0=“Never”, 1=“Rarely”, 2=“Sometimes”, and 3=“Often”. Cronbach's alpha was .87.

Future orientation in school was also taken from Ojala (2015) and measured using the same stem question and Likert scale above, followed by: (1) “What I can do to influence our future” and (2) “What I want our future to look like.” Cronbach’s alpha was .73. Students who see schools as discussing pathways and the future experience more hope; these components of hope may help children envision a future where climate change is solved and identify pathways to reach it.

Climate change anxiety was measured using a 13-item scale from Clayton and Karazsia (2020). Cronbach’s alpha was $>.80$. Respondents were asked to “Please rate how often these statements are true of you” using a 5-point Likert scale: 0=“Never”, 1=“Rarely”, 2=“Sometimes”, 3=“Often”, and 4=“Always”. Examples of items include: “Thinking about climate change makes it difficult for me to concentrate”, “I think, ‘why do I react to climate change this way?’” and “I write down my thoughts about climate change and analyze them.” Studies have shown that climate change despair is not a lack of climate change hope but a distinct concept, and thus should be measured separately (Stevenson & Peterson, 2015).

Climate change hope (CCH) was measured using a 12-item scale adapted from Ojala (2015) that falls into two sub-scales: hope based in denial and constructive hope (trust-self, trust-others, positive reappraisal). In 2018, Li and Monroe developed a CCH scale based on Snyder’s (2000) hope theory of pathways and agency which sought to capture both personal and collective-sphere pathways and agency. They argued Ojala’s CCH scale did not assess individuals’ agency, which they believe distinguishes hope from denial’s wishful thinking. However, Ojala, who also based her hope scale on Snyder’s theory, agrees that one needs both individual and collective pathways/efficacy (2015) and I argue her items measuring trust in self do capture the individual agency Li and Monroe found lacking. Ojala’s CCH scale includes

denial-based hope items for the purpose of distinguishing the source of hope reported. Maria's CCH scale accounts for an additional dimension of hope, the existential nature of climate change necessitating 'basic trust', by including items assessing one's ability to positively reappraise climate change.

Ojala's CCH scale asked the stem question "I feel hope concerning climate change" followed by: (1) "Because I believe that research and technology will help solve climate change" (trust-others). (2) "Because I do not think climate change is as big of a problem as scientists claim" (denial). (3) "Because we as individuals can change our behavior; together we can influence climate change in a positive direction" (trust-self). (4) "Because I believe that climate change is natural, and humans did not cause it" (denial). (5) "Because awareness about this problem has increased a lot in recent years" (positive reappraisal). (6) "Because leaders in more and more countries take climate change seriously" (trust-others). (7) "Because eventually we will be forced to take responsibility for climate change" (positive reappraisal). (8) "Because I doubt there is any change in the climate" (denial). (9) "Because as long as there are people working in environmental organizations, there is a possibility climate change will be solved" (trust-others). (10) "Because I know there are a number of things I can do to help the climate change problem" (trust-self). (11) "Because the summers in the U.S. are getting warmer" (denial). Cronbach's alpha was .85 for constructive hope and .86 for hope based in denial.

In response to the question: "To what extent do these statements completing the following sentence match how you are thinking?" respondents rated each item on a 5-point Likert scale: 0="Does not describe me", 1="Describes me slightly well", 2="Describes me moderately well", 3="Describes me quite well" and 4="Describes me perfectly well". All items

except 3 and 8 were modified from Ojala's study to fit a U.S. context and middle school understanding level.

To account for those who may not believe in climate change, the question "Do you believe that climate change is happening?" was asked and followed by the options 1="Yes, I am completely sure", 2="Yes, I am mostly sure", 3="Unsure", 4="No, but I am unsure" and 5="No, and I am completely sure."

Two open-ended questions were asked. The first, "When you think about climate change, what three words would you use to describe how you feel about it?" sought to give students a place to express any emotions that were not captured by the scales. The second, "Is there anything else you would like to say about your experience with climate change?" was asked to allow students to share any thoughts they felt they had not had the chance to. Participant variables include gender, school, and grade.

Data analysis

Survey data was analyzed using SPSS. Survey data was first analyzed quantitatively for patterns and insights related to the main research questions. All scales included are considered reliable (Cronbach's $\alpha > .7$). Two open-ended questions were analyzed qualitatively for emerging themes and patterns.

Two variables, climate change anxiety and self-efficacy, were recoded for the correlational analysis in Table 1 to address frequency distribution. Since reported levels of climate anxiety were quite low, the original 0-4 Likert scale was recoded so that those who received a score of 0 remained 0; those who scored below .2 received a 1; those who scored between .2-1.0 received a 2; and those who scored over 1.0 received a 3. Self-efficacy was

originally scored on a 0-6 scale and was similarly recoded: anyone who disagreed at all, scoring between 0-2 (disagreement) received a 0, those scoring a 3 (neutral) received a 1, and those scoring between 4-6 (agreement) received a 2.

Results

There were no significant differences according to gender and grade found for any reported variables.

Climate change thoughts in the classroom

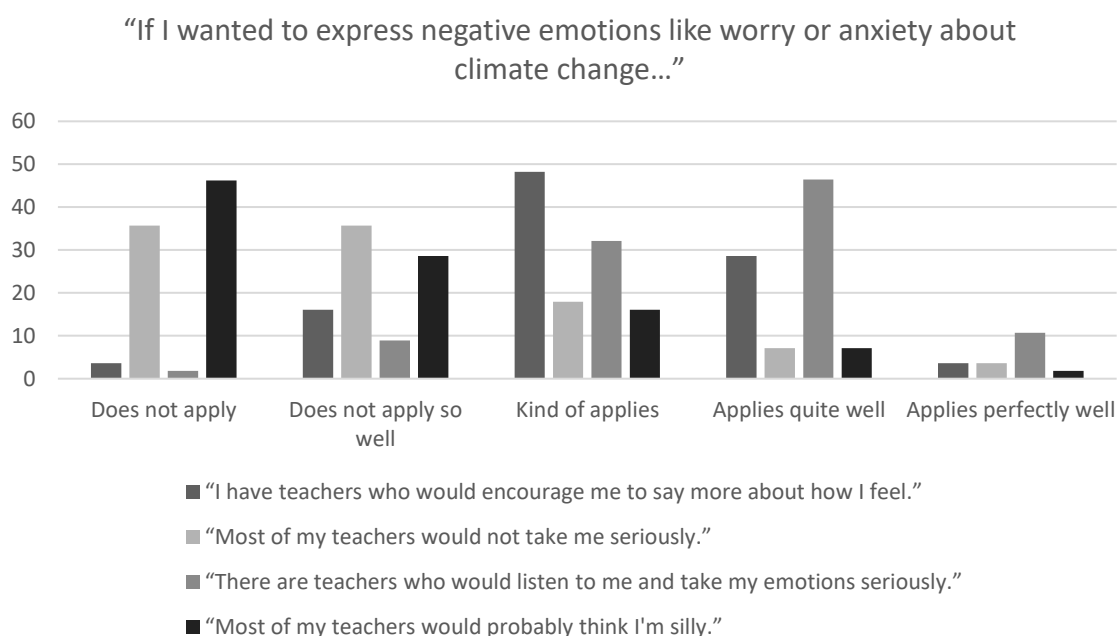
There were multiple quantitative measures related to students' beliefs about climate change and their perceptions of teachers' engagement with climate change and climate change emotions in the classroom. In response to the question "Do you believe climate change is happening", 50% responded "Yes, I am completely sure", 26.% "Yes, I am mostly sure", 13.5% "Unsure", and 7.3% "No, but I am unsure". Notably, the option "No, and I am completely sure" was never selected. Students reported an overall low level of climate change anxiety ($M=.36$, $SD=.57$, on a scale of 0-4). Over half of student participants (59.4%) reported that they express thoughts about climate change (CC) in the classroom at least sometimes.

Positive and negative emotion engagement

On average, students who do share CC thoughts in class perceived only moderate support from their teachers for taking challenging climate change emotions seriously and encouraging them to say how they feel (positive emotion engagement). See Figure 1. Students infrequently reported that they had teachers who would not take them seriously or would think their negative emotions about climate change were silly (negative emotion engagement).

Figure 1

Student perceptions of teachers' acknowledgement of negative climate change emotions (n=57)



Positive and negative climate change framing

Response frequencies show that students on average perceived teachers to take a somewhat solutions-oriented approach and positively frame CC ($M=2.68$, $SD=.64$, on a scale of 0-4), with about $\frac{1}{4}$ of students strongly agreeing teachers framed CC positively. Students were more likely to say teachers took a positive CC framing approach than a negative ‘doom and gloom’ approach. Students who perceived teachers to frame CC positively was positively correlated with having classes with individual and collective environmental behavior pathways ($r=.46^{**}$) and having classes that talked about possible futures ($r=.30^{**}$). See Table 1.

Environmental behavior pathways and futures orientation in class

On average, students said they sometimes have classes that talk about what they want their future to look like ($M=1.96$, $SD=.69$, on a scale of 0-3) and what they and others can do to help the environment ($M=1.90$, $SD=.70$, on a scale of 0-3).

Climate change hope

On average, participants experienced a moderate level of constructive hope ($M=1.8$, $SD=.9$, on a scale of 0-4) and a low-moderate level of hope based in denial ($M=1.02$, $SD=.81$).

Constructive hope

Constructive hope was positively associated with discussion of environmental behavior pathways in school. Youth who had greater constructive hope reported greater self-efficacy, inclusion of self in nature (INS), environmental behavior and climate change anxiety.

Constructive hope was also moderately positively correlated with perceiving teachers to frame climate change in class positively (i.e., solutions-oriented). See Table 1. There were no significant correlations between teachers' negative climate change outlook or negative emotion engagement and constructive climate change hope.

Hope based in denial

Hope based in denial was negatively correlated with teachers' positive emotion engagement ($-.27^*$). See Table 1. There were no other significant correlations to hope based in denial.

Table 1*Correlations among key quantitative variables*

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>
<i>1 Constructive hope</i>	1.0	.16	.22*	.24*	.37**	.22*	.30**	.25*	-.02
<i>2 Denial-based hope</i>		1.0	-.04	.18	.07	-.03	.02	.12	-.27*
<i>3 Climate anxiety</i>			1.0	.12	.21*	.20	.10	-.07	-.25
<i>4 Self-efficacy</i>				1.0	.31**	.36**	.16	.12	-.27
<i>5 INS</i>					1.0	.50**	.23*	.33**	.11
<i>6 EB</i>						.1.0	.17	.34**	.03
<i>7 EB pathways in class</i>							1.0	.46**	-.08
<i>8 Positive CC framing</i>								1.0	.18
<i>9 Positive emotion engagement</i>									1.0

Note: *p < .05, **p < .01, ***p < .0

Environmental behavior

Students exhibited a moderate level of environmental behavior (EB) ($M=2.14$, $SD=.82$). Youth who reported greater EB also experienced greater inclusion of self in nature (.50**), self-efficacy (.36**), constructive hope (.22*) and perceived teachers to positively frame climate change (.31**). Interestingly, students who perceived that teachers do not take their negative emotions seriously experienced slightly greater EB ($r=.28^*$).

Nature connection

Most participants (58.3%) spend between 2-10 hours outside a week on average; 27.1% spend less than an hour outside a week, 9.4% of youth spend 11-20 hours outside a week, which roughly equals 1.5-3 hours a day, and 5.2% exceed 21 hours spent outside a week. There were no significant correlations to time spent outside. On average, students have a moderate inclusion of self in nature ($M=2.75$, $SD=1.38$). Inclusion of Self in Nature (INS) was positively correlated not only with constructive hope and EB, but also with climate anxiety, self-efficacy, perceiving EB pathways in class, and perceiving teachers to have a positive CC outlook. See Table 1.

Qualitative climate change thoughts

Two open-ended questions were asked: “When you think about climate change, what three words would you use to describe how you feel about it?” and “Is there anything else you would like to say about your experience with climate change?” In the first question, three-word responses were coded as negative or positive. If participants shared at least one positive word in their response, such as “hopeful”, “excited”, or “we can help”, they were coded as positive. Unsurprisingly, students who responded positively to the prompt were more likely to experience constructive hope ($\text{diff}=-.0605$, $p=.015$) than those who responded negatively. However,

Table 2*Open ended student responses to experiencing climate change*

<p>“I feel like everyone that is in the generation older than us is relying on us to change the future, but the truth is you're just as important, and you shouldn't put all of the pressure on us to be the ones to ‘save the world from climate change,’ when you can help a lot.”</p>
<p>“I never really get that worked up about it because obviously I'm worried, but we can stop it so I think it should be fine.”</p>
<p>“We need to stop downplaying this and take it as a serious threat to humanity and we need to make a program designed on helping battle climate change.”</p>
<p>“I hope we can find ways to fix it soon.”</p>
<p>“I don't know that much about climate change.”</p>
<p>“People could make better changes to it.”</p>
<p>“That it could be good and bad.”</p>
<p>“I try to do something to help out and feel happy when I hear about people trying to fix it.”</p>

Discussion

These findings are best understood in the context of the sample. Our respondents were likely to have engaged with climate change in the classroom since their teachers self-selected to administer the survey. Although this presumably affected students' understanding of climate change, this was intentional because their prior engagement with climate change in class allows for observing how different climate change education styles affect students' resilience and environmental behavior.

What increases students' hope and resilience?

As hypothesized, students have a low level of climate change anxiety and a moderate level of constructive hope for climate change. Interestingly, climate anxiety and constructive hope are positively correlated, suggesting that hope and anxiety are not mutually exclusive and perhaps both reflect greater engagement with the topic. Thus, students may be able to experience hope in the midst of climate anxiety. This ability to hold multiple and conflicting emotions simultaneously is illustrated by two students' open-ended responses on climate change: "I'm worried, but we can stop it so I think it should be fine" and "It could be good and bad." See Table 2. As acknowledged by Baker, Clayton and Bragg, children may move from anxiety to grief to hope, holding many different emotions at once (2020). Research shows that by middle school, students on average have developed the ability to conceptually understand and experience mixed emotions in complex situations, though this skill continues to develop with age (Larson et al., 2007). Therefore, since middle school students are beginning to experience mixed emotions, it is important to emphasize to students that experiencing seemingly conflicting emotions about climate change is normal and healthy. While teachers should not attempt to create anxiety, knowing that some level of anxiety can coexist with hope may help alleviate

teachers' "fear of exacerbating" challenging emotions and aid their engagement with students' anxiety (Baker et al., 2020, p. 9)

Surprisingly, the feeling that one is connected to nature (INS) emerged as the strongest positive association to having constructive climate change hope. One hypothesis to explain this relationship is that those who feel they are nature may be able to think about climate change from a different perspective than those who do not, meaning those who feel that connection may have trust in nature and its potential to help humans solve climate change (i.e. it is not humans' responsibility alone to solve climate change, the natural world can help rebalance itself). It could also be that those who see themselves as a part of nature are better able to experience the restorative and healing benefits of it, contributing to children's well-being. Experiencing greater well-being overall may make it easier to be hopeful. One study by Larson et al. found that connection to nature predicated greater hope for the future, supporting this finding, but further research should explore this relationship (2017). Meanwhile, cultivating connection to nature in children, with or without mentions of climate change, may still provide them with restorative benefits that fuel their hope for the future. Time spent outside does not appear to significantly affect students' hope, environmental behavior, or even their sense of connection to nature in this study. Thus, a lack of time or resources to go outside should not deter educators from engaging in creative strategies to connect children to nature. Initiatives for connecting youth to nature inside the classroom such as Project Learning Tree and the Natural Learning Initiative offer solutions for how nature connection can be woven into school curriculum. Additionally, The Children and Nature Network offers a Natural Teachers Network where a community of teachers can ask questions, share resources, and provide support.

As found in previous research (Li & Monroe, 2017; Stevenson & Peterson, 2015), self-efficacy was positively associated with constructive climate change hope. Participants had high overall self-efficacy, though the association with hope was low, suggesting that while self-efficacy helps children perceive climate change as solvable, it may need to be combined with collective efficacy for children to have greater hope for the future. In this study, self-efficacy was measured as general self-efficacy rather than climate change self-efficacy. It could also be that while participants had high self-efficacy, they did not possess enough knowledge about climate change pathways to know how to take action to address climate change. This hypothesis is supported by the infrequency with which students reported having classes that talked about what they and others could do to help the environment and how frequently children responded that they felt ‘confused’ about climate change (see Figure 2). Due to the complex nature of responding to climate change, it is likely that cultivating a general sense of efficacy in children does not give them as much hope as cultivating climate change or collective efficacy would. In the United States, educators may need to pay particular attention to the emphasis they place on individual actions and focus on creating opportunities to build collective efficacy through community or group projects.

How should teachers engage with climate change in the classroom?

When expressing thoughts on climate change in class, students perceived their teachers to positively acknowledge their feelings more than dismiss them. However, students perceived only a moderate amount of support from teachers for their feelings. Positive emotion engagement was not associated with constructive hope, but the more that teachers were perceived to engage with students’ challenging emotions about climate change and take them seriously, the less likely students were to have hope based in denial. It is probable that when teachers acknowledge

students' challenging emotions as valid, students are less likely to ignore their feelings or pretend the source of them is invalid, thus decreasing their ability to use emotion-focused coping and experience hope based in denial. Therefore, some attention and acknowledgment to anxiety, fear, or grief in discussions of climate change is important. Educators may be wary to bring up seemingly negative emotions, especially in a school setting where such feelings are less normalized. However, offering a few minutes of space before, during, or after a lesson to ask students how they feel about the topic and model sharing your own challenging emotions, is an accessible first step towards affirming and normalizing anxiety and grief.

As hypothesized, when teachers positively framed climate change in the classroom, students experienced greater constructive hope. Having teachers who took a positive approach to CC, having classes that encouraged thinking about what one wants in the future, and having classes that talked about what can be done to help the environment were all positively associated with one-another. This suggests that focusing on the solutions and the future go hand in hand with positively framing climate change and increasing hope. If in the classroom teachers can resist over-emphasizing the problems of climate change and instead maintain a solutions-oriented approach, more time will naturally be devoted to what can be done, and students will feel more capable of enacting change.

How do teachers/students' emotions affect environmental behavior?

Children's emotional relationship to climate change affects their engagement with environmental behaviors. This study found that the more children felt constructive hope for the future, the more likely they were to take environmental action. While this finding may sound intuitive, in practice, it is challenging to resist the tendency to want to emphasize the urgency of climate change, especially if the communicator holds anxiety themselves. Yet, students' climate

change anxiety was not associated with greater environmental behavior. Thus, this study suggests that appeals to fear are less effective in creating behavioral change than appeals to ‘what could be’. Students with teachers who maintained a positive, solutions-oriented approach to climate change exhibited greater environmental behavior than those who received negative framing of climate change. How do we resist appealing to fear and communicate hope? One study suggests that in order for teachers to set aside their fears and focus on hopeful narratives, they first need to take time to understand how to cope with their own emotions about climate change (Baker et al., 2020). Thus, offering thoughtful, supportive climate change education requires more than intentional planning, it also asks educators to take the time to internally process their challenging emotions about climate change. If educators are unsupported in this difficult process, it is likelier that their challenging emotions will affect their students (Baker et al., 2020).

Implications

Ultimately, the goal of climate change education is to change behavior, but considering children's environmental distress, it is equally important to increase children's emotional resilience to climate change so they can experience greater well-being in their lives. Most importantly, children need a greater connection to nature, effective coping strategies, and opportunities to work with others towards creating a better future. This study's findings suggest that the actions teachers take in the classroom that tend to increase students' constructive hope and self-efficacy also tend to increase their environmental behavior. Therefore, the goals of encouraging environmental behavior and increasing children's well-being are connected and support one another. Recognizing this connection may help educators see the necessity in incorporating nature connection and climate change emotional resilience work in climate change lessons. It also broadens our knowledge base of climate change education best practices to include strategies from the research stream on coping with climate change.

One barrier towards educators embracing a solutions-oriented teaching style is their own anxiety, fear, and/or grief (Baker et al., 2020). Further research is needed on how teachers' self-reported climate change emotions relate to their students' emotions and hope. Initially, this study sought to compare teachers' emotions to students'; the survey for teachers that was not included in this study due to low survey collection can be found in Appendix 1. Another future direction of research would be developing and trialing climate change lessons in classrooms that meet science standards, remain solution-oriented, and support challenging emotions.

Learning to live with climate change is a lifelong process that middle school students, as their awareness begins to expand beyond their self, are only just beginning. Parallely, learning to support children through climate change is a lifelong process that teachers and parents are also

beginning. Fortunately, since adults' emotions affect children, and children's emotions likely affect adults', building resilience is a journey teachers and students are taking together. If teachers can approach climate change education in the spirit of learning to accept it and focus on what they and others can do to help solve it, they will model effective coping and behavioral strategies to students. I argue that the converse is also true; the more students are able to share their challenging emotions and learn about positive examples of climate action, the easier it will be for teachers to maintain an authentic solutions-oriented teaching approach.

From a wider lens, however, schools must incorporate emotional, environmental, and civic education into their curriculums to support teachers in these processes. Without school wide support, teachers are likely to lack the resources necessary to sustain these efforts. Inviting collaboration from different sectors of school and the community can help teachers provide children with opportunities to connect with nature and experience how they and others can build the future they hope for. Cultivating hope and resilience is a process that rests on our ability to form connections within and beyond the classroom.

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Appendix

Initially, this study sought to collect surveys from teachers and students and compare responses to determine how teacher behaviors and emotions impact students' experience of climate change. However, with the added responsibilities put on teachers due to the pandemic and the nature of this survey being optional, teacher survey collection in this study was low. Therefore, analyses on teacher responses were not conducted.

Teacher survey

Teacher's positive engagement with climate change in the classroom was measured with 8-items. Items were developed from extensive reading of literature and were largely informed by key recommendations for parents and teachers identified in Baker, Clayton & Bragg (2020) for supporting children's climate change emotions. Additionally, the items in this scale reflect items in three aforementioned student scales: *Teacher's acceptance of negative climate change emotions in the classroom*, *Teachers' negative or positive climate change outlook*, and *Discussing pathways to sustainability in school*, but from teachers' perspective.

The following stem question: "Due to the uncertain nature of environmental issues such as climate change, children may experience feelings of anxiety, overwhelm or upset. Please select to what extent the following statements describe you." was followed by: (1) "I ask my students about the emotions they are experiencing in response to climate change." (2) "I talk with my students about actions they can take to help the climate change problem." (3) "When I talk with my students about climate change, I emphasize solutions to the problem." (4) "I talk to my students about positive actions adults and other children are taking to address climate change." (5) "I try to incorporate sustainability and climate change into my curriculum." (6) "If students share negative emotions about climate change, I tell them it is okay to feel that way." (7) "If I

feel negative emotions about climate change, I am able to work through them.” (8) “I try to minimize the severity of climate change so my students are not overly worried.”

Only participants who answered “Yes, at least sometimes” to the question: “Do you ever talk about climate change in the classroom? This can be either formally as a part of curriculum or informally.” were shown all 8 items; if participants responded “No, never”, they were shown only items (6), (7), and (8). Participants were asked to rate items on a 5-point Likert scale: 1=“Does not describe me”, 2=“Describes me slightly well”, 3=“Describes me moderately well”, 4=“Describes me quite well” and 5=“Describes me perfectly well”.

Teachers were also asked to complete the *Climate change hope*, *Climate change anxiety*, *Connection to nature* and *Self-efficacy* scales described in the student survey, as well as the “*Do you believe climate change is happening?*” question. Additionally, teachers were asked context variables about their gender, school, and grade and subject they taught (optional). The order of these measures matches the student survey. As in the student survey, an open-ended question was asked to provide teachers a space to share any thoughts concerning climate change they had not had the chance to do so: “Is there anything else about your experiences addressing climate change in the classroom you would like to share?”