

STUDENTS AT THE SEASHORE: THE EFFECTS OF A VISIT TO A COASTAL  
PARK ON WELL-BEING AND PLACE MEANING

A Thesis

Presented to the Faculty of the Graduate School

of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

Master of Science

by

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December 2019

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## ABSTRACT

Today's youth face complex challenges at the individual level (e.g. bullying, academic pressure) and the societal level (e.g. climate change, drug abuse). Children's engagement with outdoor environments may help to increase capacity to deal with these challenges by improving emotional health, building social connections, and developing a stronger sense of place. This study aims to understand how an overnight experience at a coastal nature camp contributes to 5<sup>th</sup>-graders' emotional health, social health, and place meaning. Two studies were conducted in tandem. In Study 1, a pre-post research design was used to compare the nature camp experience to the classroom environment at two schools. Quantitative results showed that mental and social well-being were improved by the nature camp for students at one of the schools. No improvements were observed at the other school. In Study 2, photo-elicitation was used to evaluate place meaning of the nature camp experience. Photo categorization revealed biophysical and sociocultural features of the nature camp had significance for students. This study has implications for experiential environmental education programming for youth.

## BIOGRAPHICAL SKETCH

Anna Gannett previously completed a Bachelor of Science in Sustainable Development with a concentration in Environmental Studies at Appalachian State University in Boone, North Carolina. Her prior research interests included water quality and marine ecosystem services. Following completion of her undergraduate degree, Anna worked professionally as an interpretive park ranger for the National Park Service, and as a skiing instructor and swimming instructor before attending Cornell University. Anna's current research interests include understanding connections between the natural environment and human health.

## ACKNOWLEDGMENTS

I would like to first thank my parents, Paul and Debbie, for always believing in me and encouraging me to pursue my passions. I would also like to thank my committee, Professor Nancy Wells for her valuable feedback and advice throughout the research process, and Professor Richard Stedman for his insights into qualitative research methods. I also want to acknowledge my sister, Maria, who was a steadfast mentor and a constant role model for learning how to navigate graduate school. Finally, I would like to thank my partner, Jackson, for supporting me in this academic and life journey.

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## LIST OF ABBREVIATIONS

ART: Attention Restoration Theory

NEED: National Environmental Education Development program

NPS: National Park Service

PANAS-C: Positive and Negative Affect Scale for Children

PR-SF: PROMIS Peer relationships scale short form

RQ: Research Question

SLE: Stressful life events

SRT: Stress Reduction Theory

## CHAPTER 1

### **Introduction**

American children face many challenges, both at an individual and a community level. These complex challenges include obesity, bullying, school violence, academic pressure, and poverty (Federal Interagency Forum on Child and Family Statistics, 2018). One out of every 20 children faces emotional or behavioral difficulties (Federal Interagency Forum on Child and Family Statistics, 2018). On a larger scale, major challenges in the United States include drug addiction, pollution, and climate change (Bialik, 2019). Confronting adversity requires looking holistically at the range of contributing factors.

In the past 20 years, children have changed the way that they spend their time. Weekly, the average American child spends 16 hours watching television or using a computer, 5 hours in organized activities, and 6 hours in outdoor activities outside of the school day (Kellert et al., 2017). American children have decreased outdoor time and increased digital media time (Hofferth, 2009; Kellert et al., 2017). Wells, Jimenez, & Mårtensson (2018) suggest that reduced recess time and increased screen time may contribute to children's disconnections from the natural environment. Richard Louv coined the term "Nature Deficit Disorder" in his book *Last Child in the Woods* (Louv, 2008). Nature Deficit Disorder refers to the concern that decreased time spent outside is a factor contributing to numerous difficulties that children encounter. Therefore, it is important to understand how spending time outdoors affects children.

Given that children are facing many challenges and are spending less time outside, this thesis will address how reconnecting children with nature may help

children manage some of the difficulties by building sense of place, improving emotional health, and improving social health. Through two studies with children, this paper aims to explore the relationships between stressful life events, emotional health, social health, and place meaning at a coastal national park. First, we will discuss the resilience framework as it relates to natural environments and children's mental health. Second, we will summarize some fundamental theories supporting the resilience framework. Next, we will provide an overview of mental health outcomes of children's exposure to natural environments. Then, we will discuss the role of social health and sense of place as mediators of the relationship between natural environments and mental health outcomes. Finally, we will describe federal commitments to engaging children with natural environments.

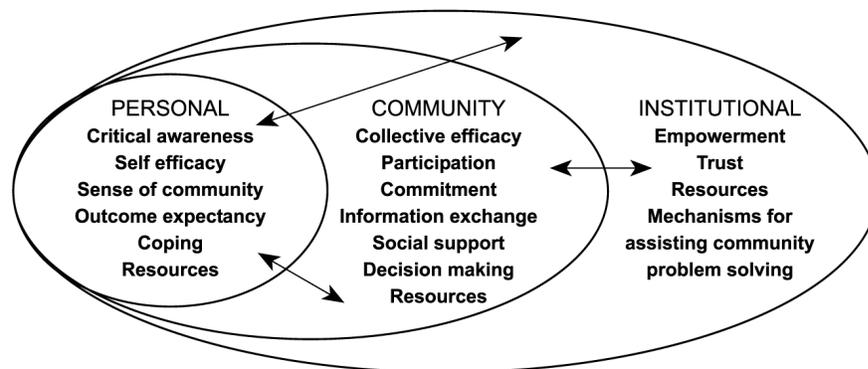
“Nature” has been defined in a variety of ways, but usually includes parks, vegetation, backyards, playing fields, ponds, and other bodies of water in an outdoor environment (Taylor & Hochuli, 2017). Depending on the discipline, the definition may include all vegetation or may only include natural spaces, such as parks or lakes. Blue spaces (areas containing water) are generally included in the broader concept of “Nature.” For the purposes of this study, “greenspace,” “natural environments,” and “nature” will be used synonymously.

Natural outdoor environments benefit children in numerous ways (Gill, 2014; Faber Taylor, Kuo, Spencer, & Blades, 2006). Natural environments have been linked to children's overall quality of life (McCracken, Allen, & Gow, 2013). In addition, natural environments have been associated with higher levels of physical activity (Cleland et al., 2008; Cooper et al., 2010; Larouche et al., 2019), reduced risk of

myopia (Sherwin et al., 2012), improved cognition (Kuo, 2016; Ulset, Vitaro, Brendgen, Bekkhus, & Borge, 2017; Wells, 2000), increased self-esteem (Bowler, Buyung-Ali, Knight, & Pullin, 2010), improved behavioral and emotional regulation (Amoly Elmira et al., 2014; Scott, Kilmer, Wang, Cook, & Haber, 2018), and reduced stress (Corraliza, Collado, & Bethelmy, 2012; Feda et al., 2015; Mygind, Stevenson, Liebst, Konvalinka, & Bentsen, 2018). Despite this promising evidence, prior research has various methodological limitations. In particular, most of these studies are cross-sectional, which limits the ability to evaluate cause and effect. In this study, we employ a pre-post intervention design to evaluate mental health, social health, and sense of place to move beyond the cross-sectional studies.

### **Resilience**

In developmental psychology, resilience has been defined as a, “positive adaptation despite adversity” (Luthar, 2006, p. 739). Resilience research has been gaining momentum in sustainability and social science fields in recent decades. Personal, community, and institutional factors work together in response to problems that occur (Figure 1.1).



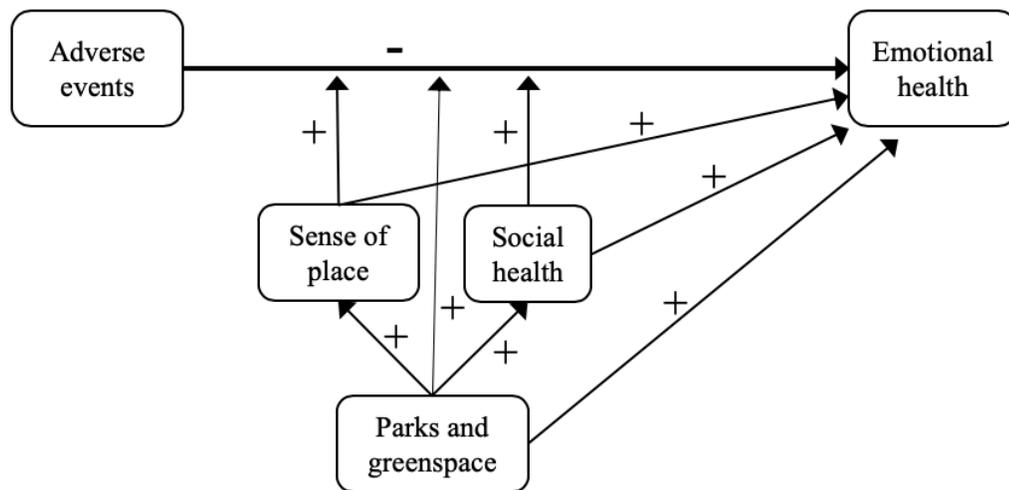
*Figure 1.1.* The resilience model showing connections between individual, community, and institutional levels (Johnston & Paton, 2001)

After spending his summers in an isolated national park, Edward Abbey famously wrote, “May your trails be crooked, winding, lonesome, dangerous, leading to the most amazing view” (Abbey, 1988, p. xii). Reflecting on this wisdom, when the trail gets crooked and lonesome, the amazing view may limit the impacts of the challenge by building resilience. A connection to nature may not allow for escaping stressors, but could potentially provide temporary relief. As it applies to research examining the connection between natural environments and people, it has been suggested that exposure to nature can increase resilience (Wells, 2014). In other words, nature may reduce the impacts that stressful life events or adversity have on mental health. This buffering of stress impacts on mental health may occur through mediating variables such as strengthening of social relationships (Fan et al., 2011) or through developing a stronger sense of place (Stedman, Amsden, Beckley, & Tidball, 2014). Figure 1.2 shows the proposed framework of how resilience connects these constructs.

Aspects of the physical and social environment can influence the ability to deal with adversity, whether at a personal or community level. Berkes and Ross (2013) posit that community resilience brings together the related fields of individual resilience on the psychological level with ecosystem resilience on a more macro environmental scale. The seemingly disconnected fields of psychology and ecology are brought together in this new perspective on how to deal with challenges. As Buikstra (2010) suggests, although resilience may happen at an individual level, it still contributes to the creation of broader community resilience through adaptation to changes and other larger scale societal problems (Berkes & Ross, 2013).

Childhood resilience literature has historically focused on the importance of family, social, and school contexts (Luthar, 2006; Masten, 2014; Masten, Best, & Garmezy, 1990). Parallels have been drawn between childhood resilience literature and exposure to the natural environment (Besthorn, 2005; Chawla, 2014; Wells, 2014). After a stressful life event, or even a war or natural disaster, exposure to nature may in part explain why some children fare better than others. The affordances of the natural environment may be a protective factor in children's development. Theoretical explanations for nature enhancing children's resilience include attention restoration (Wells, 2014) and stress reduction (Chawla, Keena, Pevec, & Stanley, 2014) (both discussed below). Natural spaces may also encourage social interaction among children (Faber Taylor, Wiley, Kuo, & Sullivan, 1998), which can contribute to individual resilience. Spending time outdoors may increase self-efficacy (Opper, Maree, Fletcher, & Sommerville, 2014), another protective factor in children's development (Masten, Best, & Garmezy, 1990). The resilience model as it applies to children spending time in nature has not been evaluated extensively. Few studies have looked at the interactive effects of stress and nature exposure on psychological outcomes (Wells, 2014).

This study aims to explore components of the proposed framework (Figure 1.2) by looking at connections among parks, emotional health, social health, and sense of place for children. Two related studies are described (Study 1 and Study 2) to examine the resilience framework for children at a nature camp.



*Figure 1.2.* Conceptual resilience framework for the present study. The “+” symbol indicates a potential positive association. The “-“ sign indicates a potential negative association.

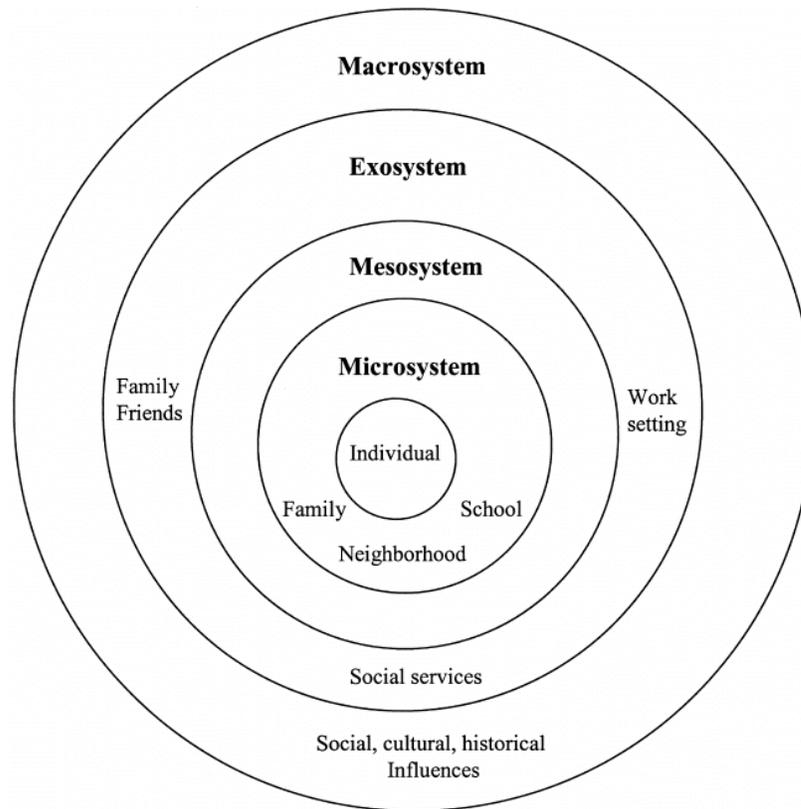
### **Theoretical perspectives**

Multiple explanations have been given as to why outdoor environments are beneficial for children. These theories may help explain why and how nature buffers the impacts of stressful events on children’s mental health. Attention Restoration Theory (ART) describes how natural environments bolster attentional capacity (Kaplan & Kaplan, 1989). ART is based on William James’ idea that there are two kinds of attention, voluntary and involuntary (James, 1892). Some environments (such as offices or urban streets) and tasks (such as data entry or driving) require directed (or voluntary) attention that with time, becomes fatigued (Kaplan, 1995). Natural environments allow for directed attention to recover (by engaging involuntary attention), thus allowing directed attention to rest and recover and ultimately improving attentional capacity (Kaplan, 1995). Attention restoration has been linked

to the ability to cope with major life issues among adults (Kuo, 2001) and self-discipline among children (Faber Taylor, Kuo, & Sullivan, 2002).

Stress reduction theory (SRT) posits that after being exposed to stressors, natural environments may induce a shift towards a more positive emotional state (Ulrich, 1991). SRT suggests that nature creates an *affective* response to the visual environment provided (Ulrich et al., 1991). The automatic positive physiological response to natural environments, particularly environments containing water, allows for recovery from stress (Ulrich, 1981; Ulrich et al., 1991). This theory has been tested in adults (Hartig, Evans, Jamner, Davis, & Garling, 2003; Ulrich et al., 1991; Ulrich, 1981), and to a limited extent in children (Corraliza, Collado, & Bethelmy, 2012; Feda et al., 2015).

The context of exposure to natural environments may matter for children's development. According to the bioecological model of development, children's development is most strongly influenced by their microsystem, the environments in which they spend the most time. Much of the research about how green spaces impact children's well-being focuses on residential and school environments. Given the amount of time children spend at school and at home, these environments play a large role in their mental and social development (Bronfenbrenner & Morris, 1998). Figure 1.3 shows how less immediate factors (the exosystem and macrosystem) also play a role in children's development. For the purposes of this study, we focus on a school population.



*Figure 1.3.* Bioecological model of development (Bronfenbrenner & Morris, 1998).

### **Emotional Health**

**Problem statement.** An important indicator of overall well-being is mental health, which comprises a wide range of indices such as emotional regulation, behavior, attention, and anxiety. The latest US Census Bureau National Survey of Children’s Health (2016-2017) indicated that the most common mental health diagnoses among children were ADHD, behavior problems, anxiety, and depression, which each impact millions of children. Often, children who are diagnosed with one mental health problem are also diagnosed with another (US Census Bureau, 2017). For the purposes of this study, the term mental health will be limited to emotional health, which encompasses overall emotion regulation, including anxiety and mood (i.e.

depression). Positive and negative emotional states, measured by affect, are correlated with overall well-being and are considered a valid measure of mental health (Laurent et al., 1999) The American Psychological Association states that emotional health is an important predictor of personal and professional success through life (APA, 2019).

Among American children, there has been a recent rise in rates of depression and anxiety (Bitsko et al., 2018). Parent-reported outcomes showed an increase in the lifetime diagnoses of children with anxiety or depression from 5.4% in 2003 to 8.4% in 2011-2012 (Bitsko et al., 2018). Complex social, economic, and environmental factors across multiple scales influence children's mental health. Poor family dynamics, low quality of care, poor social support, and socioeconomic inequality are all contributing risk factors (Zubrick, Silburn, Burton, & Blair, 2000). Overall, mental health can incur significant costs as these issues typically persist into adulthood, and can have negative impacts on families and teachers (Smith & Smith, 2010).

Some suggest that the changes in emotional health may be in part attributed to changes in how children spend their time. Today's children have decreased unstructured leisure time and increased digital media time. Correlational data show that a higher amount of screen time is linked to emotional problems (Allen & Vella, 2015; Twenge & Campbell, 2018). Although moderate use of screens (less than 1 hour per day) is not associated with signs of depression, greater than 4 hours of screen time is associated with depression (Twenge & Campbell, 2018). Particularly among girls over age 10, social media use has a significant impact on mental well-being (Booker, Kelly, & Sacker, 2018; Y. Kelly, Zilanawala, Booker, & Sacker, 2018). While excess screen time has been associated with the aforementioned negative outcomes,

decreased time spent in outdoor activities may also contribute to lower mental well-being (Hofferth, 2009). Changes in screen time, unstructured leisure time, and time spent outdoors may help explain the recent rise in mental health issues among American children.

**Nature and children's mental health.** An early study by Ulrich (1981), found that natural scenes, particularly scenes with water, brought about positive emotions among participants. Evidence suggesting that natural environments positively impact mental well-being has grown to include numerous locations and populations of adults and children (Bowler et al., 2010; Clark, Myron, Stansfeld, & Candy, 2007; Gascon et al., 2015; Gascon, Zijlema, Vert, White, & Nieuwenhuijsen, 2017; Mantler & Logan, 2015; Tillmann, Tobin, Avison, & Gilliland, 2018). Specifically regarding children, studies have covered a wide range of associations between green and blue spaces and mental well-being outcomes including: emotion regulation, life satisfaction, mood, anxiety, and depression (Gascon et al., 2015; Tillmann et al., 2018).

Many of the studies evaluating associations between nature and mental well-being involve residential environments. A few large-scale epidemiological studies have looked at associations between objectively-measured green space and mental health. A longitudinal study of over 900,000 people in Denmark found that the highest levels of residential greenspace throughout childhood (birth to age 10) was associated with fewer psychiatric disorders from age 10 until death or moving out of the country, compared to the lowest levels of residential greenspace even when controlling for factors of socioeconomic status and history of parent mental illness (Engemann et al., 2019). Those who lived in high greenspace environments for a short period of time

were more at risk of psychiatric disorders than those who lived in greener environments for longer. The lowest amounts of greenspace increased risk of developing a mental health disorder by up to 55%, particularly in urban areas.

Cross-sectional studies have evaluated associations between residential access to nature and several measures of mental health. A large cross-sectional study with over 300 schools in Canada evaluated how the amount of public natural space (including parks and blue space) within 5 kilometers of schools for students in grades 6-10 was related to self-reports of emotional well-being (Huynh, Craig, Janssen, & Pickett, 2013). Modest protective effects were seen in small cities, but this study was unable to test causation due to the non-experimental, cross-sectional study design. Feda et al. (2015) found that the amount of park area in urban-dwelling adolescents' neighborhoods moderated the relationship between physical activity and stress. Girls with more green space around their homes have better self-discipline, an important component of mental health (Faber Taylor, Kuo, & Sullivan, 2002). The participants in Faber Taylor, Kuo and Sullivan's study were quasi-randomly-assigned to their apartments within Chicago's public housing, thus limiting the effects of self-selection as an alternative explanation. Despite suggesting that green space may be a predictor of mental health, these cross-sectional studies are not able to rule out other factors related to stress reduction and other mental outcomes, thus limiting the ability to attribute a causal link between greenness and mental well-being.

Few studies have attempted to go beyond green space access or "nearby nature" to evaluate the actual *use* of these spaces in order to further understanding of the relationship between green space and mental health in children. A study with New

Zealand youth found that the amount of time spent in green space was strongly related to more positive self-reported emotional well-being (Ward, Duncan, Jarden, & Stewart, 2016). Students were equipped with GPS trackers and accelerometers for one week and asked to complete three measures of emotional well-being. Similarly, parent-reported outcomes of emotional and peer-relationship problems were used in a large study in Barcelona. Greenness surrounding homes was not significantly related to health outcomes, but rather it was the amount of time spent engaged in play in greenspace that predicted health, suggesting that access does not necessarily predict use (Amoly Elmira et al., 2014).

The buffering hypothesis purports that exposure to natural environments may moderate the relation between stressful or adverse events and mental health. One prior study found a connection between the amount of greenspace surrounding children's homes and their ability to cope with stressful life events. Nearby nature moderated the relationship between stressful life events and mental health (Wells & Evans, 2003). Similarly, another study that found the perception of the amount of nature near children's schools moderated the relationship between stressful life events and mental health, suggesting that those with better (perceived) access to nature will experience a greater ability to deal with adversity (Corraliza et al., 2012). Qualitative data supports these findings. Chawla et al. (2014) investigated how green schoolyards for children in grades 4-6 had the potential to reduce stress and build resilience in young children. Using photos, interviews, and observational methods, the researchers found that students reported feeling "peaceful" and "calm" when using these greenspaces.

Intervention study designs, which allow an examination of change over time, have been used for few studies. The following studies benefitted from measuring participants before (pretest) and after (posttest) an intervention, thus offering a baseline for comparison. Nature camps and outdoor programs are often used as interventions in studies evaluating children's connections with natural environments. Students enrolled in a 10-day outdoor adventure program had significant improvements to mental health for a one-month and one year after the program as measured by positive and negative emotions and satisfaction with life (Ritchie, Wabano, Russell, Enosse, & Young, 2014). Another intervention study of male adolescents found sustained improvements to mood and adaptability following participation in a 23-day outdoor adventure program (Opper, Maree, Fletcher, & Sommerville, 2014). In a study of young adults attending a 4-week wilderness camp, self-reported measures of well-being showed significant improvements in positive emotions and sense of place among participants (Warber, DeHudy, Bialko, Marselle, & Irvine, 2015). Interestingly, the aforementioned study also found improvements to social connectedness among participants, an issue that will be discussed in further detail as it relates to both mental well-being and the availability of green space.

We found only one study that used a control group to explore the mechanism of emotional health impacts of nature exposure. The inclusion of a control group helps to isolate the independent variable in evaluating causal relationships, thereby strengthening a study's internal validity. Looking specifically at mental health as measured by affect (a short-term measure of emotional health), a study comparing a forest school classroom to a classic indoor school classroom found a significant main

effect of the forest classroom on affect (Roe & Aspinall, 2011). However, with a sample of just 18, these results are limited by small sample size.

**Gaps in nature and mental health studies.** A prior systematic review concluded that there was not enough evidence to draw any conclusions regarding nature's effect on mental health among children (Gascon et al., 2015). A more recent literature review synthesized results from twelve studies to conclude that overall mental well-being was associated with access to green space. This review found that studies employed the following measures of mental and cognitive well-being: attention restoration, stress moderation, improved self-discipline, and increased social support (McCormick, 2017). Another review, focused on mental well-being of children interacting with nature, categorized studies by quality of study design, and points out that the literature regarding children is mostly cross-sectional (Tillmann et al., 2018) which limits the ability to draw causal linkages. Longitudinal study designs have advantages over cross-sectional designs, but only experimental research designs with random assignment allow for establishing causal linkages. Other authors suggest the need for future research using more robust experimental study designs to explore the mediating mechanisms explaining health benefits from natural environments, such as social cohesion (Markevych et al., 2017). Overall, there is a lack of strong study designs that evaluate casual linkages and mediating mechanisms. The first study aims to address this gap by using an intervention study to evaluate the short-term effects of a nature camp on emotional health using randomly assigned classrooms. Changes in positive and negative affect of students in classrooms will be compared between those who visit a nature camp and those who remain in the classroom. This study will allow

us to move closer to casual conclusions between exposure to natural environments and mental health.

## **Social Health**

**Problem statement and introduction.** This study examines children's social health as a potential explanation for how spending time in green space may be related to effects on children's emotional health (operationalized as positive/ negative affect). Having stronger social ties is connected to numerous mental and physical benefits, including more positive emotions, greater self-efficacy, improved problem-solving ability, and lower stress (Cohen & Wills, 1985; McGee & Stanton, 1992). The 2019 World Happiness Report, an annual report conducted by the United Nations, showed that reductions in perceived social support are partly to blame for reductions in overall well-being among Americans (Helliwell, Layard, & Sachs, 2019). For children, developing positive peer relationships is a significant predictor of success in adulthood (Jacob, Baird, Barker, Cooper, & Hanson, 2017). Successful mental development is associated with the relationships children develop with their peers at school (Hall-Lande, Eisenberg, Christenson, & Neumark-Sztainer, 2007). Changes in how children spend their time may relate to difficulties for children to form strong social ties. A longitudinal study found that over a two-year period, screen time was associated with less prosocial behavior and more behavioral problems (Allen & Vella, 2015). Evidence such as this shows a need for determining how to foster and maintain social health in communities.

Social capital has been defined as, "How involvement and participation in groups can have positive consequences for the individual and the community"

(Aldrich & Meyer, 2015, p. 256). The related term “social support” refers to feelings of being supported both materially and psychologically (Cohen, 2004). Collectively, feelings of being connected to others is a significant aspect of overall well-being.

**Nature and children’s social health.** Although many studies have evaluated the associations between green spaces and social health in adults (Fan, Das, & Chen, 2011; Hordyk, Hanley, & Richard, 2015; Maas, van Dillen, Verheij, & Groenewegen, 2009), few studies have examined similar associations among children (Collado & Staats, 2016). Longitudinal data from the UK shows that for young children, the presence of more neighborhood natural spaces was significantly associated with improved social outcomes (Richardson, Pearce, Shortt, & Mitchell, 2017). Cross-sectional data provides limited evidence of an association between social health and natural environments. A meta-analysis of studies looking at connections between social support and well-being among children found that there is a small, but positive effect (Chu, Saucier, & Hafner, 2010). A large study of Spanish schoolchildren found that increased time spent playing in green areas and more frequent visits to the beach were both associated with fewer peer relationship problems (Amoly Elmira et al., 2014). Parents have confirmed the importance of parks as places for social recreation for their children (Larson, Whiting, & Green, 2013).

Intervention studies provide more concrete evidence of the causal relationship between natural environments and social health. An intervention study with children in the Netherlands looked at the impacts of “greening” a school play area on physical activity, attention, and social and emotional well-being. Although there was no effect on emotional health, there was a significant effect on social well-being (van Dijk-

Wesselius, Maas, Hovinga, van Vugt, & van den Berg, 2018a). In a qualitative study, participants were interviewed as 10<sup>th</sup> grade young adults, five years after participating in a three-day residential outdoor environmental education program. Participants' memories of the program were centered around experiences with friends (Liddicoat & Krasny, 2014).

Social relationships may be one explanation for how children's exposure to natural environments benefits children's restoration. A study comparing the amount of green space in school play areas looked at how social interactions and positive affect at recess may be related to children's restoration. Social factors were related to the reports of restoration more than physical features of the play areas, suggesting the importance of social factors in children's use of parks (Bagot, Allen, & Toukhsati, 2015). Similarly, Malecki and Demaray (2006) found that social support served to moderate the relationship between economic stress and academic performance in students. The specific ways that natural environments play a role in supporting social relationships in children requires further examination.

**Gaps in nature and social health studies.** A review by Collado and Staats (2016) suggests that future research needs to evaluate the social context of nature restoration more fully for children. Existing cross-sectional and longitudinal data do not provide sufficient support for causal conclusions between green space and social health. Similar to associations for mental health, more robust research designs with random assignment to treatment and control groups are needed to understand the impacts of natural environments on social health. Although studies have proposed that the impacts of green space on mental health is mediated by social health (Fan et al.,

2011; Malecki & Demaray, 2006), more research is needed to explore this mechanism further. The first study aims to assess the causal relationship between natural environments and social health. The study employs a pre-post intervention design with participants randomly assigned to control or intervention to evaluate the effects of a nature camp on peer relationships.

## **Sense of Place**

### **Problem statement and introduction.**

An outcome that has recently gained attention in relation to natural environments is sense of place. Sense of place is the third key outcome variable examined in this thesis. Sense of place as a whole, comprises the cognitive, affective, and conative relationships with an environment (Jorgensen & Stedman, 2001). Figure 1.4 illustrates how the concepts under the umbrella of sense of place interconnect. Sense of place for individuals can be split into the two related domains of *place meanings* and *place attachment* (affective connections) (Briggs, Stedman, & Krasny, 2014). The focus of the second study will be on place meanings, or the descriptive and symbolic associations with aspects of the environment (Masterson et al., 2017). Few studies have focused specifically on children's place meanings. Existing studies have focused on how place-based experiences are related to problem-solving (Lim & Barton, 2010) and emotional self-regulation (Korpela, 1989). Derr (2002, p. 125) explains:

“Children's sense of place occurs on multiple scales: there is the child-scale experience of places, though activities such as fort-making, climbing trees, or playing games with friends; there is a family-scale experience of place that provides an historical and cultural context for experiences; and there is a

community-level sense of place, where broader cultural values and place relations take shape.”

Sense of place in place-based environmental education has gained attention in recent years (Kudryavtsev, Stedman, & Krasny, 2012). Sense of place is associated with children’s well-being (Jack, 2010), yet this relationship is not fully understood. From ages 8-11, children have a widening geographic range to explore their surroundings. During these formative years, children create the basis of their place attachment and self-identity (Spencer & Woolley, 2000). It is during this time that children form meaning through their engagement with a place (Lim & Barton, 2010). Spending time in natural environments can bolster existing place meanings or create new place meanings, but the aspects of the environment that can impact children’s place meanings are not well understood.

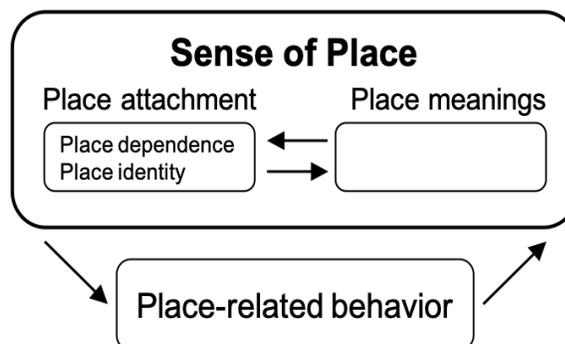


Figure 1.4. Concept diagram describing the relationships among the terms of sense of place (Masterson et al., 2017)

**Nature and children’s sense of place.** Use of parks is a significant predictor of place attachment for adults (Beery & Jönsson, 2017). Prior research has also evaluated how adults garner health benefits from interactions with coastal environments to which they feel attached (C. Kelly, 2018). Similar relationships may

hold true for children. Some studies have evaluated sense of place with respect to children's visits to parks. After visiting a park, students reflected on the meanings that developed through the activities performed at the site (Blizard & Schuster, 2007). Participating in an overnight wilderness camp significantly impacted sense of place as well as perceived stress among adolescents (Warber et al., 2015).

The research evaluating the relationship between green spaces and children's sense of place is largely within the environmental education domain. A 6-week urban environmental education program resulted in significant improvements to place meanings for adolescents (Kudryavtsev, 2013). Residential outdoor environmental education experiences in particular can be formative in children's lives (Liddicoat & Krasny, 2014). These experiences may be the first time children stay away from home without their parents, and have impacts that extend beyond traditional classroom objectives (Liddicoat & Krasny, 2014). Traditional evaluations of environmental education programs look at environmental knowledge (e.g. species identification, food webs) and behaviors (e.g. recycling, water conservation) as the primary outcomes (Stern, Powell, & Hill, 2014). Measures of improvements to environmental knowledge and behaviors leave out important influences on the development of social ties, mental health, and personal values and attitudes. There has been a shift in thinking among environmental educators that place meaning, social, and mental well-being are all significant side-effects of having interactions with natural environments (Kudryavtsev, Stedman, & Krasny, 2012; Maller & Townsend, 2006). Although these outcomes can be more difficult to quantify, their value is no less significant than evaluating environmental knowledge and behaviors.

**Gaps in nature and sense of place studies.** More studies need to incorporate place meaning outcomes into evaluation instead of only looking at place attachment (Stedman, 2008). Few studies have examined the relationships between natural environments and place meaning among children, particularly in coastal environments. Given the strong place meanings adults associate with coastal environments (C. Kelly, 2018), more research is needed to understand the associations between spending time in coastal environments and developing place meanings for children. Children's meaning of place has not been studied to the same extent as the meaning of the social environment (Jack, 2010). There is little evidence showing how attachment to place develops and the mechanisms explaining how some people develop a strong place attachment while others do not. It is difficult to measure place attachment in a way that can compare across geographies and cultures. Therefore, it is necessary to understand regional identities for establishing unique place meanings.

Sense of place research with children has primarily been conducted in familiar environments (e.g. Briggs et al., 2014; Lim & Barton, 2010). Unfamiliar environments may have a similar importance for children, particularly if they are part of a significant episode in a child's life. For example, Liddicoat and Krasny (2014) found that teens looking back on overnight environmental education programs still had strong memories of the experience 5 years later. More research is needed to establish the characteristics and extent of children's place meaning in new environments.

### **Federal commitment to getting children outdoors**

Based on the evidence presented above, it is important to understand the context of national efforts to connect children to outdoor environments as a potential

source for children's resilience. As parks are considered public health resources, it is important to evaluate their impact on children's emotional and social well-being. A commitment at the national level to connecting children with parks and greenspaces demonstrates public support for these programs (Kruger et al., 2009), yet few have been evaluated for their impacts on children's well-being. In the United States, each federal land management agency has an agenda incorporating funding for field trips or promoting park visitation by youth. The Department of the Interior, which oversees the management of the National Park Service, has set a goal to expand recreation in parks for American youth from 2018-2022, demonstrating a commitment to ongoing engagement with youth (U.S. Department of the Interior, 2018). Although these programs support youth involvement with natural spaces, the success of these programs and the extent to which visits to national parks or other federal lands impact children are not well understood (Montero, Roberts, Wilson, & Fonfa, 2018).

In the early stages of the environmental movement in the 1970s, the National Park Service formalized environmental education in the United States. One of their primary initiatives, the National Environmental Education Development (NEED) program, aimed to provide week-long residential programs for 5<sup>th</sup> and 6<sup>th</sup> grade students to visit parks near to their schools. The idea of the program was to provide experiences that would create meaningful connections to natural environments to promote ethical resource development and environmental behaviors among participants. The creators of the program wanted to convey "environmental quality as an essential to worthwhile life" (Evison, 1970, p. 18). The program was focused on

designing human-centered programs where people would find meaning in the experience (Evison, 1970).

The educational role of National Parks has broadened from the original definition to include supporting restoration and well-being among visitors (Myers & Park, 2013). The National Park Service adopted the Healthy Parks, Healthy People program in 2011, emphasizing a shift toward thinking about parks as a part of the public health domain (National Park Service, 2019). Parks were not only recognized for their traditional roles as places of historic and ecological significance, but also as a resource for visitors' well-being, both physical and mental. Parks around the country have initiated new programs to re-brand themselves with health outcomes. Physicians can actually prescribe a visit to the park as part of their patient's treatment plan (Razani et al., 2019; Razani et al., 2016). A nature camp located within a national seashore managed by the National Park Service will be used as the nature intervention in this study.

## **Objectives**

American children are facing challenges at multiple scales and are also disconnected from nature. Reconnecting children with nature may help mitigate the impact of these challenges through mental health, social health, and sense of place. Synthesizing literature about connections between natural environments and mental and social well-being showed a need for more robust intervention research designs. The literature regarding relationships between natural environments and sense of place revealed a need for more studies about place meaning in coastal environments and unfamiliar environments. To address these gaps, two related studies were conducted.

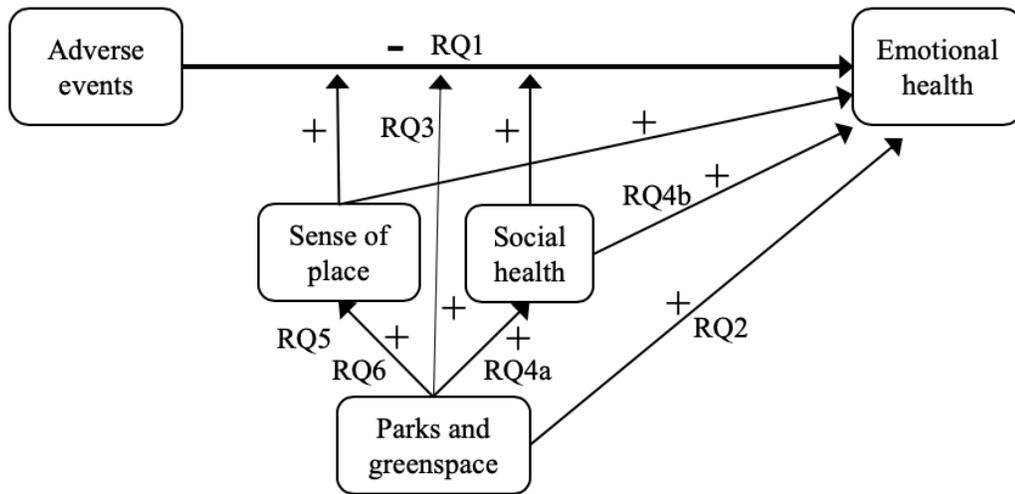
Study 1 uses quantitative methods to evaluate stressful life events, emotional health, and peer relationships. Study 2 uses qualitative methods to evaluate place meaning. A visual overview of how the research questions fit into the resilience framework is shown in Figure 1.5. The studies were designed to answer the following research questions:

Study 1:

1. Are stressful life events associated with emotional health (operationalized via positive and negative affect) at pretest?
2. Does a coastal nature camp have an impact on positive and negative affect?
3. Does the nature camp moderate the relationship between stressful life events and positive and negative affect?
4. a. Does a coastal nature camp have an impact on peer relationships?  
b. Are peer relationships and positive and negative affect associated?

Study 2:

5. Which aspects of a visit to a coastal park are meaningful to children?
6. What elements of place meaning do children associate?



*Figure 1.5.* Conceptual resilience framework for the present study including research questions. Relationships that will be evaluated in this study are labeled with the associated research question. The “+” symbol indicates a potential positive association. The “-“ sign indicates a potential negative association.

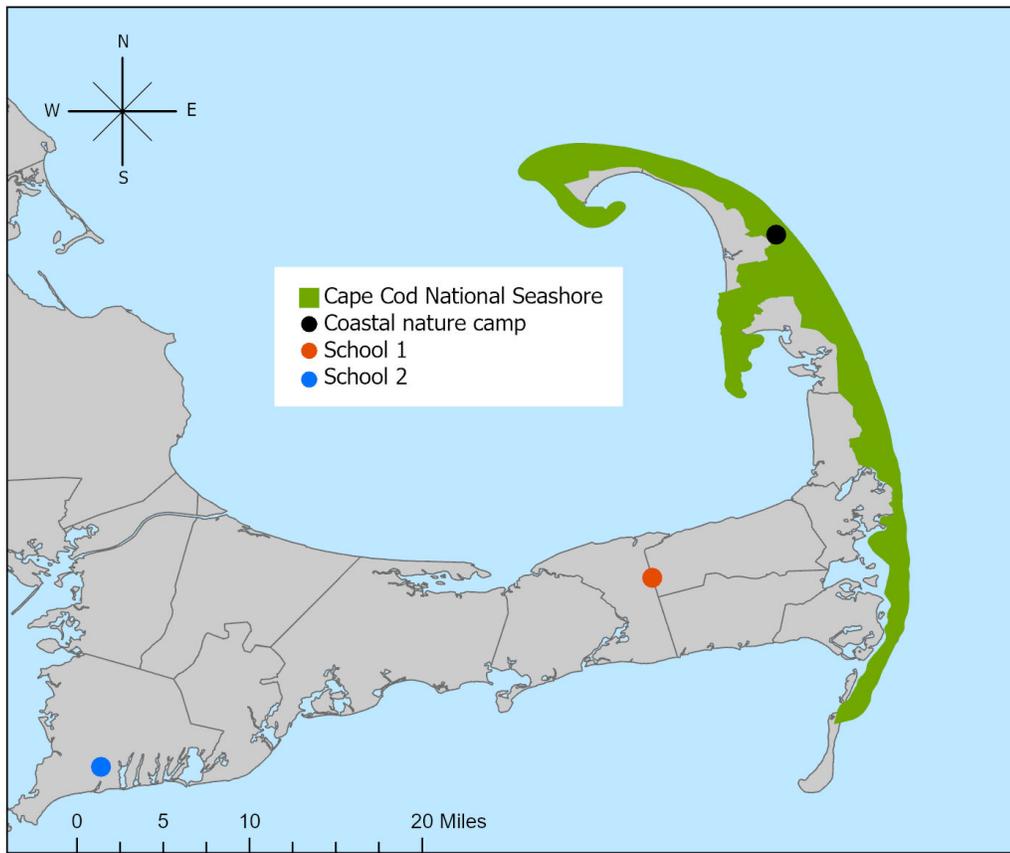
## CHAPTER 2

### **Method – Study 1**

#### **Setting**

This study will focus on the coastal peninsula Cape Cod, Massachusetts, an area well known for its beaches. Residents from Cape Cod have a strong place identity (Cuba & Hummon, 1993). The United States Census Bureau reports a population estimate of 213,444 persons (as of 2017) living in Barnstable, the suburban county that comprises the fifteen towns on Cape Cod. The area experiences a population three to four times higher during summer months due to tourism. Although a popular summer tourist destination, Cape Cod is faced with both cultural and ecological challenges. Changes in sea water temperature averages between 1961 to 1990 compared to 2000-2011 showed an increase of 1.7°F. In addition, development compounded with sea level rise threatens drinking water quality (Merrill et al., 2018). These issues are perhaps less noticeable than cultural challenges, including substance addiction. High opioid addiction rates have prompted some schools to implement programs to support students whose parents are struggling with addiction (Gotbaum, 2018).

At the tip of the peninsula lies Cape Cod National Seashore (Figure 2.1), a federally-managed park that limits development on 44,000 acres of land, including grasslands, heathland, deciduous forest, mixed pine forest, wetlands and ponds, and salt marsh. In addition to its natural resources, the area also has cultural significance with its fisheries and Native American history (National Park Service, 2018).



Anna Gannett  
 July 1, 2019  
 Source: MassGIS, National Park Service  
 Projection: NAD 1983

*Figure 2.1.* Map of Cape Cod, Massachusetts, the study setting, along with the locations of the coastal nature camp and the two schools involved with the study.

## Participants

Participants were recruited from public schools on Cape Cod. Three schools were approached, and two schools agreed to participate (“School 1” and “School 2”). Characteristics of the schools are summarized in Table 2.1. These schools were selected based on their ongoing participation in an overnight environmental education program located at Cape Cod National Seashore, herein referred to as the “coastal nature camp.” In 2014, the Massachusetts Department of Education transitioned from

measuring student economic disadvantage with eligibility for free or reduced lunch to measuring economic disadvantage based on participation in any of the following programs: the Supplemental Nutrition Assistance Program (SNAP); the Transitional Assistance for Families with Dependent Children (TAFDC); the Department of Children and Families' (DCF) foster care program; and MassHealth (Medicaid).

*Table 2.1.* Summary of school characteristics.

	<b>School 1</b>	<b>School 2</b>
Number of students	512	555
Grades taught at school	4 and 5	5 and 6
School Setting	Suburban	Suburban
Distance to coastal park program	31.8 mi	59.5 mi
Economically disadvantaged	41.6%	28.3%
Students with disabilities	23%	21.1%

At each school, four 5<sup>th</sup> grade classes were selected for participation in the study based on the fact that these classes were scheduled to participate in the coastal nature camp program between January and June. Demographic characteristics of participants for each school are described in Table 2.2. Study procedures were approved by the Cornell University Institutional Review Board prior to beginning the study. School 1 did not have a formal research application process, so approval was sought by contacting the district superintendent and the school principal. Approval was granted by School 2's district office as well as the school principal prior to beginning the study.

Table 2.2. Demographic profile of participants. Some percentages may not add up to 100% due to rounding and incomplete parent responses.

	School 1		School 2	
	Sample n=32 n(%)	School population (%)	Sample n=31 n(%)	School population (%)
<b>Gender</b>				
Male	17 (53)	(51)	16 (52)	(52)
Female	15 (47)	(49)	15(47)	(48)
<b>Ethnicity</b>				
Hispanic or Latino	3 (9)	(13.1)	1 (3)	(5.2)
American Indian	1 (3)	(2.9)	1 (3)	(2.5)
Black	2 (6)	(9.2)	0	(4.3)
White	21 (66)	(64.8)	22 (71)	(78.4)
Other/Undefined	3 (9)	(8.8)	6 (19)	(6.8)
<b>Poverty ratio</b>				
Above poverty line	21 (66)		20 (65)	
Chose not to answer	7 (22)		5 (16)	
Below poverty line	4 (13)		6 (19)	
<b>Length of residence</b>				
Less than one year	1 (3)		3 (10)	
1-2 years	1 (3)		0	
3-4 years	3 (9)		2 (6)	
5 or more years	26 (81)		23 (74)	
Do not live in town	1 (3)		2 (6)	
<b>Previous seashore visit</b>				
Yes	14 (44)		11 (35)	
No	17 (53)		19 (61)	
Not sure	1 (3)		0	
<b>Frequency of seashore visits in past year</b>				
None	24 (75)		22 (71)	
1 to 2	7 (22)		5 (16)	
3 to 4	1 (3)		0	
5 or more	0		3 (10)	
<b>Parent participated in nature program</b>				
Yes	12 (38)		12 (39)	
No	18 (56)		18 (58)	
Not sure	1 (3)		0	

**School 1.** Data were collected at School 1 from February through April. All students in the classes were invited to participate, regardless of learning disability or medical condition in order to yield a representative sample of the overall school population. The response rate for School 1 was 37.5%, with 88 parents contacted and

33 parents who responded. Response rates for the individual classes ranged from 33% to 46% (see Table 2.3). All parents who responded agreed to have their child participate. One student was excluded from analysis because although they had parent permission, the student did not partake in any of the study procedures. Three students did not participate in the quantitative portion of the study (Study 1). Therefore, a total of 29 students participated at School 1. As shown in Table 2.2, our study population shows a similar racial and gender profile to the overall school population.

**School 2.** Data were collected at School 2 in April. All students in the classes were invited to participate, regardless of learning disability or medical condition in order to be representative of the overall school population. A total of 93 parents were contacted and 36 parents responded yielding an overall response rate of 38.7%. Response rates for the participating classes ranged from 21% to 52% (see Table 2.3). Four of the parents who responded did not agree to have their child participate. One student at School 2 was excluded from analysis because although they had parent permission, the student did not partake in any of the study procedures. Therefore, a total of 31 students were included in analysis for School 2. Our study population shows a similar racial and gender profile to the overall school population, but black students are underrepresented in our sample (Table 2.2).

*Table 2.3. Calendar overview of study procedure at School 1 and School 2.*

School	Class	Parent response rate	Length of nature camp (days)	Pretest (Time 1) in classroom	Nature camp (intervention) or Classroom (control)	Posttest (Time 2)
1	1	33%	5	None	Camp	Feb 1
	2	46%	5	Feb 9	Camp	Feb 15
	3	38%	5	Feb 9	Camp	Mar 15
	4	36%	3	Feb 15	Camp	Apr 5
2	5	26%	3	Apr 5	Camp	Apr 10
	6	35%	3	Apr 5	Camp	Apr 12
	7	52%	-	Apr 5	Classroom	Apr 12
	8	21%	-	Apr 5	Classroom	Apr 12

### **Intervention**

All fifth-grade classes at School 1 and School 2 take a three or five day trip to Cape Cod National Seashore during the school year to participate in an environmental education program. The program is highly structured with a set schedule for each day, similar to a school day. The classroom teachers are present during the program, but instruction is guided by four naturalists who lead all lessons. A historic building within the park serves as the home base for the nature camp program. Students sleep, eat, and complete daily reflections at the historic building. The historic building is located 300 meters from the beach. Three meals are served each day. Students stay in group bunk rooms with other students of the same gender. Although students spend most of the time near the building, they also take day trips to other locations within the national seashore to learn about the natural and cultural history of the area. The lesson locations vary depending on weather and duration of the stay (3 or 5 days), but some examples of locations include: marsh, open beach, swamp, bog, scrub pine forest, and a historic monument. The curriculum of the program aligns with state standardized

testing requirements for learning about historic events, local ecosystems, and scientific concepts. Throughout the program, students are exposed to hands-on lessons within an ecosystem similar to that found in their hometowns. Students complete journals each day at the nature camp to reflect on the experience. As a policy, no digital or screen technologies are allowed for the duration of the program. For this study, the coastal nature camp served as the intervention environment while the classroom within the school served as the control environment. The two schools included in this study have been participating in the nature camp program for the past 50 years.

### **Procedure**

Quantitative methods were used to evaluate peer relationships, stressful life events, and positive and negative affect among fifth-grade students.

First, the parent demographic survey was distributed along with the parent consent and permission form 5-7 days prior to collecting data from students in each class. Paper letters and emails containing an electronic link to the survey were distributed to parents in all four classes. A reminder email containing the same link was sent to parents by email two days prior to collecting data from students.

All student surveys were administered on paper forms distributed by the teacher. Assent was sought for individual students at each survey testing period. The pretest included the following measures (in sequential order): stressful life events, positive and negative affect, and peer relationships. The posttest included the following measures: positive and negative affect, and peer relationships. A full summary for each class is shown in Table 2.3.

**Research Design at School 1.** At School 1, a pre-post study design was used for three classes (Class 2, 3, and 4). These classes took the pretest after a week in the classroom and the posttest after the trip to the nature camp. To strengthen the internal validity of the study, one class (Class 1) had a posttest only. The posttest only class took the posttest after the trip to the nature camp. The final research design for School 1 is shown in Table 2.4. The timing between pretest and posttest varied among classes<sup>1</sup>. Although students at School 1 typically attend the nature program for 5 days, due to instructor illness, Class 4 only attended the program for 3 days.

*Table 2.4.* Research design at School 1. O represents a testing period while X represents the intervention.

	<b>Pretest (Time 1)</b>		<b>Posttest (Time 2)</b>
Class 1		X	O
Class 2	O	X	O
Class 3	O	X	O
Class 4	O	X	O

**Research design at School 2.** Due to the low response rates at School 1, the research design was altered for School 2 to increase the statistical power of the study. At School 2, a pre-post with a control group study design was used. The control classes took the pretest and the posttest after a week in the classroom. The intervention

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<sup>1</sup> The original research design for student participants at School 1 was a Solomon-four group design. This research design has strong statistical power controlling for the effects of testing and maturation (Braver & Braver, 1988; Solomon, 1949). The original design would have had a posttest only intervention group, a pre-post intervention group, a pre-post control group, and a posttest only control group. However, due to teacher error, students who were originally the pre-post control group (Class 3) were not given the posttest in the classroom. Therefore, the study design was altered so that this group took a posttest after the coastal nature camp. Due to the small sample size, the original posttest only control group (Class 4) was given a test in the classroom and then given a posttest after the nature camp.

classes took the pretest after a week in the classroom and the posttest after the trip to the nature camp, as illustrated in Table 2.5.

*Table 2.5.* Research design at School 2. O represents a testing period while X represents the intervention.

	<b>Pretest (Time 1)</b>		<b>Posttest (Time 2)</b>
Class 5	O	X	O
Class 6	O	X	O
Class 7	O		O
Class 8	O		O

In all four classes, teachers administered the pretest on the same Friday in April in the classroom (Table 2.3). The next week, Class 7 and Class 8 remained in the classroom (control group) and took the post-test the following Friday. Class 5 and Class 6 were the intervention (treatment) group. Class 5 visited the nature camp from Monday to Wednesday of the following week and took the posttest on Wednesday at the park. Class 6 visited the nature camp from Wednesday to Friday of the following week and took the post-test on Friday at the park.

### **Constructs and measures**

Measures focused on demographic data and four variables: stressful life events, positive affect, negative affect, and peer relationships.

**Demographic Data.** The parent demographic survey was created using Qualtrics survey software of the Qualtrics Research Suite (Copyright © 2019 Qualtrics). The demographic survey covered gender, race, and time spent living in the town where the school was located. To calculate poverty, the demographic survey also asked questions about income and household occupants. This measure, used by the

U.S. Census Bureau to calculate poverty, takes into account the number of adults and children supported by the total household income (US Census Bureau, 2018). Parents were asked about the frequency of their child's visits to Cape Cod National Seashore because previous visit may impact the child's experience. There was an item asking if the parent had previously participated in the nature camp program themselves.

The full parent demographic survey is in Appendix C. As compensation for participation, at School 1, all parents who completed permission forms and surveys were entered into a drawing for an Amazon gift card. Due to school district regulations, no parents received compensation for their participation at School 2.

**Nature Exposure.** Exposure to the natural environment was operationalized as the nature camp (as described above). We recognize that a nature camp is multifaceted and involves more than mere exposure to a natural environment, but limitations with the study design prevented isolating the single variable of the environment.

**Stressful Life Events.** The stressful life events measure differed for School 1 and School 2.

**School 1.** Children's stressful life events were operationalized using the Lewis Stressful Life Events Measure. Construct validity was established using interviews and small group sessions with 5<sup>th</sup> and 6<sup>th</sup> grade students (Lewis, Siegel, & Lewis, 1984). The measure has been tested for reliability with diverse groups of 5<sup>th</sup> and 6<sup>th</sup> grade students (Lewis et al., 1984). The Lewis measure has been used in other studies using an interview format (McGee & Stanton, 1992; Wells & Evans, 2003) and in paper format (Corraliza et al., 2012) to evaluate frequency of stressful life events. Lewis, Siegel, & Lewis (1984) advised that this measure is not a scale and each item

stands on its own because frequent exposure to one item may produce the same amount of stress as exposure to multiple items.

For each item, students could select one of three response options: “A lot,” “Sometimes,” or “Never.” The 20 items inquire whether stressful events have occurred in the past three months. All student participants were administered this measure once. For analysis, the total score for each participant was calculated by taking a sum of items. In addition, the parent survey included 6 of the same items for additional validation of student responses. For each item, parents were given options of “A lot,” “Sometimes” or “Never” and asked about the prior three months. Table 2.6 has the full list of items, including the parent-only items.

*Table 2.6.* Stressful life events measure items for the prior three months. The + symbol indicates that the item was on the parent survey. The \* symbol indicates that the item was administered at School 2.

1. Have you changed schools? * +
2. How often were you not able to wear the clothes you wanted to? *
3. How often have you been bored, with nothing to do? *
4. How often were you sick? * +
5. How often was your homework for school late? *
6. How often did you fight or argue with your parents about house rules? (like bedtime or TV watching) *+
7. How often did you not spend enough time with your mom or dad?
8. How often did you feel left out of the group?
9. How often did someone make you try something new like a cigarette that you really didn't want to?
10. How often have you not felt good enough at sports?
11. How often did your parents make you get good grades?
12. How often did you not have enough money?
13. Did your parents separate? (separate means one of your parents moved away) +
14. How often have your parents argued in front of you?
15. How often did you feel overweight, bigger than other kids your age?
16. How often did you feel smaller than other kids your age?
17. How often have you felt like your body is changing?

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18. How often have you been punished or gotten in trouble at school? +

---

19. How often were you were picked on or made fun of by other kids?

---

20. Have you moved houses? +

---

**School 2.** Due to school administration and teacher concerns about the sensitive nature of some of the items, a trimmed version of the stressful life events measure was used at School 2. Because items in this measure are not measuring a single construct, then one would not expect the participant responses to remain consistent throughout. Therefore, other studies have used a reduced version of the scale (Corraliza et al., 2012). To prepare the data for analysis, the total score for each participant was calculated by taking the sum of all items. The items on the reduced measure are listed in *Table 2.6*. The full version of the student survey is in Appendix A.

**Emotional health.** Emotional health was measured using the Positive and Negative Affect Scale for Children (PANAS-C) short form. The full PANAS-C scale has 27 items and has been tested using children in refugee camps, children diagnosed with anxiety, and school children in grades 4-8. It was originally adapted from the adult version of the scale (Laurent et al., 1999). Good convergent and discriminant validity were established with the original scale. To establish validity, responses were compared between a general school population and a population of inpatient children diagnosed with anxiety or depression. The short form was developed using item response theory, a method of scale development that accounts for each item's distribution among a sample population (Hambleton, Swaminathan, & Rogers, 1991). The 10-item short form has been shown to have similar reliability to the full version in

diagnostic tests. The short form has good reliability with the positive affect (Cronbach alpha=0.86) and negative affect (Cronbach alpha=0.85) (Ebesutani et al., 2012). The 10-item Likert scale consists of 5 positive affect items (joyful, cheerful, happy, lively, proud) and 5 negative affect items (miserable, mad, afraid, scared, sad). The five response options range from “Very slightly or not at all” up to “Extremely.” Other studies measuring greenspace impacts on children’s mental health rely on Goodman’s Strengths and Difficulties Questionnaire (SDQ), a 25-item parent-reported or teacher-reported measure with 5 subscales: emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial behavior (Feng & Astell-Burt, 2017). Because this study was designed to test the effects of a short-term intervention, it was determined that the SDQ was not appropriate.

Classes at School 1 and School 2 both took the PANAS-C short form scale. Classes 1, 2, and 3 were asked about the past 5 days. Classes 4, 5, 6, 7, and 8 were asked about the past 3 days to reflect differences in time of the intervention. The full version of this scale is presented in Appendix A. For each participant, a positive affect score was compiled from a sum of the items. A negative affect score was compiled from a sum of the negative items. Any responses with missing items were not used in analysis.

### **Social health.**

*School 1.* Social health was measured using the PROMIS peer relationships scale 8-item short form (PR-SF). The scale has been established as a valid way to measure social health among children ages 8-17 years. The original scale was developed using item response theory. Items were selected from the longer 15-item

full PROMIS peer relationships scale to maximize the representation of social health facets for the 8-item short form (DeWalt et al., 2013). This scale established construct validity with cognitive interviews, focus groups, expert advice, and peer-reported outcomes. Further construct validity was established with peer-reported outcomes of peer acceptance and social reputation (Devine et al., 2018). The PR-SF scale has been split into two factors, “friendship quality” and “peer acceptance.” When establishing construct validity, self-reported social functioning on the PR-SF accounted for between 8% and 19% of the variance in peer-reported social reputation while self-reported friendship quality accounted for 1% to 7% of the variance in peer-reported social reputation. Reliability was marginal for the “friendship quality” factor (Cronbach alpha= 0.66) and good for the “peer acceptance factor” (Cronbach alpha= 0.85) (Devine et al., 2018).

Students were asked about the past 5 days or the past 3 days, depending on the time period in the nature camp or the classroom (i.e., 5 days for classes 1, 2, and 3 and 3 days for class 4). For each item, students were given five response options ranging from “Never” to “Almost always.” The list of items is shown in *Table 2.7*.

PROMIS instruments are scored using item-level calibrations. This means that the most accurate way to score a PROMIS instrument is to use the HealthMeasures Scoring Service per recommendation by the National Institutes of Health. This service reports each student score as a T-score. The T-score rescales the raw score into a standardized score with a mean of 50 and a standard deviation of 10. By using this service, it is possible to calculate scores even when values are missing (PROMIS, 2018). See Appendix A for the full scale.

**School 2.** Due to school administration concern about the sensitivity of some items on the peer relationships scale, a reduced version of the peer relationships scale with 4 items was used for School 2. At School 2, the students were asked about the prior 3 days to match the length of the intervention. As the PROMIS HealthMeasures system maintains an item bank for peer relationship items, then it is possible to accurately score the reduced scale. The HealthMeasures Scoring Service was also used to calculate T-scores for each participant. The reduced scale has not been evaluated for validity. *Table 2.7* shows the PR-SF items that were included for School 2.

*Table 2.7.* PROMIS peer relationships scale short form items. The \* symbol indicates that the item was administered at School 2.

1. I was able to count on my friends *
2. I was able to talk about everything with my friends *
3. My friends and I helped each other out *
4. Other kids wanted to talk with me *
5. I felt accepted by other kids my age
6. I was good at making friends
7. Other kids wanted to be my friend
8. Other kids wanted to be with me

### **Analytic Strategy**

Analyses were conducted using Microsoft Excel and R Statistical software (R Core team, 2019), and were visualized using the R software ggplot package (Wickham, 2016). Several between-school and within-school inconsistencies exist in this study. Because these factors have implications for the analytic strategy, they are summarized here:

Between Schools:

- At School 1, the stressful life events measure had the full 20 items. At School 2, the stressful life events measure had 6 items.
- At School 1, the peer relationships measure had 8 items. At School 2, the peer relationships measure had 4 items.
- Classes at School 1 visit the coastal nature camp for 5 days while classes at School 2 visit the park for 3 days.

Within Schools:

- School 1: Time periods between pretest and posttest varied for each classroom (see Table 2.3).

School 1: Class 4 visited the coastal nature camp for 3 days. Classes 1, 2, and 3 visited the coastal nature camp for 5 days.

Due to the variation in timing between pretest and posttest for all classes at School 1, different analytic strategies were used for each school. At School 1, comparisons were made within each class to be conservative. Because all the classes at School 2 completed the testing periods over the same week, it was possible to make comparisons between classes that went to the coastal nature camp (Intervention) and those who were in the classroom (Control).

Analyses to address the core research questions (RQ) were conducted separately for School 1 and for School 2. Below is the analytic strategy for School 1 and School 2 in turn, with respect to each of the four research questions:

1. Are stressful life events associated with emotional health (operationalized via positive and negative affect) at pretest?
2. Does a coastal nature camp have an impact on positive and negative affect?
3. Does the nature camp moderate the relationship between stressful life events and positive and negative affect?

4. a. Does a coastal nature camp have an impact on peer relationships?
- b. Are positive and negative affect associated with peer relationships?

**RQ1: Are stressful life events associated with emotional health  
(operationalized via positive and negative affect) at pretest?**

*School 1.* Before analyzing data to address RQ1, the correlation between parents' and students' reports of stressful life events was examined in order to determine the validity of just using student responses for all further analysis. Prior research with this age group has found that children's reports of life events are valid (Theunissen et al., 1998).

Spearman's rank-order correlation test was used to determine the association between student-reported stressful life events and positive and negative affect at School 1 at time of pretest.

*School 2.* Prior to addressing associations between stressful life events and positive and negative affect, a t-test was used to determine any differences in students' frequency of stressful life events between School 1 and School 2 on all items that these schools had in common.

Additionally, to establish that the reduced stressful life event items (administered at School 2) were representative of the full set of items, Spearman's rank-order correlation test was used to evaluate the association between the reduced stressful life event score and full score for students at School 1.

Spearman's rank-order correlation test was used to determine the association between student-reported stressful life events and positive and negative affect at School 2 at time of pretest.

**RQ2: Does a coastal nature camp have an impact on positive and negative affect?**

We initially compared the six intervention classes (Classes 1, 2, 3, 4, 5, and 6) from School 1 and School 2 from pretest to posttest. Paired t-tests were used to evaluate the main effect of the nature camp experience on positive and negative affect. Mean values were compared using t-tests for positive and negative affect at pretest and posttest.

*School 1.* Due to small sample size and inconsistencies among classes, conservative statistics were used to evaluate the School 1 data. A series of paired Wilcoxon signed rank-sum tests were used to compare pretest to posttest within each class for the variables of positive and negative affect. A series of unpaired comparison tests were then used to determine any differences between classes at the time of pretest and posttest. Unpaired Wilcoxon rank-sum tests were used to compare pre-test scores for positive and negative affect between each class. Unpaired Wilcoxon rank-sum tests were also used to compare post-test scores for positive and negative affect between each class. Because Class 4 was only tested after visiting the seashore, their responses can help in determining the potential effects of the test itself on peer relationship scores.

*School 2.* Because of the consistent timing between tests at School 2, it was possible to conduct a more robust statistical analysis. We ran two linear mixed models,

one for positive affect and another for negative affect. One model determined the fixed effects of time, treatment, and the interaction between time and treatment on positive affect. The other model determined the fixed effects of time, treatment, and the interaction between time and treatment on negative affect. Individual students were treated as random effects within each linear mixed model. The package lme4 was used to create the models for positive and negative affect (Bates, Maechler, Bolker, & Walker, 2015).

Post-hoc comparison was conducted using the package emmeans (Lenth, 2019). This package uses the linear mixed models to calculate mean values for the control group and the intervention group at the pretest and the posttest. Mean values were compared using t-tests for the independent variables of time and treatment on the dependent variables positive and negative affect. The resulting p-values are automatically corrected according to Tukey's comparison adjustment.

**RQ3: Does the nature camp moderate the relationship between stressful life events and positive and negative affect?**

*School 1.* Due to the small sample size at School 1, it was not possible to evaluate the interaction between stressful life events and the nature camp using a multivariate analysis model. Therefore, we are examining whether there is a trend toward an SLE x nature interaction effect by comparing the rate of change (i.e., from pretest to posttest) in positive and negative affect for those with a high frequency of stressful life events to the rate of change for those with a low frequency of stressful life events. Each participant in Class 2, 3, and 4 was classified as "High SLE" if their score was greater than or equal to the median score of stressful life events for

participants at School 1 or “Low SLE” if their score was below the median score of stressful life events for participants at School 1. The mean values of positive and negative affect at pretest and posttest were used to look at whether the nature camp had more of an impact on positive and negative affect for those with high SLE compared those with low SLE. Variation in rate of change may indicate that the independent variables of stressful life events and the nature camp intervention interact to predict positive and negative affect.

*School 2.* As with School 1, due to the small sample size at School 2, it was not possible to evaluate the interaction between stressful life events and the nature camp using a multivariate analysis model. Therefore, the same strategy was used as School 1 to examine whether there is a trend toward an SLE x nature interaction effect at School 2. Because there were fewer items on the stressful life events measure at School 2 compared to School 1, then the median SLE score at School 2 was used for categorizing as “High SLE” or “Low SLE.” Each participant in Class 5 and 6 (the intervention group) was classified as “High SLE” if their score was greater than or equal to the median score of stressful life events for participants at School 2 or “Low SLE” if their score was less than the median score of stressful life events for participants at School 2. Changes in positive and negative affect from pretest to posttest were calculated for each group to determine if there was an interaction.

**RQ4: a. Does a coastal nature camp have an impact on peer relationships?**

**b. Are peer relationships and positive and negative affect associated?**

*School 1.* First, we evaluated the peer relationship scores for each class. Paired Wilcoxon signed rank-sum tests were used to compare pre-test to post-test within each

class for peer relationships. A series of unpaired Wilcoxon rank-sum tests were used to compare pre-test scores for peer relationships between each class. Unpaired Wilcoxon rank-sum tests were used to compare post-test scores for peer relationships between each class. Because Class 4 was only tested after visiting the seashore, their responses to determine the potential effects of the test itself on peer relationship scores.

Then, to address RQ4b, we evaluated the association between peer relationships and positive and negative affect. Spearman's rank-order correlation test was used to test the association between peer relationships and positive affect and to test the association between peer relationships and negative affect.

*School 2.* We ran one linear mixed model for peer relationships to determine the fixed effects of time, treatment, and the interaction between time and treatment on peer relationships. Individual students were treated as random effects within the linear mixed model. The package lme4 was used to create the model for peer relationships (Bates, Maechler, Bolker, & Walker, 2015).

Post-hoc comparison was conducted using the package emmeans (Lenth, 2019). This package uses the linear mixed model to calculate mean values for the control group and the intervention group at the pretest and the posttest. Mean values were compared using t-tests for time and treatment on peer relationships. The resulting p-values are automatically corrected according to Tukey's comparison adjustment.

Then, we evaluated the association between peer relationships and positive and negative affect. Spearman's rank-order correlation test was used to test the association

between peer relationships and positive affect. Spearman's rank-order correlation test was used to test the association between peer relationships and negative affect.

## CHAPTER 3

### Results – Study 1

This chapter presents the results of Study 1. To begin, descriptive statistics for stressful life events at School 1 and School 2 participants are provided. Then, a comparison of the stressful life events measure for students and parents is provided. Finally, the findings for the Study 1 research questions, RQ1 – RQ4, are presented.

#### **Descriptive Statistics**

The overall mean score for School 1 on the twenty-item stressful life events measure was 33.89 ( $SD=4.72$ ). The overall mean score for School 2 on the six-item stressful life events measure was 9.30 ( $SD=1.11$ ). At School 1, participants had a mean score of 1.69 per item across twenty items while at School 2, participants had a mean score of 1.55 per item across six items, where 1 is equivalent to an event happening “Never” and 3 is equivalent to an event happening “A lot”. The most common responses to the stressful life events inventory are summarized in Table 3.1. At both schools, “Feeling bored” was the most common stressful life event reported by participants.

*Table 3.1.* Five most common stressful life events experienced by participants at School 1 and School 2.

<b>School 1</b>	<b>Participants who experienced n=23 n (%)</b>	<b>School 2</b>	<b>Participants who experienced n=23 n (%)</b>
3. Feeling bored	19 (83)	3. Feeling bored	21 (91)
8. Feeling left out of the group	18 (78)	4. Getting sick	17 (74)
7. Not spending enough time with parents	17 (74)	6. Fighting with parents about house rules	14 (61)
11. Parents requiring them to get good grades	17 (74)	2. Not able to wear the clothes they wanted	11 (48)
10. Not feeling good enough at sports	17 (74)	5. Homework for school late	7 (30)

### **Establishing agreement between parents and students**

To validate child-reported responses for stressful life events, items answered by parents (proxy) and students for frequency of stressful life events (SLE) were compared. After finding that student and parent responses had high agreement for most items (Table 3.2), then the student responses were used for all further analysis. At School 1, six items were answered by parents and students. At School 2, four items were answered by parents and students. There was moderate to strong agreement for each item (Table 3.2).

Spearman's rank-order correlation test was used to test the association between the reduced stressful life event score and full score for students at School 1. A significant correlation was found between the scores on the reduced and the full SLE measure,  $r(20)=0.598, p=.0026$ .

Table 3.2. Percent agreement between parent and student responses from frequency of stressful life events at School 1 and School 2 for six items that were on both scales

Item	Agreement at School 1 n=23	Agreement at School 2 n=23
1. How often has your child changed schools?	82.6	82.6
4. How often was your child sick?	73.9	73.9
6. How often did your child fight with you about house rules (such as bedtime or watching TV)?	47.8	47.8
13. Did you separate from your partner?	60.1	-
18. How often was your child in trouble at school?	60.1	-
20. How often has your child moved houses?	82.6	-
<b>Overall</b>	68.0	68.1

**RQ1: Are stressful life events associated with emotional health (operationalized via positive and negative affect) at pretest?**

At pretest, participants at School 1 ( $M= 10.34$ ,  $SD=1.50$ ) had significantly higher frequency of stressful life events than participants at School 2 ( $M=9.30$ ,  $SD=1.11$ ),  $t(40.5)=2.69$ ,  $p=.010$  for the six items that were answered by students at both schools. This difference limits the ability to compare results between School 1 and School 2. Therefore, results for stressful life events at each school will be considered independently.

**School 1.** Spearman’s rank-order correlation test was used to test the association between student-reported SLE and positive and negative affect at pretest. There was no significant correlation between frequency of SLE and positive affect,  $r(14)=-0.213$ ,  $p=.427$ . However, there was a significant positive correlation between frequency of stressful life events and negative affect,  $r(14)=0.525$ ,  $p=.037$ . As frequency of stressful life events increased, so did negative affect (Figure 3.1).

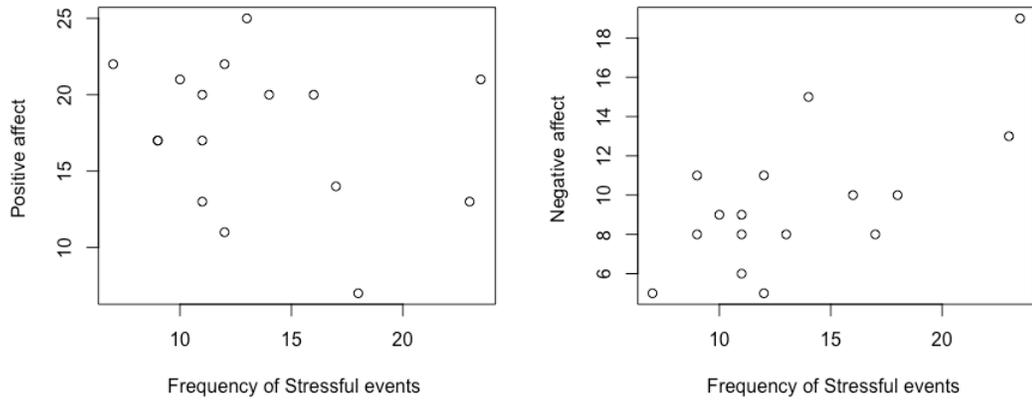


Figure 3.1. Correlations between frequency of stressful life events and positive and negative affect at School 1.

**School 2<sup>2</sup>.** There was no significant correlation between frequency of stressful life events and positive affect at School 2,  $r(20)=0.121, p=.591$ . There was a significant positive correlation between frequency of stressful life events and negative affect,  $r(21)= 0.474, p=.023$ . As frequency of stressful life events increased, so did negative affect (Figure 3.2).

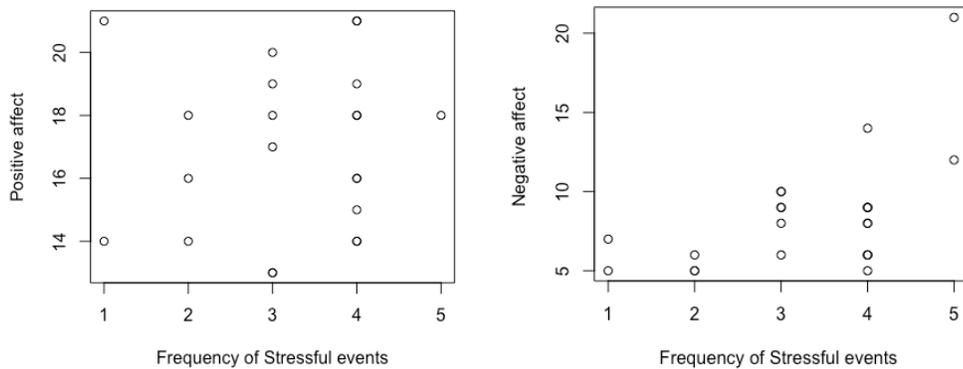


Figure 3.2. Correlations between frequency of stressful life events and positive and negative affect at School 2.

<sup>2</sup> A t-test revealed that there was no significant difference between the parent overall score and the student overall score,  $t(22)=1.18, p=.252$ . Therefore, only the student overall score was used in analysis.

**Summary.** At both schools, frequency of stressful life events was associated with negative affect, but not with positive affect.

**RQ2: Does a coastal nature camp have an impact on positive and negative affect?**

We examined overall changes to positive and negative affect for all participants at both schools who went to the nature camp (Intervention group). Positive affect significantly increased from pretest to posttest for intervention classes,  $t(35)=-4.34, p=.00011$ . Negative affect significantly decreased from pretest to posttest for intervention classes,  $t(35)=3.94, p=.00035$ .

**School 1.** Within each class, Wilcoxon Rank-sum tests revealed no significant changes to positive and negative affect from pretest to posttest (at the 0.05 level of significance) (Figure 3.3).

Class 2 ( $Mdn=22.0, IQR=1.25$ ) had significantly higher positive affect than Class 3 ( $Mdn=15.5, IQR=3.75$ ),  $p=.023$ , and Class 4 ( $Mdn=18.5, IQR=6.0$ ),  $p=.0397$ , at pretest. Because Class 1 only took the posttest and did not differ from any of the other classes at posttest (at a 0.05 level of significance), this suggests that there may not have been an effect of the test itself on student responses, thus increasing the internal validity of the results.

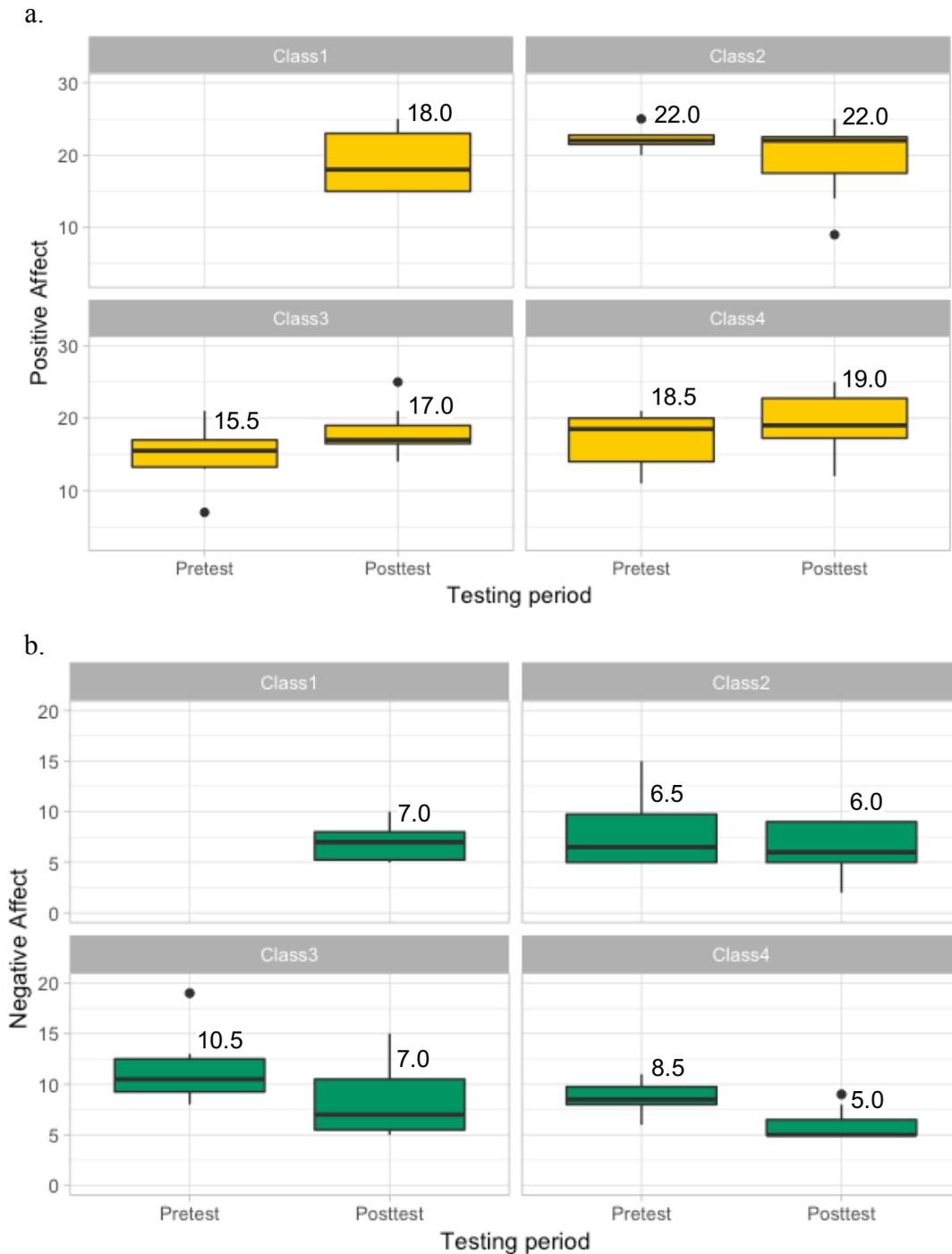


Figure 3.3. Comparison from pretest to posttest for each individual class for positive affect (a) and negative affect (b) at School 1. There were no significant differences within classes from pretest to posttest for positive or negative affect. Median values are displayed above each box. Outliers are shown with dots and represent points that are greater than 1.5 times the interquartile range above quartile 4 or below quartile 1.

**School 2.** Results from the linear mixed model indicate that none of the independent variables (time, treatment, and interaction effects between time and treatment) had a significant effect (at a 0.05 level of significance) on positive affect. The linear mixed model used to examine time, treatment, and interaction between time and treatment effects on negative affect also revealed no significant independent variables (Table 3.3).

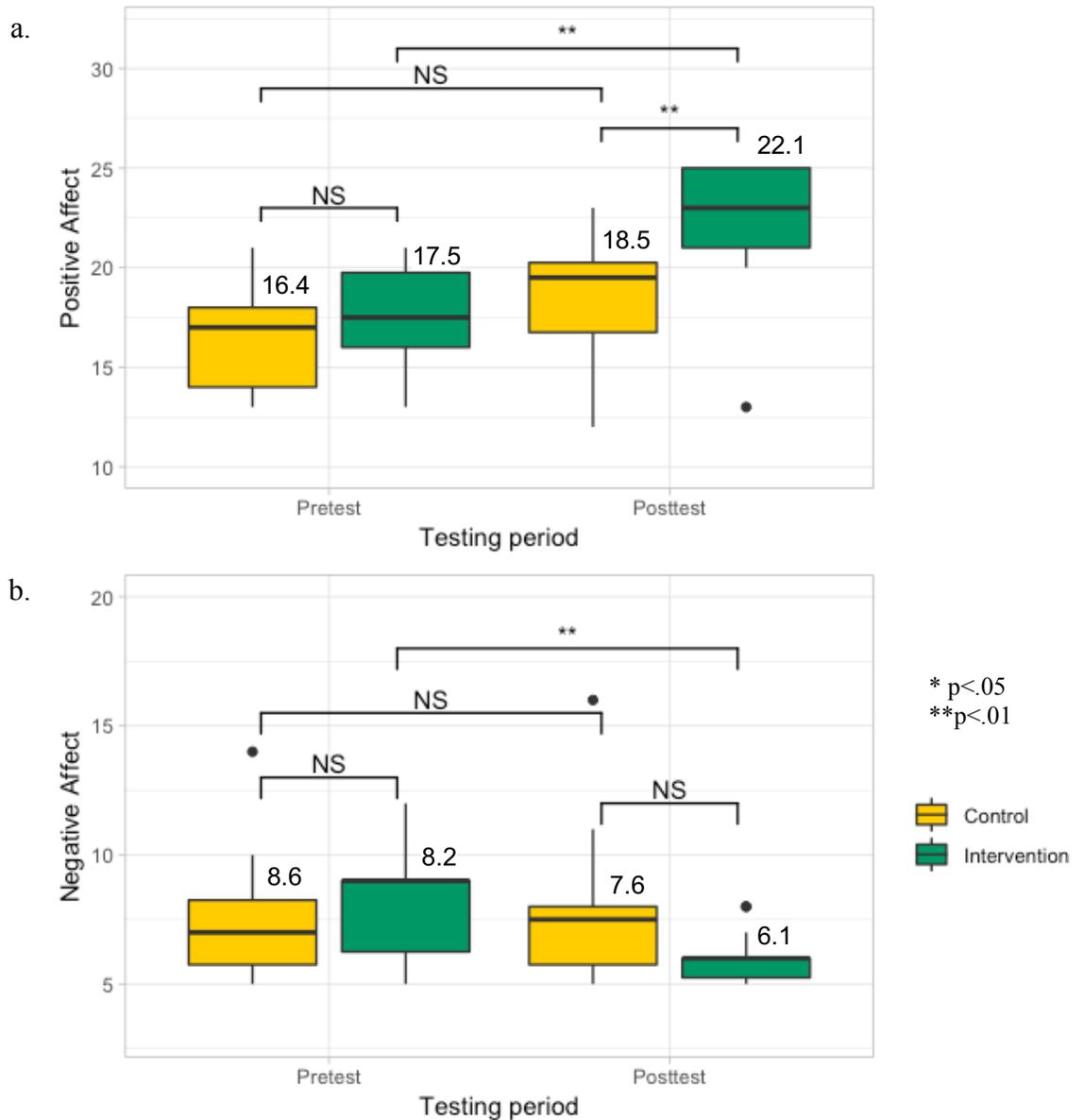
*Table 3.3.* Linear mixed model for the effects of time, treatment, and the interaction between time and treatment on positive affect, negative affect, and peer relationships at School 2

		<b>Estimate</b>	<b>SE</b>	<b>df</b>	<b>T value</b>	<b>p value</b>
<b>Positive affect</b>	(Intercept)	16.39	0.84	46.88	19.46	
	Time	2.07	1.04	18.12	1.99	0.0622
	Treatment	1.07	1.25	46.86	0.86	0.3942
	Time x Treatment	2.62	1.55	18.19	1.69	0.1077
<b>Negative affect</b>	Intercept		0.76	44.84	11.34	
	Time	-1.03	0.70	24.67	-1.47	0.15
	Treatment	-0.37	1.15	45.50	-0.33	0.75
	Time x Treatment	-1.14	1.04	24.4	-1.10	0.28
<b>Peer relationships</b>		44.03	1.78	39.26	24.74	
	Time	1.54	1.34	19.00	1.15	0.266
	Treatment	3.05	2.68	40.18	1.14	0.262
	Time x Treatment	2.73	2.08	19.64	1.31	0.205

In post-hoc comparison using emmeans for positive affect, at pretest, the intervention group and the control group were not significantly different,  $t(46.9)=-0.860, p=.394$ , indicating that the groups had similar levels of positive affect at baseline. At posttest, positive affect for the intervention group ( $M= 22.1, SE=0.811$ )

was significantly higher than the control group ( $M=18.5$ ,  $SE=0.731$ ),  $t(45.8)=3.38$ ,  $p=.0015$ . Comparing the changes within each group, there was no significant difference from pretest ( $M=16.4$ ,  $SE=0.842$ ) to posttest ( $M=18.5$ ,  $SE=0.731$ ) for the control group,  $t(18.1)=1.987$ ,  $p=.062$ . There was a significant increase in positive affect for the intervention group from pretest ( $M=17.5$ ,  $SE=0.922$ ) to posttest ( $M=22.1$ ,  $SE=0.811$ ),  $t(18.2)=4.09$ ,  $p<.001$  (Figure 3.4a).

In post-hoc comparison using emmeans for negative affect, at pretest, the control ( $M=8.6$ ,  $SE=0.760$ ) and intervention ( $M=8.2$ ,  $SE=0.857$ ) groups did not differ,  $t(45.5)=0.326$ ,  $p=.746$ , indicating a similar baseline level of negative affect for both groups. At posttest, the control ( $M=7.6$ ,  $SE=0.709$ ) and intervention ( $M=6.1$ ) group also did not differ,  $t(39.9)=1.451$ ,  $p=.155$ . Within each group, the control group did not change significantly from pretest ( $M=8.62$ ,  $SE=0.760$ ) to posttest ( $M=7.59$ ,  $SE=0.709$ ),  $t(24.7)=-1.47$ ,  $p=.154$ , but the intervention group significantly decreased negative affect scores from pretest ( $M=8.24$ ,  $SE=0.857$ ) to posttest ( $M=6.07$ ,  $SE=0.767$ ),  $t(24.2)=2.81$ ,  $p=.0096$  (Figure 3.4b).



*Figure 3.4.* Comparison from pretest to posttest for positive affect (a) and negative affect (b) between the control group (classroom) and intervention group (nature camp) at School 2. Mean values are displayed above each box. Outliers are shown with dots and represent points that are greater than 1.5 times the interquartile range above quartile 4 or below quartile 1.

**Summary.** Analyses to address RQ2 reveal that there were no significant changes for any classes at School 1. At School 2, positive affect significantly increased

for the intervention group but not for the control group. At School 2, negative affect significantly decreased for the intervention group, but not for the control group.

**RQ3: Does the nature camp moderate the relationship between stressful life events and positive and negative affect?**

**School 1.** The pretest median value of stressful life events at School 1 was 12. Therefore, those with a score greater than or equal to 12 were classified as “High SLE” and those with a score less than 12 were classified as Low SLE. Descriptive statistics examine whether there is a trend toward moderation. The effect of the nature camp on positive affect appears to depend upon frequency of SLE. Specifically, those with low SLE experienced a greater increase in positive affect from pretest to posttest than those with high SLE (Table 3.4, Figure 3.5). For negative affect, the pattern was different, but the effect of the nature camp on negative affect also appears to depend upon frequency of SLE. Specifically, those with high SLE experienced a greater reduction in negative affect from pretest to posttest than those with low SLE (Table 3.5, Figure 3.6).

*Table 3.4.* Mean (SD) positive affect scores for participants at School 1 with Low and High SLE at pretest and posttest.

	<b>Pretest</b>	<b>Posttest</b>
<b>Low SLE (n=7)</b>	17.3 (3.8)	21.3 (3.1)
<b>High SLE (n=9)</b>	17.8 (5.9)	18.5 (4.6)

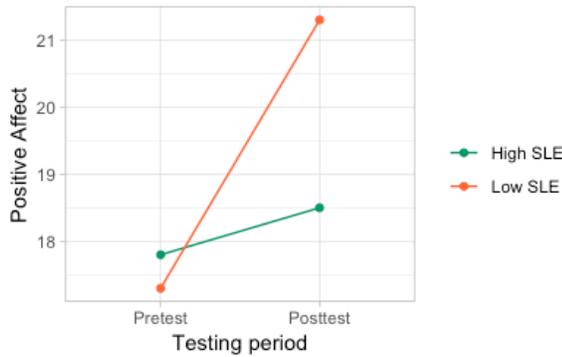


Figure 3.5. Mean positive affect scores for participants at School 1 with Low and High SLE at pretest and posttest.

Table 3.5. Mean (SD) negative affect scores for participants at School 1 with Low and High SLE at pretest and posttest.

	Pretest	Posttest
<b>Low SLE (n=7)</b>	8.4(4.1)	6.5 (3.5)
<b>High SLE (n=9)</b>	11(4.5)	8.3(3.3)

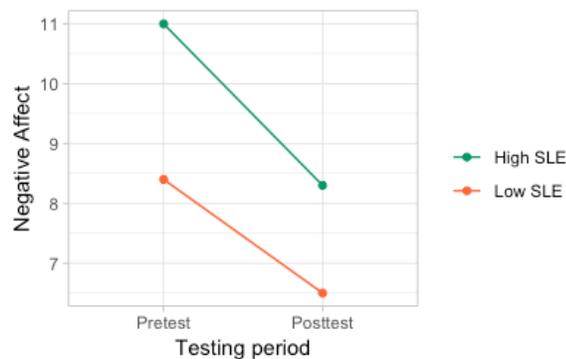


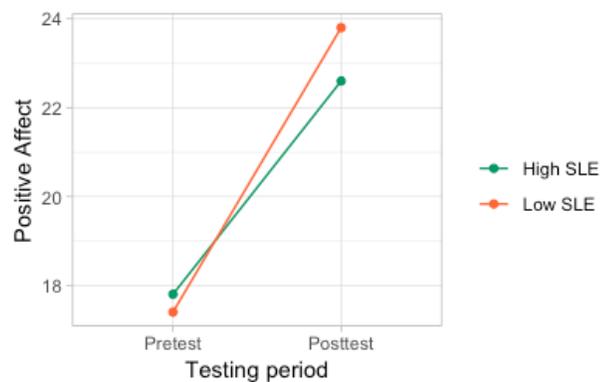
Figure 3.6. Mean negative affect scores for participants at School 1 with Low and High SLE at pretest and posttest.

**School 2.** The pretest median value of stressful life events at School 2 was 3.5. Therefore, those with a score greater than or equal to 3.5 were classified as High SLE and those with a score less than 3.5 were classified as Low SLE. Descriptive statistics showing a trend towards moderation are displayed in Table 3.7. The effect of the

nature camp on positive affect appears to depend upon frequency of SLE. Specifically, those with low SLE experienced a greater increase in positive affect from pretest to posttest than those with high SLE (Table 3.6, Figure 3.7). The effect of the nature camp on negative affect also depends upon frequency of SLE. Specifically, those with low SLE experienced a greater reduction in negative affect from pretest to posttest than those with high SLE (Table 3.7, Figure 3.8).

*Table 3.6.* Mean (SD) positive affect scores for participants at School 2 with Low and High SLE at pretest and posttest.

	<b>Pretest</b>	<b>Posttest</b>
<b>Low SLE (n=5)</b>	17.4 (3.2)	23.8 (1.5)
<b>High SLE (n=5)</b>	17.8 (2.4)	22.6 (2.1)



*Figure 3.7.* Mean positive affect scores for participants at School 2 with Low and High SLE at pretest and posttest.

*Table 3.7.* Mean (SD) negative affect scores for participants at School 2 with Low and High SLE at pretest and posttest.

	<b>Pretest</b>	<b>Posttest</b>
<b>Low SLE (n=5)</b>	8.0 (2.0)	5.4 (0.5)
<b>High SLE (n=5)</b>	8.4 (2.5)	6.6 (1.3)

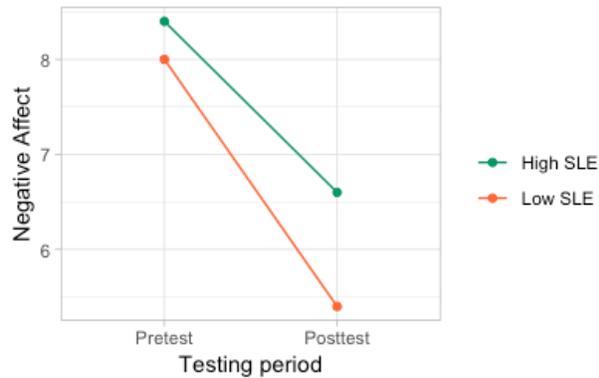


Figure 3.8. Mean negative affect scores for participants at School 2 with Low and High SLE at pretest and posttest.

**Summary.** Analyses to address RQ3 reveal that there were differences between the groups with low SLE and high SLE at both schools. In general, at School 1 and School 2, positive affect increased more from pretest to posttest for students with low SLE compared to students with high SLE. At School 2, students with low SLE decreased negative affect more than students with high SLE, but at School 1, students with high SLE decreased negative affect more than students with low SLE.

**RQ4a. Does a coastal nature camp have an impact on peer relationships?**

**School 1.** Results from paired Wilcoxon Rank-sum tests revealed no significant changes from pretest to posttest for all classes (at the 0.05 level of significance) (Figure 3.9). There were no differences in peer relationships between the groups at pretest (at the 0.05 level of significance). Class 4 ( $Mdn=48$ ,  $IQR=17.1$ ) had significantly higher scores than Class 1 ( $Mdn=45.6$ ,  $IQR=3.8$ ),  $p=.043$ , and Class 3 ( $Mdn=41.3$ ,  $IQR=2.8$ ),  $p=.0048$ , at posttest. Class 2 ( $Mdn=49.2$ ,  $IQR=7.0$ ) had significantly higher peer relationship scores than Class 3 ( $Mdn=41.3$ ,  $IQR=2.8$ ),  $p=.008$ , at posttest which may limit comparison between these classes.

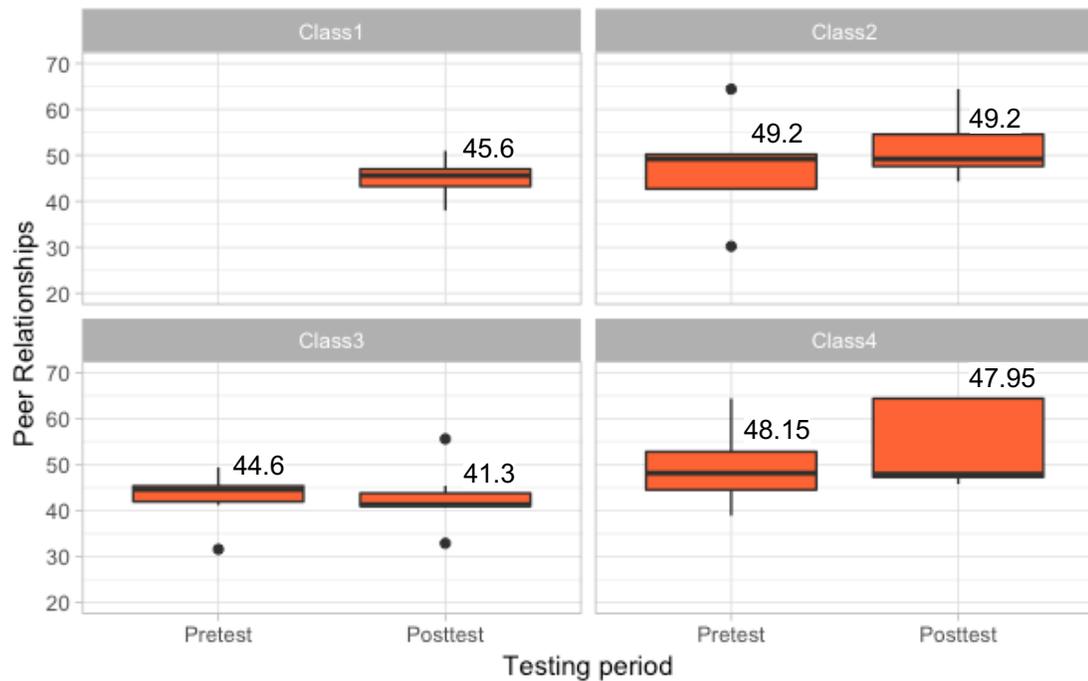
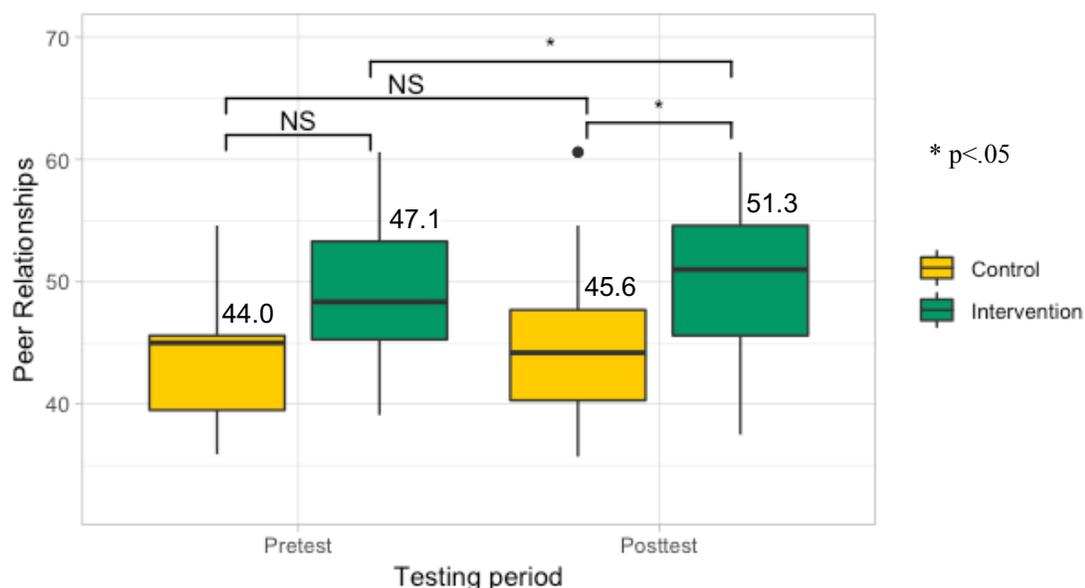


Figure 3.9. Comparison of peer relationship scores at pretest and posttest 2 for all classes at School 1. Median values are displayed above each box. Outliers are shown with dots and represent points that are greater than 1.5 times the interquartile range above quartile 4 or below quartile 1.

**School 2.** The linear mixed model was used to examine time, treatment, and interaction effects between time and treatment on peer relationships. None of the independent variables had a significant effect (at a 0.05 level of significance) (Table 3.4). In post-hoc comparison using emmeans for peer relationships (Figure 3.10), at pretest, the control ( $M=44.0$ ,  $SE=1.78$ ) and intervention ( $M=47.1$ ,  $SE=2.00$ ) groups did not differ,  $t(40.2)=-1.138$ ,  $p=.262$ , indicating that both groups were similar at baseline. At time of posttest, the intervention group ( $M=51.3$ ,  $SE=1.87$ ) was significantly higher in peer relationships than the control group ( $M=45.6$ ,  $SE=1.67$ ),  $t(33.7)=2.30$ ,  $p=.028$ . Within the groups, the control group did not significantly change from pretest

( $M=44.0$ ,  $SE=1.78$ ) to posttest ( $M=45.6$ ,  $SE=1.67$ ),  $t(19)=1.147$ ,  $p=.266$ . The intervention group significantly increased from pretest ( $M=47.1$ ,  $SE=2.00$ ) to posttest ( $M=51.3$ ,  $SE=1.87$ ),  $t(20.1)=2.69$ ,  $p=.0142$ .



*Figure 3.10.* Comparison of control and intervention groups for peer relationships at pretest and posttest at School 2. Mean values are displayed above each box. Outliers are shown with dots and represent points that are greater than 1.5 times the interquartile range above quartile 4.

**Summary.** There were no significant changes to peer relationships at School 1. However, at School 2, peer relationships were significantly higher for the intervention group than the control group at the pretest.

**RQ4b. Are peer relationships and positive and negative affect associated?**

**School 1.** Peer relationships had a significant positive correlation with positive affect,  $r(41)=0.45$ ,  $p=.0024$ , and a significant negative correlation with negative affect,  $r(42)= -0.44$ ,  $p=.0025$ .

**School 2.** At School 2, peer relationships had a significant positive correlation with positive affect,  $r(48)=0.43, p=.0018$ . Peer relationships and negative affect were not significantly correlated,  $r(50)= -0.06$  (at the 0.05 level of significance).

**Summary.** At School 1 and School 2, peer relationships were significantly positively correlated with positive affect. Peer relationships were significantly negatively correlated with negative affect at School 1, but not at School 2.

## CHAPTER 4

### Method – Study 2

#### Participants

Qualitative methods were used to evaluate place meaning among fifth-grade students who participated in a coastal nature camp. Participants from Study 1 overlapped with participants from Study 2.<sup>3</sup> Although the schools are not located near to the National Seashore, Cape Cod is considered as a single region with cultural cohesion.

#### Research Design

The qualitative portion of this study uses a non-experimental research design to explore the variable of place meaning among participants.

#### Procedure

During the coastal nature camp, students go on multiple walks through varying environments. Before embarking on one of the hikes, the teacher handed out disposable cameras (FUJIFILM Quicksnap 400, 35mm) to students who had been granted parental permission to participate. Then, the teacher read aloud the following instructions: “During this nature hike, take up to 5 pictures of what is meaningful to you in your surroundings and/or community.” To limit the influence of the teacher on students’ photos, few additional directions were given. Following the nature hike, students were instructed to write a justification for taking their photos. Each student

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<sup>3</sup> The participants from School 1 from Study 1 were also participants in Study 2 (n=28). In addition, participants from School 2 (Class 5 and Class 6) were also participants in Study 2 (n=13). The permission form sent home for Study 1 also gave permission for the student to participate in Study 2. Seven students with parent permission opted out of participating in Study 2 for unknown reasons.

was provided with a paper photo response sheet to write an explanation for each photo. The full teacher script and photo response sheet can be found in Appendix B.

Table 4.1 shows the locations of each class' hike with the cameras. Hikes took place at open beach, forest swamp, and historic monument locations (Figure 4.1). Class 4 took photos at a historic monument rather than the beach hike because instructor illness shortened the nature camp for this group.

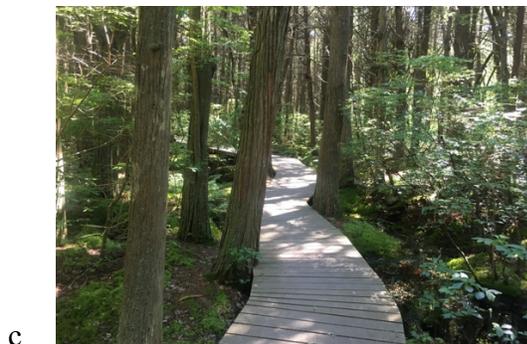
### **Place Meaning**

Sense of place was operationalized using the photo-elicitation method to evaluate place meaning among children. Photo-elicitation methods have been used in prior research with children and adults in natural environments (Kyle & Chick, 2007; Stedman et al., 2014; Tunstall, Tapsell, & House, 2004). The present method was adapted from a pilot study with children ages 9-12 (Briggs et al., 2014). Benefits of the photo-elicitation method include limiting power differences between the student and researcher, a limitation that can impact research with children (Briggs et al., 2014). Additionally, this method works well for children because it allows participants to articulate what they might not otherwise be able to communicate in words.

*Table 4.1.* Summary of photo-elicitation study groups

	<b>Class</b>	<b>Location of hike</b>	<b>Month of hike</b>
School 1	Class 1	Beach, forest, heathland	January
	Class 2	Beach, forest, heathland	February
	Class 3	Beach, forest, heathland	March
	Class 4	Historic monument	April
School 2	Class 5	Forest, swamp	April
	Class 6	Beach, forest, heathland	April

*Figure 4.1.* Settings for the three different hike locations where photos were taken by participants at the (a) beach and heathland trail, (b) historic monument, and (c) swamp and forest.



### **Analytic strategy**

This study examines the fourth and fifth research questions of this thesis.

**RQ5: Which aspects of a visit to a coastal park are meaningful to children?** In line with the method set out by Mandleco (2013), photos were initially categorized independent from their text responses. Nine basic photo categories were identified by a single researcher: *people, animals, trees and plants, lake, ocean and beach, buildings, trail, and moss or lichen*. Each photo could fall into more than one category, for example, in the case of having both plants and water.

Following categorization of the photos on their own, the photos combined with the text responses were categorized. Categories were partially informed by categories created by researchers studying connections to place among Canadians (Beckley, Stedman, Wallace, & Ambard, 2007). Two researchers categorized the photo responses independently and then discussed discrepancies and came to agreement on appropriate categories. Analysis was conducted by calculating percent of responses that fell into each of the 23 categories, similar to what has previously been done in studies with children (Tunstall et al., 2004). As with the photo-only categorization, photos and text responses could be assigned to multiple categories.

**RQ6: What elements of place meaning do children associate?** Further analysis was conducted by calculating how many times categories appeared together in the same response. For example, how many times “happy” and “beach” appeared together. The purpose of this analysis was to determine how frequently affective responses were tied to the biophysical and sociocultural categories identified understand the connections between greenspace and social and emotional well-being.

## CHAPTER 5

### Results – Study 2

A total of 152 photos were taken by participants. Twenty-one photos were excluded from analysis due to lack of an accompanying text explanation. Of the remaining 133 photos, four were excluded from analysis due to inability to interpret students' handwriting on text responses. Therefore, 129 photos and written responses were analyzed. Examples of the photos are shown in Figure 5.1. We will discuss the results for each research question in turn.

#### **RQ5: Which aspects of a visit to a coastal park are meaningful to children?**

The most common subjects in photos were 1) trees and bushes and 2) ocean and dunes. People and buildings were also frequent subjects, as summarized in Table 5.1.

*Table 5.1.* Frequency of student photos in visual categories ( $n= 129$ ). The photos do not total 129 because some photos were placed into multiple categories.

<b>Photo category</b>	<b>Frequency</b>	<b>%</b>
Trees and bushes	36	27.9
Ocean and dunes	34	26.4
People	26	20.2
Buildings	22	17.1
Lichen and ground plants	12	9.3
Pathway	4	3.1
Animals	3	2.3
Lake	2	1.6

Table 5.2 shows the resulting categories for photo text responses. Biophysical aspects of the photos included tangible components of the physical environment. This overarching category was broken down into water and plant components for a more in-depth analysis. Sociocultural aspects of the photos were identified through the text responses and included the social and cultural elements that were identified by

participants, such as memories and people. More difficult to define were the responses that showed the emotion or response to the subject in their photo. We included these as individual categories because they reflect the meaning of each photo to an individual. In addition, these place meanings may reveal clues for responses on the positive and negative affect scores. Another overarching category was created for place dependent responses in which participants identified an interaction between themselves and the environment (e.g., "Trees are meaningful because trees give us oxygen to breathe" Participant #30, and "Hiking which is exercise and exercise is good for you" Participant #21).



Sea gulls flying above the ocean because it looked nice" – Participant #7, Male, School 1



"The first photo I took reminded me when I went to Canada with my cousins and we went hiking" – Participant #21, Female, School 1



I took a photo of the forest because the forest contains trees which give out oxygen. They also contain animals that help the environment – Participant #23, Male, School 2



A picture of the waves at the beach. I find waves very relaxing – Participant #9, Female, School 1

*Figure 5.1.* Example photos and accompanying written responses

Table 5.2. Student photo response categories and examples. Frequency of responses in each category are expressed as percentages of the total number of responses for each class (n=129).

	<b>Overall category</b>	<b>Category</b>	<b>Example</b>	<b>Class 1 (n=21) (%)</b>	<b>Class 2 (n=22) (%)</b>	<b>Class 3 (n=23) (%)</b>	<b>Class 4 (n=23) (%)</b>	<b>Class 5 (n=12) (%)</b>	<b>Class 6 (n=28) (%)</b>	<b>Total (%)</b>
1	Sociocultural	Friends	Me and my friend because all my friends are a big part of my life	0	9	39	17	0	14	15
2	Sociocultural	Family	The beach ... because it reminds me of my mom she loves the beach	5	9	0	0	0	0	2
3	Sociocultural	Teachers	My two friends because they and the teachers made the hike fun	0	5	4	0	0	4	2
4	Sociocultural	Home	My home that was a town	14	0	4	9	0	0	5
5	Sociocultural	History/culture	Monument because it's a very important part of history	0	0	0	13	0	7	4
6	Sociocultural	Self/identity	It is a big part of ... history and I have lived here all my life	0	0	0	13	8	0	3
7	Sociocultural	Memories	A tree... reminds me about my tree house	33	9	13	4	0	0	10
8	Biophysical	Animals/pets	Bright red bird... it looked really pretty	10	5	4	4	8	14	8
9	Biophysical	Plants/trees	The woods/forest is an important home for animals	38	27	9	9	42	43	27
10	Biophysical	Ocean/beach/dune	The waves were amazing	29	27	26	0	0	25	19
11	Biophysical	Moss/lichen	Carpet moss because it looked awesome	19	0	0	0	33	4	7
12	Biophysical	Lake/pond	I took a picture of the lake because it is a good habitat to many animals	0	0	0	0	8	11	3
13	Biophysical	Outdoors/nature	State tree because I love nature	0	5	0	4	0	0	2
14	Affective	Calm/relaxing	It calms me listening to the ocean waves	5	0	17	0	0	7	5
15	Affective	Love	Next I took a photo of the trees and I love the outdoors	0	14	0	4	0	4	4

16	Affective	Happy/glad	I love to be around the ocean ... because it makes me happy	0	5	0	0	0	7	2
17	Affective	Fun/play	Elm tree and it was so much fun	0	9	4	0	8	4	4
18	Affective	Beauty/pretty	It was a beautiful view of the trees.	5	5	22	13	17	7	11
19	Affective	Cool, neat	The ocean because it had really cool waves	29	27	4	26	8	4	16
20	Affective	Unusual/unexpected	Wheat field ... because I don't usually see them	24	18	0	17	0	0	10
21	Dependence	Human-nature relationship	People ... breathe out carbon dioxide and plants need carbon dioxide to live	0	9	0	0	17	25	9
22	Dependence	Health/recreation	Hiking which is exercise and exercise is good for you	0	5	0	4	8	11	5

*Note: Values are given as percentage of responses matched with photos. Some percentages add up to more than 100% because some responses fell into multiple categories.*

## RQ6: What elements of place meaning do children associate?

Many responses fit into more than one of the identified categories. We calculated the number of times categories appeared together in the same written response for a photo. All categories that appeared together two or more times are shown in Figure 5.2. The same categories were used for research questions 5 and 6. The most commonly-associated elements (linked by the thickest lines) were: (1) plants/trees + human-nature relationship; (2) memories + home; (3) plants/trees + beauty/pretty; (4) ocean/beach + cool/neat; (5) ocean/beach + unusual/unexpected; and (6) ocean/beach + calm/relaxing.

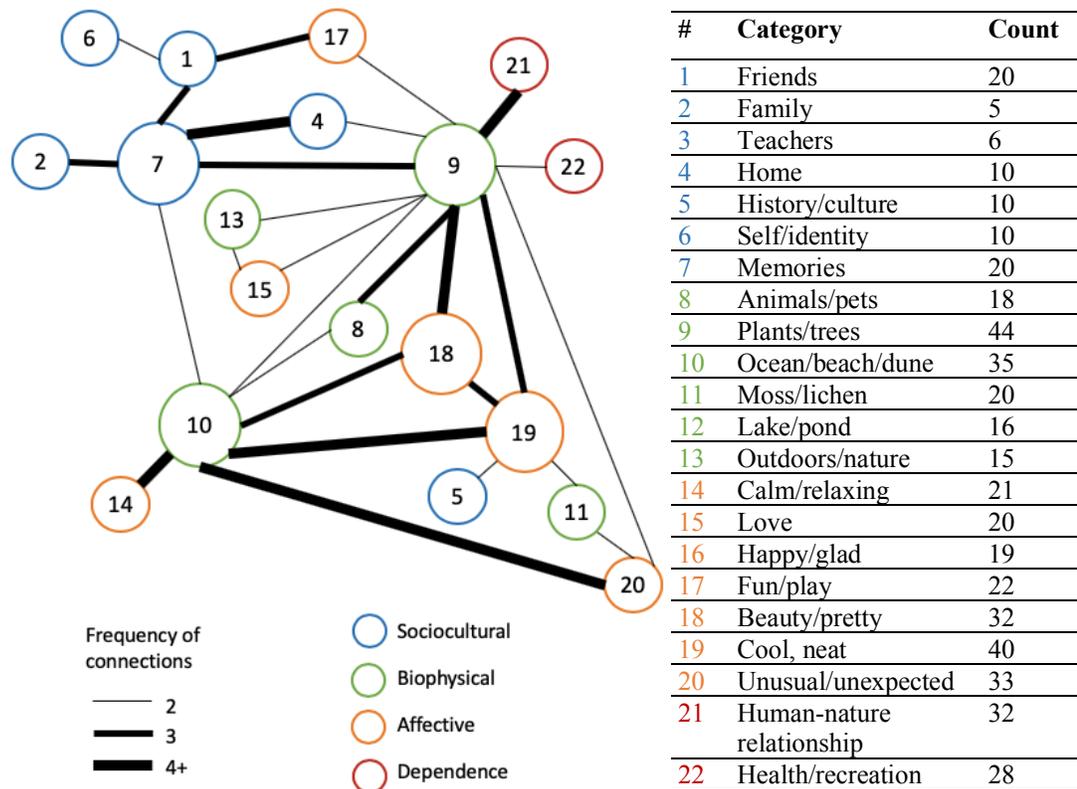


Figure 5.2. Frequency of photo response categories appearing together. Line thickness translates to more frequent connections. The legend shows how many times the category appeared in responses overall.

## CHAPTER 6

### **Discussion**

In these studies, we evaluated the impacts of a multi-day, overnight visit to a coastal park on 5<sup>th</sup> grade students' emotional health (positive and negative affect), social health (peer relationships), and place meaning. In Study 1, while there were inconclusive results at School 1, students at School 2 had significant improvements in emotional and social health following their trip to the coastal nature camp compared to their peers in the control group who spent the week in the classroom. In Study 2, we found biophysical, sociocultural, affective, and dependency categories of place meaning through participants' photo responses. These results are promising for understanding how spending time outside benefits children. In this chapter, we will discuss (a) how the results for each research question relate to prior findings; (b) strengths of this research; (c) limitations of the present studies; (d) suggestions for future research; (e) challenges conducting this research; and (f) implications of the findings for policy.

#### **RQ1: Are stressful life events associated with emotional health (operationalized via positive and negative affect) at pretest?**

Cross-sectionally, at both schools, frequency of stressful life events was associated with negative affect at pretest. However, there were no significant relationships between stressful life events and positive affect. Prior research has found that stressful life events at home and school have an impact on emotional well-being (McLaughlin & Hatzenbuehler, 2009; Repetti, Taylor, & Seeman, 2002). Within the field of environmental psychology, studies have also found an association between

stressful events and mental health. Prior cross-sectional studies that used the same stressful life events measure as the present study evaluated different mental well-being outcomes. Corraliza, Collado, and Bethelmy (2012) found that there was a direct effect of stressful life events on perceived stress in urban children ages 10-13. Similarly, Wells and Evans (2003) found a highly significant relationship between increased frequency of stressful life events and psychological distress in rural children as measured by two mental health indicators, one self-reported and the other parent-reported. The two aforementioned studies looked at more long-term mental health indicators. In contrast, the present study used positive and negative affect as a more fluid mental health indicator appropriate for the intervention study design.

Studies have shown that positive and negative affect are not inverse constructs. Thus, the reduction of one does not necessarily translate to an equal increase of the other (Ebesutani et al., 2012). It is possible for a participant to have both high positive affect and high negative affect. This may explain why stressful life events and negative affect are correlated, but stressful life events and positive affect are not correlated.

### **RQ2: Does a nature camp impact positive and negative affect?**

At School 2, positive affect significantly increased for those who went to the seashore compared to those who were in the classroom over the same time period. These results corroborate existing cross-sectional and experimental evidence. In studies with adolescents experiencing nature camps, positive associations with emotional well-being were sustained after participation (Opper et al., 2014; Ritchie et al., 2014). These two prior studies (Opper et al, 2014 and Richie et al , 2014) were

conducted with older children (ages 12-18) who may experience emotion in a different way than the present study population of children ages 9-10. However, in a study with similar aged children, interviews with students who had access to a natural area at their school reported that their experiences in nature were calming and reduced classroom stress (Chawla et al., 2014). Other studies have also found positive associations between availability of green space and socio-emotional outcomes (Amoly Elmira et al., 2014; Scott, Kilmer, Wang, Cook, & Haber, 2018). In studies with adults, even a single visit to a park has been found to have a significant impact on mental well-being (Park et al., 2008).

True experiment research designs with random assignment and control groups have rarely been employed in studies evaluating the relationship between the natural environment and children's well-being. There are few prior studies of children that employed random assignment and control groups, similar to the present study. One study with high school students randomly assigned to classrooms measured stress levels among students in classrooms with varying window views (Li & Sullivan, 2016). Stress levels dropped for students with views to greenspace (trees and grass), but not for students with views of the built environment or without windows. Interestingly, the researchers concluded that stress reduction and attention restoration occur through different mechanisms. The present study differs in that it looks at a single episode of immersive exposure to green space rather than the repeated, albeit potentially low-dose exposure provided by a window. Contrasting the current study to that of Li and Sullivan (2016), the nature camp intervention differed from the

classroom control in more ways than just views, so changes cannot be attributed to merely the physical environment.

Inconclusive results were found at School 1 in relation to mental health as measured by positive and negative affect. The lack of consistency in timing between pretest and posttest among classes may be responsible for the inability to draw any conclusions from the data on mental well-being at School 1 in addition to small sample size.

**RQ3: Does the nature camp moderate the relationship between stressful life events and positive and negative affect?**

The intention of the study was to look at how time spent in green space may moderate the relationship between stressful life events and mental health (affect) outcomes. The small sample size at both schools combined with the inconsistent timing at School 1 meant that it was not possible to statistically test this relationship, but we looked at trends in the results. We found that the effect of stressful life events on affect depends upon the nature camp. In three out of the four trends analyzed, the low SLE groups and the high SLE groups were comparable at pretest (baseline) and changed at different rates, but trends were not in the predicted direction. With respect to positive affect, at both School 1 and School 2, the less vulnerable group with fewer stressful life events, increased positive affect at a greater rate than the high SLE group. For negative affect at School 2, the participants with fewer stressful life events decreased negative affect at a greater rate than the high SLE group. The trends for positive affect at School 1 and positive and negative affect at School 2 are opposite the expected direction. Only at School 1, negative affect was much different at baseline

between the low SLE and high SLE groups. At School 1, the high SLE group experienced a greater reduction in negative affect than the low SLE group, which was in the expected direction. We hypothesized that those who had experienced more frequent stressful life events may experience a greater improvement to affect following the seashore trip compared to those who had experienced fewer stressful life events.

It is useful to consider prior research investigating the buffer hypothesis, or the idea that the impact of stressful life events on mental health is moderated by exposure to nature. Wells and Evans (2003) found exposure to nearby nature directly impacted mental health and also that the impact of frequent stressful life events on mental health was moderated by residential exposure to green spaces for children. A later study found that neighborhood green space was a predictor of emotional resilience in children (Flouri, Midouhas, & Joshi, 2014). Similarly, Corraliza, Collado, and Bethelmy (2012) found that frequency of stressful life events did have a significant impact on stress levels in middle school students, but these impacts were moderated by perceived exposure to nature. The three aforementioned studies were conducted using cross-sectional data of children with varying levels of exposure to greenspace. The present study differs in that the independent variable was an intervention—the visit to the coastal park—rather than day-to-day exposure to greenspaces. Because the towns in the present study are suburban, it is likely that all student participants are regularly exposed to greenspaces at home and school, but not necessarily parks and beaches.

**RQ4:**

**a. Does a coastal nature camp have an impact on peer relationships? At**

School 2, peer relationships did significantly improve for students who went to the seashore, but did not improve for students in the classroom. Given that both positive affect and peer relationships improved for students who went to the seashore, this suggests a possible explanatory relationship that requires further investigation. At School 1, the results for peer relationships were mixed and therefore inconclusive for each class.

The results at School 2 are consistent with existing cross-sectional research. Cross-sectional data have revealed social factors are related to the reports of restoration for children's outdoor play areas (Bagot, Allen, & Toukhsati, 2015). Similarly, a large-scale cross sectional study found that increased time spent playing in green areas and more frequent visits to the beach were both associated with fewer peer relationship problems (Amoly Elmira et al., 2014). The coastal environment of the present study relates to these findings as well as the findings of another prior study evaluating social interaction of family beach visits (Ashbullby, Pahl, Webley, & White, 2013). Parks and beaches where people come together to relax and play can result in social connections.

Interviews and observational data with students in grades 4-6 who regularly go into a natural area near school have revealed that cooperation and accountability with peers were learned through natural play (Chawla et al., 2014). The qualitative results of Study 2 are consistent with these prior findings as students frequently took pictures of their friends, commenting on their significance to the overall experience of being at

the park. The photos of friends are an indication of the importance of the social dimension of the experience. An observational study indicated that park use may depend on social factors for girls more than boys (Bocarro et al., 2015), but the present study did not evaluate gender differences in changes to peer relationships.

The present study's pre-post intervention design contrasts with former observational and cross-sectional study designs. The present study is more similar to an intervention study in the Netherlands that found greening schoolyards resulted in decreased peer problems and increased social support, but had no effect on emotional well-being (van Dijk-Wesselius, Maas, Hovinga, van Vugt, & van den Berg, 2018). Unlike this previous study, the present study looked at a coastal environment. Stronger community ties may be shaped by social connections formed, which could help in addressing future community-level and broader issues, such as climate change and drug addiction.

**b. Are emotional health and peer relationships associated?** The original intention of Study 1 was to evaluate whether social health mediated the relationship between nature and mental health. However, the small sample size limited the ability to analyze this relationship. Therefore, in this study we evaluated how closely associated peer relationships are with positive and negative affect. At School 1, as expected, peer relationships were positively associated with positive affect and negatively associated with negative affect. At School 2, although peer relationships had a positive relationship with positive affect, there was no association with negative affect. The inconsistency at School 2 may be due to the shortened version of the peer relationship scale administered. The present study provides correlational, not causal

evidence. However, the findings are consistent with prior research with children documenting the strong relationship between peer relationships and mental health (Currie et al., 2009; Roach, 2018). Research in other fields shows that strong peer relationships contribute to mental well-being (Chu, Saucier, & Hafner, 2010; Cohen, 2004; Cohen & Wills, 1985). In particular, strong peer relationships are important for children approaching adolescence, and are therefore of particular importance for this age group. Children transition from relying more on their parents for support to their peers during this life stage. In adolescence, strong peer relationships are associated with improved mental-well-being, self-esteem, and optimism. In addition, peer support can serve as a protective factor against depression, anxiety, and stress (Roach, 2018).

**RQ5: What aspects of the natural environment are meaningful to children?**

The fifth objective of this study was to improve understanding of the experiences to which students ascribe meaning. The beach and the forest were the most common subject matters in student photos. In a study of children's photo-based perceptions of a river landscape, students identified similar elements of the physical environment as in the present study (Tunstall, Tapsell, & House, 2004). Although it would be expected that natural elements dominate an experience on a hike in a park, the diversity in reactions to these locations show that students respond differently based on prior experience or knowledge. For example, many students took photos of a beach vista from a sea cliff. This shows how students' photos may have influenced each other. However, responses associated with this single viewpoint show how the construction of the place in each participant's mind was unique. The single viewpoint was described as "peaceful," "cool," and "unexpected." In the environmental

education program, this particular vista is called the “End of the Universe” by the teachers. This title may predispose students to conceiving of this location in a certain way.

The concept of a view has been studied extensively in environmental psychology and may be important for the development of positive place meanings. Work on attention restoration theory equates views with “extent” (Kaplan, 1995). Attention restoration theory claims that experiences in natural environments allow for the restoration of directed attention capacity. This theory has been used to explain the cognitive benefits of spending time in natural environments and may apply to linkages between natural environments and resilience. For example, this theory has been used to explain why urban girls with more natural bedroom window views have better self-discipline (Faber Taylor, Kuo, & Sullivan, 2002) and rural children with more nature around their homes deal with stressful life events (Wells & Evans, 2003). Another aspect of attention restoration theory that came through in responses included feelings of “fascination,” or aspects that capture attention without taking conscious effort (involuntary attention). Responses showed that participants were seeing these places for the first time and that defined some aspects of the environment as “interesting” or “unusual”.

Social dimensions were evident as an important part of the experience as well. Many students took photos of their friends, reflecting on how meaningful their friends are to their identity. Memories were brought up a handful of time in the responses, most often along with social elements. Memories were described in two different ways. Some students described their photo as making a new memory, such as in, “I

took a pic of me and (friend) because I thought that I would be able to have a memory” (Participant #10). Capturing a memory shows the participant’s desire to remember the current experience in the future. Other memories were brought up about events or people in the past. For example, the response, “The first photo that I took reminded me (of) when I went to Canada with my cousins and we went hiking” (Participant #21) shows that students are relating their experience to prior experiences or familiar places. The people are an important part of the context, and similar to Liddicoat and Krasny’s (2014) finding in looking at past memories, an experience with peers in nature can create moments for students to talk about when they return to the classroom. Therefore, outdoor nature experiences have the potential to strengthen social ties and potentially strengthen ties with the physical place as well.

The park was a new experience for many of the students (as per parent responses to the question, *Have you visited the seashore before?*), providing an interesting opportunity to look at place meaning in a new environment. According to some research into environmental preference, people need a balance between familiar and unfamiliar to maintain interest in the scene (Kaplan, Kaplan, & Brown, 1989). Perhaps the coastal national park provides enough familiarity with the beach setting to their homes while also introducing new places, thus matching to student preference. For example, “I took a picture of the beach because it reminds me of home because I live next to the beach” (Participant #20).

Novelty also emerged as an important construct in comments that showed how the experience was different from normal. For example, “I took a photo of the end of the universe because it was so pretty and I had never been there or seen such a

beautiful sight” (Participant #11). Some comments, such as, “I took this photo because I think trees are mysterious” (Participant #11) show an appreciation for the unknown qualities of the natural environment, almost touching on the “sublime” aspects of the natural environment in which beauty and mystery are combined into a form of respect (Hitt, 1999). The same feeling was captured in students who visited the historic monument. Climbing to the top of a sea cliff and looking down on the ocean produced similar feelings to climbing to the top of a tower and looking down. These feelings are difficult to capture in words, but the students used words such as “cool,” “beautiful,” and “amazing.” These concepts are also related to Kaplan’s theories of environmental preference. People want a balance between the unfamiliar and the familiar, or “legibility” and “mystery.” With a balance, then the scene is both interesting and safe. It is likely that the experience at the seashore created this balance in a way that day-to-day classroom experiences cannot.

**RQ6: What elements of place meaning do children associate?**

The final objective of the study was to understand the types of meanings students associate together. Ocean was commonly associated with adjectives such as calm, cool, and unexpected, showing the affective impact of this element of the natural environment. The affective responses that students had to the place were clear from the responses. Place affect has been shown to be a good predictor of pro-environmental intentions for adults visiting parks (Halpenny, 2010). Building these emotional connections may be just as important as cognitive understanding of the information provided, thus achieving the ultimate goal of environmental education to breed knowledge and action (Pooley & O’Connor, 2000; Stern, Powell, & Hill, 2014).

The domains of sense of place beyond place meaning were evident throughout student responses. The cognitive understanding aspect of sense of place appeared in responses frequently through comments showing facts that were likely learned during the hike, such as how lichen differs from moss and how trees emit oxygen. Plants and trees were commonly associated both with beauty and with human-nature relationship. Students commented on how the trees were important for people and people were important for the trees. These responses show how students are recognizing themselves as part of their local surroundings. For example, “I took a photo of trees because they are good for the environment and help you breathe by taking carbon dioxide out of the air and making it oxygen” (Participant #35). The cognitive understanding of the place was closely tied to place dependence. Responses in which students reflected on the trees providing oxygen for the people showed an understanding of the need for the function that the forest system provides. For example, “Woods because we need woods to live” (Participant #16). Additionally, the experience was seen as providing a recreational purpose for those who mentioned the path’s importance for hiking and exercise. Place identity, or the parts of a place that make up an individual’s identity, were also evident. Comments included phrases such as, “Me and my friend because all my friends are a big part of my life and who I am” (Participant #34) and, “I took a picture of the monument because it is a big part of Cape Cod History and I have lived here all my life” (Participant #34). These quotes show that some students feel as though the nature camp experience aligns with their constructs of home and self.

### **Looking at the study as a whole**

Overall, the results at School 2 are promising for understanding how parks may reduce negative affect, increase positive affect, and improve peer relationships. The results at School 2 also support the idea that the positive impacts on mental well-being are related to positive impacts on peer relationships. The tested pathways explored in this study do not do justice to the complexity of multiple pathways working simultaneously. One prior study of the multiple mechanisms underlying greenspace-health connections found that simplifying mechanisms between the natural environment and health lowers the validity of results (Dzhambov, Hartig, Markevych, Tilov, & Dimitrova, 2018). The researchers concluded that by evaluating simple cause and effect relationships between natural environments and health leaves out the multitude of other variables (i.e. activities being performed, social and political factors, biodiversity, etc.). However, it is difficult to empirically take into account the relationships among the numerous variables in a complex system of stress reduction and attention restoration. Therefore, more research is needed to evaluate how these mechanisms may be operating together.

The quality of the natural environment is an important variable that has not been studied extensively. Given the wealth of evidence supporting the connections between natural environments and health outcomes, the focus has been to specify what the outcomes may be, why they occur, and what particular features are producing the greatest benefits. It has been suggested that the quality of the space may matter when looking at mental and physical outcomes for people's interaction with those spaces (Söderström et al., 2013). Grassy fields in the backyard may not provide the same

improvements to mental and social health as a coastal park, or perhaps are more beneficial. Existing studies with adults define park quality in varying ways, including the availability of play equipment (Feng & Astell-Burt, 2018), but it is unknown which specific characteristics of the park experience may be the most beneficial for children. Preference for wildland or built environments has an impact on how the environments are perceived by children (Bixler & Floyd, 1997). Therefore, stress reduction or attention restoration may not happen at the same rate for all children during exposure to natural environments. Prior exposure or parental preference may impact the way a student experiences an environment.

In this study, the constructs measured short-term influences of the program, but failed to test how the effects persist over time. It may be that multiple short visits to the national seashore could have a stronger effect than a single longer visit. In a recent study on children's park visits, more frequent visits to parks were associated with increased resilience for children under age 12 (Razani et al., 2019). A study evaluating the effects of an overnight environmental education program on environmental knowledge and attitudes found that a 5-day experience had a longer-lasting impact than a one-day program (Bogner, 1998). Although the outcomes of this study did not include resilience, the same underlying effects may hold true. It is also possible that school and residential environments matter more for resilience outcomes than episodic experiences. However, if home or school are providing the source of stress for the child, then being removed from these environments for a few days may be very significant. In the future, evaluating different frequencies and dosages of nature may reveal important thresholds for policy and curriculums.

## **Strengths of this research**

This study built upon previous research in two key ways: (1) by using an intervention study design with a control group and (2) by looking at a park environment that is not in a residential or school setting.

The intervention study design using random assignment to intervention or control allows us to move toward making causal conclusions between the independent and dependent variables. The pre-post intervention study design builds upon associations found in cross-sectional research and contributes to a better overall understanding of connections between the natural environment and emotional and social health. Four similar classrooms provided a good opportunity to compare the nature camp environment to the classroom environment to increase our confidence in the findings. Other researchers have noted the need for more robust study design to examine the relationship and the mechanisms underlying between natural environments and health benefits (Markevych et al., 2017; Tillmann, Tobin, Avison, & Gilliland, 2018).

The second strength of this study was evaluating an unfamiliar environment rather than nearby nature. Engaging with unfamiliar and more regional parks may produce a different effect than daily exposure to green space in children's local environments. Kaplan and Kaplan (1989) suggest the importance of the availability of larger parks (such as Cape Cod National Seashore), saying, "The knowledge that one could enjoy such as area is in itself a source of satisfaction" (Kaplan & Kaplan, 1989, p. 163). The unique quantitative and qualitative methods used in this study to evaluate

the one-time, but memorable experience at the coastal nature camp provide a multidimensional understanding of the park's impacts.

### **Limitations of Study 1**

This thesis is not without limitation. Below, we consider the threats to various types of validity: construct, internal, external, and statistical. First, we present the threats to validity for Study 1, the quantitative portion of the study.

**Threats to construct validity.** Validated measures were used for stressful life events (SLE), positive and negative affect, and peer relationships at School 1. The abbreviated version of the SLE measure used at School 2 has not been tested for validity and reliability. The reduced 6-item SLE measure may not have been a valid representation of the events in children's lives at School 2. The school administration (Principal and teachers) removed the most sensitive items (*i.e. not spending enough time with parents and feeling smaller than other children*), which means that the most stressful events in participant's lives may have been missed. The abbreviated version of the peer relationships (social health) measure used at School 2 has also not been tested for validity and reliability. Therefore, it is possible that the four items used to measure peer relationships do not fully capture the construct of peer relationships. Additionally, social health consists of family relationships in addition to peer relationships. Because the nature camp intervention did not involve family members, then we did not expect any changes to family relationships for participants.

In addition, mono-method bias, a threat to construct validity may have influenced the results. Each construct (nature, stressful life events, peer relationships, and positive and negative affect) was only measured in one way. A single scale was

used for SLE, peer relationships, and positive and negative affect. With respect to the independent variable, the construct of “nature” was only operationalized as the nature camp. Although the camp is set within a natural environment, there are other factors of the nature camp besides the physical environment that differ from the classroom environment. For example, leaving the classroom for several days is a change of routine and scenery. This may compromise construct validity which, in turn, undermines internal validity (discussed below).

The construct validity of this study was also threatened by self-report. However, the measures used in this study were previously validated with other methods (i.e. parent or teacher proxy), thus reducing the risks of self-report. In addition, to improve validity of self-report data, parent proxy data was gathered for some items on the SLE measure. To improve the construct validity in future studies, it would be beneficial to use multiple measures for each construct and to reinforce self-report data with proxy measures (such as from teachers) of social and emotional well-being.

**Threats to internal validity.** There are numerous factors that limit our confidence in the results, including maturation, selection by history, instrumentation, and history. Maturation may have played a role in the results at School 1. One or two months elapsed between testing periods for two of the classes (Class 3 and Class 4). Students in these classes may have developed coping strategies or peer relationships during this time, but there were no significant changes in affect or peer relationships, so maturation is unlikely to have had an effect. If the original Solomon Four-Group study design had been possible as originally proposed, it would have been possible to

rule out effects caused by testing and maturation (Shadish, Cook, & Campbell, 2001; Solomon, 1949). However, in order to maintain a large enough sample size in School 2 for statistical analysis, the study design was adjusted.

An additional threat to internal validity relates to issues of construct validity (described above). Because “nature camp” or “nature exposure” was operationalized through a multi-day overnight camp experience that includes a variety of out-of-the-ordinary experiences compared to the classroom, selection by history was an additional threat. Students at the nature camp are experiencing more than just nature exposure. They are also sleeping outside of their homes, spending less time using screen technologies, and spending more-than-usual time with peers. All of these additional components of the nature camp could provide an alternative explanation for changes to positive affect and peer relationships. A field trip to a museum and an overnight stay in a hotel could have a similar effect due to the change of routine. This study examined a bundle of activities that cannot be isolated. Future research could employ an additional field trip condition in indoor settings for comparison.

In the classroom, students in the control groups may have experienced an exam or project that could have negatively impacted positive affect, but would not have impacted the intervention classes. It is unclear from the findings in the present study if the improvements to emotional and social well-being can be attributed to spending time outside, spending more time with classmates, or to the reduction in screen time. The mental and social impacts may be a result of these other factors rather than nature exposure.

Instrumentation may have impacted the results because the pretest and the posttest differed. At pretest, students took the measures in the following order: 1) stressful life events, 2) positive and negative affect, and 3) peer relationships. The stressful life events measure was not administered at posttest. Items on the stressful life events measure may have impacted students' mood by bringing up unpleasant memories. The improvements to positive affect and reduction to negative affect seen at School 2 may have been a result of not taking the stressful life events measure. However, we think that this threat is unlikely because both the control and intervention groups took the same pretest and posttest.

History also presents a possible threat to internal validity at School 1. There were a number of events that happened between testing periods for Class 3 and Class 4, including seasonal changes and school holidays that could provide an alternative explanation for why there were no impacts of the nature camp on affect or peer relationships. These events would not have had an effect on Class 1 and Class 2 because they were tested over the course of a single week. The stressful life events measure helps to understand if students are being exposed to different types of stressors, but the models used for statistical analysis could not take these factors into account at School 1 because this measure only accounted for the previous 3 months. At School 2, we would not expect history to have an effect on validity. All students had standardized State testing during the week leading up to the testing period. Fatigue from this testing may have resulted in lower than normal emotional states during this week. However, both the control and intervention classes were exposed to standardized testing.

Selection bias was not a likely threat to the internal validity of Study 1. It was assumed that students are assigned to classrooms randomly at the beginning of the school year. At pretest, intervention and control classrooms were similar for positive affect, negative affect, and peer relationships at School 2, making selection an unlikely alternative explanation.

**Threats to external validity.** The generalizability of this study is mainly limited by selection by treatment. The effects of the intervention may differ with the variables of age, race, and culture. Two schools from a culturally comparable area may not be representative of students in the state or region. Prior research has shown age to be a significant factor in evaluating the effects of green spaces on health (Flouri et al., 2014). Therefore, it may not be wise to generalize the results found here to younger children or adolescents.

The results may not be representative of the populations at School 1 or School 2 either. Demographic data collected from the parents showed that the study populations were made up of a less diverse population than the overall school populations. The intervention may not have had the same impacts on other students at the school who were not included in the study. In addition, the low response rate from parents may reduce the generalizability to all students at the schools included in this study. Parents without internet access, those with multiple jobs, or those who have less time may have been left out of the study. There may be some inherent differences between study participants and other students in the school, as income and children's time with parents are factors in stressful life events. Similarly, absences during either the pre-test or the post-test resulted in gaps in the data. The students who were present

for both study periods may not be representative of all participants or students at the school. Students who are absent frequently may have more stressful home lives or could have developmental issues that would have impacts on peer relationships and emotional health. Low income children may have been underrepresented in the present study and prior studies have shown the importance of income for greenspace-health studies (Kuo, 2001).

An interaction of the setting and the treatment may have also limited external validity of the results. The findings from a coastal park environment may not generalize to urban or mountain parks for example. If students familiar with an urban environment visited the nature camp, they might not experience the same changes to peer relationships and affect.

**Threats to statistical validity.** The small sample size of students used for conducting statistical analysis limits the confidence in the results. Another factor that may have influenced the statistical analysis may have been non-independence. All students took the pre-test and the post-test in the same classroom. They also spent the rest of the school week together. Students discussing responses with their peers may have influenced the results. In this way, responses were not entirely independent from each other. Given these limitations, then the statistical conclusions found here must be viewed with caution.

### **Limitations of Study 2**

There are some limitations to the method of photo-elicitation that was used in this study. An interaction of the setting and the treatment may have impacted the external validity of the study. Students all took photos along the same hike. Although

the hike does include diverse landscapes, given the opportunity, students may have taken photos of other meaningful aspects of the physical environment. This is evidenced by the fact that when students were brought to the built environment, they took pictures of buildings. Other settings may have yielded different results than found in this study. Selection by treatment provides another threat to the generalizability of the study. Only students from two towns participated in the research at three outdoor locations. The population of participants selected for this study may not be comparable to children in different contexts. What is meaningful to the students from School 1 and School 2 may not represent what is meaningful to other students in the school or state.

One threat to the statistical validity of the photo responses is non-independence. Students were all together on the hikes and while writing responses. It is likely that student photographs influenced each other, thus limiting our confidence in the categories created by participants. For example, many students in Class 6 wrote about the human-nature connection between trees producing oxygen and humans breathing. Although much of the content overlaps, the meaning for the places differed among the students. Future research could use photo-elicitation in additional settings to see how categories of place meaning compare. The text responses from students could have revealed more information had in-depth interviews with all students been possible.

### **Future research**

The present study prompts further investigation to improve understanding of children's connections with natural environments. We will discuss the following suggestions for future research directions: (a) expansion upon the current study

location (b) expanding the constructs of social health, mental health, and place meaning; (c) expanding to additional environments; (d) evaluating doses of nature exposure; and (d) large-scale longitudinal studies.

**Expansion of current study.** Although the study occurred over the months from February through April, weather conditions on Cape Cod can vary greatly during this time. The students at School 2 all experienced the seashore in April. It would be beneficial to study these schools over the full duration of the school year to capture a larger sample of participants and to account for seasonal changes.

To expand upon the present study further, it would be interesting to look at students who have gone through the seashore program in past years to understand how it may have impacted future place meaning and health behaviors. Former studies have found that after an outdoor intervention, the impacts on mood and adaptability persist (Opper, Maree, Fletcher, & Sommerville, 2014). Because the seashore program has been running for the past 50 years, it would be possible to see how memories of the program differ among those who attended 2 years, 10 years, or 40 years ago. Although we might not expect that a single visit to a park would have long-term effects, the present study moves us toward an understanding of causal relationships.

**Expanding constructs.** Constraints due to class time and participant burden restricted the number of measures used to evaluate each construct. Future research can address this limitation for measures of mental health, social health, and place meaning.

**Mental health.** One future research direction would be to include additional measures for mental well-being beyond positive and negative affect. Prior studies have shown differences among parent, teacher, and child-reported outcomes of mental

health (Feng & Astell-Burt, 2017). Interviews with teachers or parents could increase the depth of understanding for multiple components of overall mental health. In addition, this study focused on the emotional component of mental health. Ideally, mental health would be operationalized using multiple scales and tasks.

***Social health.*** Future research should evaluate how individual peer relationships may operate on a community level to understand implications for larger scale resilience, such has been done with adults (Kuo, Sullivan, Coley, & Brunson, 1998). Exploring the idea that individual resilience is tied to community resilience may involve interviewing those who attended the nature camp in past years reflecting on the social aspects of the experience.

As discussed in the limitations, the nature camp exposes students to more than the natural environment, including time spent without screen technologies. Excess screen time is associated with sociopsychological issues among children (Allen & Vella, 2015). Reducing screen time could have the opposite effect, but investigating the relationship between screen time and prosocial behavior is a hypothesis that requires further investigation.

***Place meaning.*** The present study lacked multiple methods for evaluating the overall sense of place construct. Future studies that are not limited by class time could benefit from employing methods such as map-making and journaling to evaluate place meaning on a deeper level. In the future, it would be interesting to see how place meaning develops through time from creating place meanings in childhood through to maintaining or changing place meanings in adulthood. Due to concerns about water quality issues on Cape Cod, the Environmental Protection Agency is currently

conducting a study evaluate how sense of place among adults factors into perceptions about water quality, showing the relevance of the present study (Mulvaney, Chintala, Lyon, Mazzotta, & Merrill, 2016). If feasible, it would be beneficial to evaluate place meanings in multiple contexts, both familiar and unfamiliar, over multiple years for the same group of participants. Future research should evaluate the impacts that the experience of spending time outside in a coastal park has on pro-environmental behaviors to understand how place meaning can foster children's self-efficacy in protecting a specific place. Understanding the mechanisms of how individual sense of place contributes to both personal and community-level resilience in response to adversity may help grasp the fundamental characteristics of sustainable social-ecological systems.

**Additional environments.** In order to confirm that the results found in the present study were due to the increased exposure to the natural environment, it would be beneficial in the future to isolate the variable of “nature” from the other factors of the nature camp (i.e. lasting overnight, having food at scheduled times, spending time away from family). Although logistically challenging, randomly assigning children to different types of camps, varying only in physical environment would allow for concluding that effects were due to the natural environment. For example, a camp located in a natural history museum could be compared to the nature camp.

It would also be interesting to compare the results found in the present study to similar future studies conducted in different ecosystems and across multiple age groups. The present study evaluated students spending time in an ecosystem relatively similar to their own, but interacting with an unfamiliar environment may have

different effects. Further exploration into the relationship between natural environments and children's health outcomes should evaluate the specific quality of the environment as a variable. Few studies have measured quality of the natural environment as a variable (Söderström et al., 2013; Wood et al., 2018). More research is needed to look at how resilience builds in the context of large undeveloped natural areas (such as national parks) versus more urban natural areas (such as sports fields). Biodiversity of plant species, features (i.e. bathrooms, playgrounds, picnic benches), length of trails, or number of viewpoints all provide quantitative measures that have practical applications to park design.

**Dose-response relationship.** The nested structure of the classrooms within the school system limited the ability to compare between schools, but it would be interesting to look into a dose-response relationship between time spent at the nature camp and mental and social outcomes to determine an optimal threshold. Then, it would be possible to compare a three-day program to a five-day program. A higher sample size would have made this possible at School 1 where one of the classes only went to the nature camp for 3 days compared to the other classes at School 1 who went for 5 days.

**Large scale longitudinal studies.** It would also be beneficial to conduct longitudinal studies of time spent outside and resulting changes to social and mental well-being. These studies could take into account the residential and school environments, use of other parks, and other factors that may impact children's health. Future large-scale research would allow for stronger statistical analysis using multiple regression models to look at interaction effects of nature and stressful life events.

## **Challenges**

In conducting this study, the researchers encountered a number of challenges associated with conducting research in schools. Acknowledging these barriers may help future studies anticipate these barriers and adjust the study design accordingly. Guidelines for conducting research in schools speak of similar challenges (Alibali & Nathan, 2010). One such barrier is the layers of approval that are required before undertaking research, many of which have been implemented to protect students and parents from unnecessary tasks. Approval must be sought at the district level as well as the principal level before it reaches the teachers. Because some information may prompt unintended effects on students, it is particularly important to consider the sensitivity of all items.

Busy schedules of teachers and administration reduce time for reading through provided research materials and fall lower on the priority list than immediate student problems. Anecdotal information from teachers indicated that there is a severe lack of available class time to cover required materials. Because the traditional role of schools is to provide education, emphasis is placed on standardized testing scores rather than on emotional learning outcomes. Funding is tied to student performance on tests and the accompanying required curriculums. Although there are challenges to working in schools, these environments have a significant impact on children's development (Bronfenbrenner & Morris, 1998). Thus, it is important to understand the non-academic outcomes that may be provided by experiences both within and outside of the classroom.

The challenges of working in the schools was one reason for the low participation in the present study. With small sample size, statistical analysis is not able to make solid conclusions about how the variables are related, thus limiting the ability to draw conclusions that may have an impact on school curriculum and programming.

### **Implications**

These results have important implications for school curricula. Experiential environmental education has been shown to achieve the goals of environmental education more often than knowledge itself (Stern et al., 2014), thus signifying the importance of more programs such as the one studied here. However, the importance of these programs may not align with the qualifications for standardized testing despite that time spent outside has the potential to improve classroom performance. Students who are happier and healthier would likely have overall better success (Graziano, Reavis, Keane, & Calkins, 2007). Other schools may benefit from programs designed to get more students into parks. The idea that nature may have the ability to contribute to resilience on an individual level has significant implications for addressing mental health issues.

These results also have implications for land management. The psychological and social values provided by the nature environment make up the “cultural ecosystem services” (Russell et al., 2013). However, the intangibility of these benefits (compared to services like water quality and soil health) means they are often left out of the land management decision-making process. As many environmental education programs may be geared towards adults, it is important to incorporate child-centric approaches

to park engagement as well, highlighting some of the features identified here. Programs highlighting fun, calm, and interesting experiences in parks may have the most impact on young visitors. Additionally, it is important to acknowledge the emotional significance of park visits for children. Environmental education in parks has the potential to improve sense of place, emotional health, and social connectedness. Emphasizing these factors in addition to the cognitive outcomes may help in reaching the ultimate goal of environmental education to create more caring communities of individuals who take action to protect their natural resources.

## **Conclusion**

This study aimed to evaluate social and emotional responses of a school trip to a seashore park. In addition, it evaluated how the experience may influence students' place meaning related to the natural environment. The results indicate the importance of spending time in nature for young people, particularly in areas with blue space. Using a unique quasi-experimental mixed methods design, results showed improvements to mental and social outcomes and identified the attributes of the social and physical environment that may have contributed to the emotional responses. Although the results were promising, the small scale of this study necessitates further investigation of these mechanisms. Future studies should expand upon this research by maintaining a robust study design while looking at these relationships in a variety of natural setting. The results from this study have implications in the fields of marine conservation, health, land use planning, and education. In combination with other research showing benefits of experiential education for children may reveal important insights for future educational program development. The results from this study may

indicate that parks provide an importance resource for building both individual and community-level resilience for coping with adversity on multiple scales to address environmental and cultural issues.

## APPENDIX A

### Child survey

Below are some things that happen to kids. For each question below, indicate if it happened to you. Fill in one circle next to each question. Think about the past **three** months, since (**Halloween**) or (**Christmas**). How often did these things happen to you?

	A lot	Sometimes	Never
1. Since October, have you changed schools? * +	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. How often were you not able to wear the clothes you wanted to? *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. How often have you been bored, with nothing to do? *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. How often were you sick? * +	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. How often was your homework for school late? *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. How often did you fight or argue with your parents about house rules? (like bedtime or TV watching) *+	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. How often did you not spend enough time with your mom or dad?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. How often did you feel left out of the group?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. How often did someone make you try something new like a cigarette that you really didn't want to?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. How often have you not felt good enough at sports?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. How often did your parents make you get good grades?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. How often did you not have enough money?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Since October, did your parents separate? (separate means one of your parents moved away) +	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. How often have your parents argued in front of you?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. How often did you feel overweight, bigger than other kids your age?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. How often did you feel smaller than other kids your age?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. How often have you felt like your body is changing?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. How often have you been punished or gotten in trouble at school? <sup>+</sup>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. How often were you were picked on or made fun of by other kids?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. Since October, have you moved houses? <sup>+</sup>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Now we are going to think about just the past five/three days, since Monday/Wednesday. Fill in one circle next to each question. In the past **(five) or (three)** days, I felt...

	<b>Very slightly or not at all</b>	<b>A little</b>	<b>Moderately</b>	<b>Quite a bit</b>	<b>Extremely</b>
Joyful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cheerful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Happy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proud	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Miserable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scared	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Again, think about just the past five/three days. In the past **(five) or (three)** days, since (Monday) or (Wednesday)...

	<b>Never</b>	<b>Almost never</b>	<b>Sometimes</b>	<b>Often</b>	<b>Almost always</b>
I felt accepted by other kids my age	<input type="radio"/>				
I was able to count on my friends *	<input type="radio"/>				
I was able to talk about everything with my friends *	<input type="radio"/>				
I was good at making friends	<input type="radio"/>				

My friends and I helped each other out *	<input type="radio"/>				
Other kids wanted to be my friend	<input type="radio"/>				
Other kids wanted to be with me	<input type="radio"/>				
Other kids wanted to talk with me *	<input type="radio"/>				

Note: All items were administered at School 1. Items marked with an \* were administered at School 2. Items marked with a + were validated by parent responses.

## APPENDIX B

### **Photo-elicitation method**

#### **Script for teacher**

*Before handing out cameras.*

“Each of you has a disposable camera. During this nature hike, take up to 5 pictures of what is meaningful to you in your surroundings and/or community. This means that these things are important to you. The pictures can be of people, physical features, or any other things that are important to you. Be prepared to explain why you took each picture after the hike.”

*After the hike with the cameras.*

“During the hike we just completed, you each had a disposable camera. You were instructed to take up to 5 photos of things that are important to you. Now, you will each get a paper where you can describe why you took each of your photos.”

## Photo response sheet

During the hike at the national seashore, you were asked to take photos of “what is meaningful to you in your surroundings and/or community.” In the space below, explain why you chose to take your photos. For example, what is meaningful about the photos you took?

Photo 1:

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Photo 2:

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Photo 3:

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Photo 4:

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Photo 5:

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APPENDIX C

**Parent survey**

*Distributed via a link to Qualtrics (online) \**

For each of the following questions, please consider your child mentioned above. This brief survey takes approximately 10 minutes to complete.

**Has your child ever visited Cape Cod National Seashore?**

*Options: Yes, No, Do not know*

**How many times in the past year has your child visited Cape Cod National Seashore?**

*Options: None, 1-2, 3-4, 5 times or more*

**How long has your child lived in (town name)?**

*Options: Less than one year, 1-2 years, 3-5 years, more than 5 years*

**In the past three months, since October/December...**

	<b>A lot</b>	<b>Sometimes</b>	<b>Never</b>
How often has your child moved houses?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often has your child changed schools?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did you separate from your partner?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often did your child fight with you about house rules (such as bedtime or watching TV)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often was your child in trouble at school?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often was your child sick?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Please specify your child's gender:**

*Options: Female, Male, Other*

**Please specify your child's ethnicity:**

*Options: Hispanic or Latino, American Indian or Native American, Asian or Pacific Islander, Black, non-Hispanic, White, non-Hispanic, Other*

**Please indicate your annual household income?**

*Options:*

Less than \$20,000

20,000-34,999

35,000-49,999

50,000-75,999

76,000-99,999

over 100,000

Choose not to answer

**How many people live in your household? \_\_\_\_\_**

**Of these, how many are children? \_\_\_\_\_**

**And how many are adults (over age 18)? \_\_\_\_\_**

**Did you ever participate in the Cape Cod National Seashore program as a student?**

*Options: Yes, No, Do not know*

*\*All text in italics was not included in the final version of the survey*

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