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Department of Environmental Studies

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Childhood Nature Contact And Its Effect On Adult Coping Skills

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CHILDHOOD NATURE CONTACT AND
ITS EFFECT ON ADULT COPING SKILLS

By Mary-Jeanne Raleigh, MA, MEd

A dissertation submitted in partial fulfillment of
the requirements for the degree of

Doctor of Philosophy

Environmental Studies

at

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ABSTRACT

Reported anxiety levels continue to rise, in conjunction with a decrease in the depth and breath of coping strategies reported in college populations throughout the United States (Arthur, 1998; Twenge, 2000). Emotional management skills begin development in middle childhood (8-12yrs) and transition into adult coping skills in early adulthood (18-24yrs) (Seifert, 2000). The uses of natural restorative environments for coping may be reinforced during developmental phases in which coping skills are being learned. The development of coping strategies incorporating the use of natural restorative environments maybe contingent on early exposure to the qualities of natural restorative space found in routine nature (nature found in backyards, empty lots, school yards, athletic fields etc). This is a mixed method study, blending qualitative information and quantitative data, exploring the relationship between exposure to nature in childhood and the use of natural restorative environments for coping in adulthood.

The key research questions include: Do individuals who report spending time in nature during childhood report spending more time in restorative nature as adults? Do individuals who report utilizing natural restorative environments demonstrate a reliance on active coping skills? Do individuals reporting high contact with nature in childhood and in adulthood report low to moderate trait anxiety?

The independent variable in this study is time spent outside during middle childhood. Dependent variables include coping skills, use of restorative environments in adulthood and anxiety levels. A convenient sample of 121 college students from the New England region of the United States completed a series of written assessments focused on

nature contact, coping and anxiety, followed by interviews with 9 participants reporting specific trait anxiety levels.

Results confirm that young adults who utilize natural restorative environments for soothing were more likely to report spending time in nature during childhood.

Participants who report using natural restorative environments for soothing were more likely to report a reliance on active coping skills. Trait anxiety levels were not correlated with nature exposure in childhood. These findings may help create an understanding of the importance of nature contact in the development of positive mental health and effective coping skills.

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CHAPTER ONE

Does a Childhood in Nature Matter?

As a child, I had no specific reason to be in the woods. There was no task or activity to complete in the woods. I had no larger purpose for being there, other than to follow my own curiosity. In the woods under an upturned stump, that I later learned is the pillow and cradle of forest transition, I found a quiet spot. It was a space to think, a spot to work out the problems circling in my thoughts and to get away from the frenetic movement of a household filled with people. I would head back to the house when I felt ready to face the real world.

To this day, I find myself walking in the woods when I am stressed or need to find a solution to a nagging problem. Going to nature for soothing is a habit I established in childhood. This habit is the reflection of my belief that the environment shapes emotions and that we possess a physical need to move away from the noise of buildings and into the solace of nature. The use of natural restorative environments (spaces out-of-doors, within nature, that replenish emotional and cognitive energy: Kaplan & Kaplan, 1989) is part of my set of coping skills. This strategy is one that I developed in childhood and perfected more fully as an adult.

As a therapist working with college students, I watch individuals struggle to cope with stress, some use nature as a coping strategy but others do not. Psychotherapy often focuses on teaching clients the coping skills that their lives require. Exploring past events that affect current coping, unlearning maladaptive skills, and learning positive coping skills can be an important part of the therapeutic process.

I have observed that some clients utilize nature for soothing whereas others do not

employ that strategy, which led me to ask the following questions: Is my experience of the soothing qualities of nature just anecdotal? Is there empirical evidence for a relationship between positive experiences in nature during childhood and the ability to successfully incorporate nature into a set of coping skills as an adult? Does a childhood in nature encourage the development of natural restorative spaces as a coping strategy in young adulthood? Simply stated, does a childhood in nature matter?

Conceptual Overview

The list of stressors that we face everyday continues to expand as each generation spends more time interacting with machines and the expectation of multitasking increases in all aspects of our lives. Today the average young adult exhibits anxiety levels equal to or greater than those faced by a demographically similar group of 50 years ago (Twenge, 2000).

Research by Arthur (1993) indicates that the breadth and depth of coping strategies used by college students is shrinking. Children and young adults in the late 1950s spent more time outside than do young people today (Orr, 2002). As anxiety levels are rising, the coping strategies that young adults use are dwindling and they are spending less time in nature. Is there a link between these events? The philosopher John Locke acknowledged that our thoughts and feelings develop through associations, repetition, and imitation (cited in Crain, 2005). Is it possible that we are not creating associations between contact with nature and the experience of feeling soothed during critical developmental periods? Is the reduction of time outside during childhood removing a strategy from our set of adult coping skills?

Coping is itself a complex system of physical and psychological responses used to

contend with the internal and external demands of a situation that is perceived as threatening. Coping is an embedded and dynamic process that involves the environment, the person, and the relationship between them (Folkman & Moskowitz, 2004). In this definition, environment includes all external aspects of the world. Coping is an interactive process between the environment generating the stress and the environment in which the coping skill is employed.

Our physical response to stress is perhaps the most measurable and easily defined aspect of our coping system. Hans Selye (1956) introduced the idea of the general adaptation syndrome in the 1930s and continued to write about stress well into the 1970s. Selye understood that the body physically responds to both positive (eustress) and negative (distress) stress. Eustress is caused by life events such as getting a new job, getting married or buying a new home. Eustress causes less physiological damage to the body when compared to the damage created by distress (Selye, 1976). Distress is caused by negative life events such as losing a job, the death of a loved one or illness. How stress is perceived determines our body's ability to absorb the physiological response to that demand. This finding demonstrates that emotional states influence physical responses to stress.

Cognitive appraisal can limit or meliorate the effects of a stressful situation. Lazarus and Folkman (1984) published *Stress, Appraisal and Coping* outlining the transactional model of stress. The transactional model proposes that stress can be thought of as an imbalance between demands and resources. When the demand of the situation exceeds our perceived ability to cope we experience stress. How we understand the environment shapes our stress response and which coping skills are employed.

Schore's (1996) research indicates that exposure to environmental stressors creates physiological changes that reshape the neural pathways in our brain. Behaviorally this means that an individual with long-term exposure to stress (specifically a traumatic stressor) may startle more easily and may not be able to soothe or feel relaxed when a new or mild stress is presented (Solomon & Heide, 2005). The reshaping of neural pathways changes how we understand and react to the world around us. The neural pathways shaped by early childhood experience connect to areas of the brain that are critical to both psychological and cognitive development. Many of these neural connections are important for adaptive coping in stressful situations (Schore, 1996).

Life events shape our neural pathways as well as our associations between emotions and environments, and these associations directly influence the way we respond to the world around us. Selye's (1956, 1976) research supports the conclusion that internal and external stressors generate a stress response from the body. In turn, our bodily response shapes the physiology of the brain (Schore, 1996). The human body physically responds to the world we perceive, and how we perceive that world is psychologically and physiologically shaped by our experiences (Neylan, 1998). Soothing experiences in natural settings as well as stressful experiences in nature equally shape the way we emotionally understand, physically respond to, and cognitively perceive the world.

These findings place in context the research question: Is a childhood in nature associated with the likelihood that an adult will use natural restorative environments as a coping strategy? Previous research supports the hypothesis that time in soothing natural environments during childhood shapes our developing physiology and, in turn, our

coping skills. If we acknowledge that external and internal experiences, along with positive and negative experiences, play a role in shaping our coping skills, we can begin to explore the role of restorative natural environments in this process.

Definitions of Key Concepts

My research was designed to explore the relationship between nature and coping by asking college students about their current nature exposure, nature exposure during middle childhood, current levels of anxiety, and current coping skills. Nature, restorative environments, soothing, coping, and anxiety are the five key concepts that are used throughout this work. The concept of *nature* and *natural space* is illusive, and several researchers have attempted to define this in meaningful and useful ways. In his work, *Last Child Left in the Woods: Saving our Children From Nature-Deficit Disorder*, Louv (2005), cited several different definitions of nature from current researchers. These definitions used the concepts of biodiversity, natural abundance, and economic resources. Louv accepted a wider definition of nature based on the work of Kaplan and Kaplan (1989). The Kaplans' definition of nature includes both the pristine nature of land untouched by humans and the routine nature typically found in a suburban backyard. This definition of nature is the one that I use throughout my research.

The important aspect of this particular definition of nature is the inclusion of both routine nature and exceptional spaces. Routine nature includes nature found in our daily interaction with the environment. Exceptional nature encompasses the extraordinary pristine spaces untouched by man. Following this example, I use the term nature to encompass all aspects of non-man-made space outside of built environments, and use the terms *outside*, *outdoors*, and *in nature* interchangeably.

Restorative environments include all spaces, inside and outside, that replenish mental and emotional energy (Staats & Hartig, 2004). My research focuses on the restorative, soothing, and self-regulation effects of contact with natural restorative spaces. I define *natural restorative spaces* as spaces that are out-of-doors and contain natural elements. This definition allows for the inclusion of local parks, backyards, office complex courtyards, and green spaces between college residence halls as well as pristine national parks.

Soothing is defined as the action of exerting a calming influence or bringing tranquility to a person. Natural restorative environments are spaces that foster soothing as well as the replenishment of mental and emotional energy (Kaplan, 1995).

Coping is defined as all of the elements of an individual's response to a perceived or experienced stress. Strategies employed to soothe and reduce anxiety produced by exposure to a stressor constitute *coping skills* or *coping strategies*. Coping skills and coping strategies represent the same concept and are used interchangeably here. Passive coping skills are strategies that reduce the feelings of stress but are not solution-focused (Carver et al., 1989). Venting, denial, and distraction are classified as passive coping skills. Active coping includes strategies that are solution-focused (Carver et al., 1989). Creating a plan to resolve the stress and demonstrating restraint from destructive behaviors, such as yelling at the boss, are two examples of active coping strategies.

Anxiety is defined as the psychological and physiological response to stress or fear (Carson et al., 2000). Anxiety is a complex set of reactions and not limited to observable behaviors. This includes the cognitive rumination and internal dialogue that perpetuates or reduces the level of stress experienced. Fear and worry are concepts related to, but

different than, anxiety. Fear describes the physical and mental manifestations of feeling threatened. In contrast, worry is a purely cognitive event that represents thoughts of what might or could happen.

Research Questions

The primary research question, “Is a childhood in nature increase associated with the likelihood that natural restorative spaces will be used as a coping strategy in young adulthood?” can be broken down into distinct subquestions. Each question builds on the other to explore layers of the primary question:

1. Do individuals who report spending time in nature during childhood report spending more time in restorative nature as adults?
2. Do individuals who report utilizing natural restorative environments demonstrate a reliance on active coping skills?
3. Do individuals reporting high contact with nature in childhood and in adulthood report low to moderate trait anxiety?

To address these questions, I performed several assessments on 119 college students that focused on anxiety level, nature contact, and coping strategies. Each chapter of this dissertation focuses on a subquestion or set of subquestions that explores the primary research question.

In chapter 2, I examine the question, “Is exposure to nature in childhood an antecedent to intentionally seeking nature in young adulthood?” This chapter explores this relationship by examining correlations between several variables. These variables include the following: use of local parks/managed recreation areas, favorite outdoor space currently and in childhood, self reported use of natural restorative spaces currently, as

well as overall time in nature from childhood to the present. Strong positive correlations were found between time in nature during childhood and time in nature as an adult, level of greenness in childhood favorite outdoor place and greenness in adult favorite outdoor place, use of local parks in childhood and use of similar areas in adulthood, and time in nature during childhood and use of natural restorative environments in adulthood.

In chapter 3, I examine the question, “Do individuals who report utilizing natural restorative environments demonstrate a reliance on active coping skills?” Chapter 3 explores the potential relationship between the coping skills utilized most and the use of natural restorative environments. The use of natural restorative environments for soothing was highly correlated with a reliance on active coping skills but not correlated with the use of passive coping skills.

The focus of chapter 4 is the question, “Do young adults reporting high contact with nature throughout childhood report low to moderate trait anxiety?” Chapter 4 explores the relationship between contact with nature during childhood, and young adulthood, and the development of trait anxiety. Continuing this thread, the next question addressed in this chapter is, “Do young adults currently reporting high contact with nature report low to moderate trait anxiety scores?” Results indicate no correlation between time in nature during childhood or current nature contact and low or moderate anxiety scores.

Chapter 5 assimilates the conclusions of chapters 2 through 4 and reflects on the results of the previous chapters to address the primary research question, “Is a childhood in nature associated with the likelihood that natural restorative spaces will be used as a coping strategy in young adulthood?” The results of the research may be beneficial for

modeling appropriate coping strategies at all grade levels, both inside and outside of the classroom. Currently, no therapeutic intervention model incorporates nature contact.

The results of this research support the inclusion of nature contact as a therapeutically recognized coping tool. Campus landscape designers focus on aesthetic and cost issues in landscape design, but they rarely focus on creating restorative natural spaces for college students. This research suggests that landscape design on college campuses may be integral in fostering the development of coping skills for this age group. In addition, this research supports the importance of family modeling of natural restorative environments as a coping skill and access to the soothing qualities of nature during childhood. Areas for future research, limitations of this methodology, and applications for this work are also discussed.

Chapters 2, 3, and 4 are written as stand-alone chapters. Each chapter contains its own literature review, method, results, discussion, and reference sections. Appendices are grouped together at the end of the dissertation to reduce repetition. A hypothesis matrix (see Table 1) was created to help the readers follow the connection between the research hypotheses, and the dissertation chapter design. This matrix identifies each hypothesis, the assessments used, the variables explored, the method of analysis, and the chapters that address that area of the research.

Table 1

Hypothesis-Analysis Matrix

Hypothesis	Brief COPE	State-trait inventory	Nature Contact Survey	Variables	Statistical analysis
H ₁ : Exposure to nature in childhood predicts the use of restorative environments in adulthood. <u>Chapter 2</u>			Childhood Contact # 4,5,6,7, 8,9,10, & 11 Adult Restorative Environments Contact # 3, 15, 19 & 20(a or b)	IV: Childhood Nature Contact Score DV: Adult Restorative Environments Use	Correlation
H ₂ : Adults utilizing natural restorative environments will demonstrate a reliance on active coping strategies. <u>Chapter 3</u>	1) Active Coping 2) Passive Coping		Adult Restorative Environments Contact # 3, 15, 19 & 20(a or b) Range 3 to 16: 3 indicates no restorative environment use, 16 indicates regular use of restorative spaces.	IV: Adult Restorative Environments Use DV: COPE Scores DV1-Active coping DV2-Passive Coping	Correlation a) IV/DV1 b) IV/DV2
H ₃ : Adults reporting high contact with nature as children will have low to moderate trait anxiety scores <u>Chapter 4</u>		Total Trait Score Range 20 to 80: 20 indicates low trait anxiety – 80 indicates high trait anxiety	Childhood Contact #4,5,6,7,8,9,10, & 11 Range 8 to 32: 8 indicates little nature contact, 32 indicates high contact	IV: Childhood Nature Contact Score DV: Overall Trait Anxiety Score	Correlation Interview
H ₄ : Adults reporting high contact with nature will have low to moderate trait anxiety scores. <u>Chapter 4</u>		Total Trait Score Range 20 to 80: 20 indicates low trait anxiety – 80 indicates high trait anxiety	Adult Nature Contact #3, 12,13,14,15 16,17,18, 19 & 20 Range 9 to 40: 9 indicates little contact with nature, 40 indicates high contact.	IV: Adult Nature Contact Score DV: Overall Trait Anxiety Score	Correlation Interview

Note. COPE = Coping Orientation Problems Experienced scale (Carver et al., 1989).

DV= Dependent Variable

IV= Independent Variable

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CHAPTER TWO

Is Exposure to Nature in Childhood an Antecedent to Intentionally Seeking Nature in Young Adulthood?

Abstract

I explored the relationship between time spent in nature during childhood and the use of local parks, outdoor favorite places, use of natural restorative space and overall time in natural spaces in adulthood. A sample of 119 (69 men and 50 women) college students completed a survey designed to assess degree of nature contact, use of local parks, ability to identify a favorite outdoor space, and use of natural restorative spaces. The results from the Nature Contact Survey indicate that a significant positive relationship exists between having a favorite outdoor space in childhood and in adulthood, and that the level of greenness in both past and current favorite outdoor space is positively correlated. The use of local parks and managed play areas specifically in childhood predicted the use of similar spaces in adulthood. I found a significant positive relationship between the quality of nature contacted during childhood and the use of natural restorative environments for coping in early adulthood. Earlier research suggested that young adults have a limited breadth and depth of coping skills (Arthur, 1998). At a time in our society when children are spending less time outside, these findings suggest that childhood contact with nature might provide the basis for coping strategies in adulthood.

Recently, a young man came into my office looking for a safe place to talk. He clearly stated that he did not need my advice or want me to “do therapy” on him. He just needed to vent in a safe space. His story was not uncommon. His girlfriend had gotten pregnant and had terminated the pregnancy. Although he was unsure how he felt about the termination, he believed that he could not force her to have a child. He believed that it was ultimately her body and her decision. My only interjection into the conversation was an acknowledgment of his grief and feelings of helplessness.

About 20 min into our meeting, he offered his own solution to dealing with his troubled feelings. He decided that he would go camping over the coming weekend to his favorite spot on Birds Eye Mountain. He offered the explanation, “I would sleep out in the backyard in a sleeping bag when I was a kid and that made things clearer. I always felt better the next day.” From this conversation, it was apparent that he was able to make the connection between the soothing quality of spending time in the routine nature of his backyard as a child and his current need for soothing during a stressful moment in his young adult life.

My research sought to explore the relationship between exposure to nature in childhood and the intentional use of restorative nature as a young adult for soothing. The term *natural restorative environments* refers to outdoor environments with predominately natural elements that restore emotional balance, increase attentional capacity, and allow for emotional regulation. Environments used for self-regulation, anxiety reduction, and emotional soothing, are called restorative environments. Favorite places and outdoor spaces, such as local parks and managed play areas, are often natural restorative spaces for those who seek them. The term *routine nature* refers to nature we are exposed to that

is not extraordinary, pristine, or outside of our normal routine. Walking across the lawn to get to a car, peering out of an office window that overlooks a copse of trees, or walking down a tree lined sidewalk to get to a place for lunch are examples of exposure to routine nature.

Indicators of a continued relationship with nature include the use of local parks and managed recreation areas, identification of a favorite outdoor place, and contact with nature at two points in the life span. In this study, these aspects of a relationship with nature are reported from the perspective of the young adult looking back at childhood events, as well as from the perspective of current nature contact. This allows the information to be viewed from two different stages of development; childhood (6-13 years) and young adulthood (18-24 years). Anecdotally, compelling arguments can be made that adults spend less time outside than do children. Furthermore, children of today spend less time outside than similarly aged cohorts of only 30 years ago (Louv, 2005). The current research explored whether people who report nature exposure in childhood intentionally seek time in restorative nature as young adults for the purpose of soothing and reducing anxiety.

Overview of Restorative Environments Theory

The ability to use natural environments for soothing, stress reduction, and self-regulation plays a role in healthy emotional development (Kahn & Kellert, 2002). Two theories of restorative environments dominate the literature. The functional-evolutionary theory of Kaplan and Kaplan (1989) explored interactions with natural space with a focus on cognitive processes and assumed that it is our cognitive ability that allows us to assess a space as being restorative. This theory requires active cognitive processing of the

experience and argued that spaces we find soothing and restoring are created through our cognitive response to the environment. In contrast, Ulrich's (1983) psycho-evolutionary theory explored the emotional aspects of our responses to natural settings. Ulrich postulated that our immediate emotional response to a natural space triggers relaxation, and that no cognitive process is needed to experience psychological restoration.

Functional – Evolutionary Theory

Preference for one environment over another involves evaluating the space within an organized cognitive framework. Kaplan and Kaplan (1989) created a preference framework that outlines the basic informational properties necessary for an environment to be engaging, drawing our attention. Because vision is our primary mode of receiving information from the surrounding world, this preference framework relies on visual cues.

Coherence, complexity, legibility, and mystery are properties of the environment that warrant further exploration (Hartig, 1993).

Although coherence (a natural or logical connection) and complexity (composed of interconnected parts) are commonly understood terms, legibility and mystery in this context are not. Legibility refers to the ability to organize visual information into useful and engaging patterns with the expectation of further exploration. Mystery is the promise of more information as one moves in the environment (Hartig, 1993).

Once an individual is mentally engaged with a space, restoration can only occur once certain conditions are met. According to the functional-evolutionary theory, four basic characteristics of an environment that create an atmosphere of psychological restoration are as follows: *a sense of being away, extent, fascination, and compatibility*.

Being away is ultimately a state of being that is facilitated by changing one's

physical space (Kaplan, & Kaplan, 1989). We develop routine behavioral responses to specific stimuli in our environment. Removing oneself from a routine space provides the opportunity for contact with stimuli that trigger soothing responses.

The concept of extent involves two properties of the environment: scope and connectedness. *Scope* encompasses spatial dimensions. An environment with scope is an environment large enough to allow free movement, facilitating the reduction of boredom, and allowing for change in perspective and the exploration of small as well as large features of the space. Scope also refers to the extent, or breadth, of the view.

Connectedness refers to aspects of the environment that connect us to the whole experience (Kaplan & Kaplan, 1989). In order to allow our mind to rest, we must feel a sense of harmony with the space. The scene must fit our worldview. Without harmony between our world view and the environment, we must repeatedly expend effort to find the model that is appropriate to the current situation (Kaplan et al., 1998).

Restoration also requires the element of fascination, or an attraction that holds us spellbound as if by a unique power (Stein, 1984). Fascination can take two forms. Process fascination is the continued attraction to how an event unfolds, whereas content fascination is the sense of being spellbound by the very nature of the event or object itself (Kaplan, 1995). Natural restorative environments can hold both process and content fascination. James (1981) introduced the idea of immediate sensorial attention, what we now refer to as soft fascination. The term soft fascination is used to make the distinction between an attraction that allows an involuntary relaxed response and an attraction that requires intense focus or hard fascination. Restorative spaces inspire soft fascination. Soft fascination will keep boredom at bay without demanding energy from the person

engaged with the environment. After an average of 20 minutes of working on a visual task such as reading, directing our attention requires that we voluntarily focus with intention. Novel stimuli that attract our continued involuntary attention prevent boredom (Carson et al., 2000). If a space holds no elements of interest, our mind becomes restless and bored.

According to functional-evolutionary theory, the last element of a restorative space is compatibility. Compatibility with the physical and mental demands of the environment is critical for psychological restoration to occur (Kaplan & Kaplan, 1989). The goals and actions of the individual are important aspects of compatibility. What a person wants to do and is inclined to do in a specific space is supported by the environment (Kaplan et al., 1998).

According to the functional-evolutionary theory, restorative environments trigger a cognitively initiated response that balances the need for stimulation with the need for relaxation. Time needs to be spent in the restorative environment in active ways: moving, exploring, experiencing, and interacting. An increased ability to attend to stressors is the outcome of time spent in spaces that engage our information processing needs. Reduction of fatigue, increased ability to self-regulate emotions, and clearer thinking are also results of time in natural restorative spaces (Kaplan et al., 1998).

The functional-evolutionary theory postulates that, once a restorative environment is found, four phases of emotional and attentional restoration occur. Upon initially entering and acknowledging a restorative space, an individual is free to allow random thoughts or stray ideas to run their course, clearing one's head (Kaplan & Kaplan, 1989). The second phase, restoration of attentional capacity, allows unaddressed issues to

surface, reducing internal white noise. The third phase involves organizing and prioritizing issues, creating options for conflict resolution. The fourth and deepest level of restoration is the ability to reflect on one's life (Kaplan et al., 1998).

Psycho-Evolutionary Theory

Ulrich (1983) contended that emotional, not cognitive, reactions are the key to understanding how we experience restorative space. Arousal theory postulates that a certain level of psychophysiological arousal needs to be present in order for a person to be motivated. The Yerkes-Dodson law of arousal states that the emotional state of experiencing stress facilitates cognitive functioning, to a point (as cited in Kalat, 1993). When arousal is very high, it blocks or disturbs cognitive functioning. For example, there is a U-shaped correlation between stress and test scores. Low anxiety results in low test scores, moderate anxiety results in high test scores, and high anxiety results in low test scores. This evidence supports the conclusion that emotional state can supersede or direct cognitive functioning.

Emotional reactions to specific environments are mediated by the basic elements of the space as well as the individual (Ulrich, 1983). Ultimately, how we feel about a space dictates how we understand the space, whether we see it as providing safety or posing a threat. Ulrich outlines eight elements of space that facilitate a soothing emotional response to nature.

Complexity is a key feature of restorative spaces. Spaces with many independent features are complex and easily engage our attention. Spaces that lack complexity quickly become boring, and boredom produces stress. *Structure*, the grouping of patterns in the space, is another element. We respond to homogenous textures and continuity among the

various elements of the space. Each restorative space also needs *focality*, a focal point, the aspect that draws the observer's attention. To engage attention, a space needs *depth*, the fourth concept. Depth refers to spaciousness that allows for movement without restriction. Spaces that restrict movement can increase anxiety or make a person feel trapped. These spaces are also likely to contribute to boredom. *Quality* of the space, specifically the characteristics of the ground, is encompassed in the fifth concept. Uneven or difficult terrain that presents restricted movement or lack of egress is considered to be low quality (Ulrich, 1983). Spaces with easily traversed terrain with clear and multiple points of egress are considered to be high quality. The sixth construct, *threat*, involves the assessment of inherent risk of harm. From an evolutionary standpoint, the sixth construct is the most valuable. Threatening spaces are immediately disliked and avoided.

The opposite is the seventh construct, *promise*. Promise is the presence or indication of new and more interesting nonthreatening aspects in the space. The presence of a deflected vista promises new information just around the corner for the observer (Ulrich, 1983). This seventh concept supplies an important element to restorative space, the recognition that we are curious animals. Even when relaxing, we need a source of new information (Hartig, 1993). The eighth construct is the most concrete and measurable – *water*, or more specifically, the presence of water in a space. Korpela and Hartig (1996) reported that water was considered an important element to the restorative quality of a favorite space by 73% of their sample. This finding supports the importance of Ulrich's final construct.

Psycho-evolutionary theory states that psychophysiological stress can be reduced by visual exposure to a scene containing the eight constructs described above. Exposure

reduced autonomic nervous system responses and the negative emotions connected with an aroused state (Ulrich, 1979). Visual contact with an environment possessing these qualities decreased blood pressure, normalized heart rate, and restored proper circulatory function (Ulrich, 1984).

The argument that we are emotionally open to the passive qualities of space is valid because we cognitively prepare for or recognize the need for emotional openness. However, the counterargument is that our emotions guide our intellectual processes before, during, and after our interaction with any particular space. My results support the conclusions of James (1890) and Heft (2001), that these are intertwined and inextricable concepts. Critical to this research is the recognition of both emotion and cognition as integral to our experience at all points of human development.

Development of the Child–Nature Bond

Events that shape our childhood experiences with nature involve both direct and passive contact with our environment. Direct contact includes activities in nature such as hiking, walking, or skiing. Viewing a film of nature scenes and looking out of a window overlooking nature are examples of passive contact with nature. Passive contact through school or media improved a child's environmental knowledge and understanding, but direct exposure appeared to have a stronger influence on fostering an emotional bond to nature (Bixler & Floyd, 1997; Chawla, 1986; Clees, 1994). Children create the emotional bond of refuge when in direct contact with nature.

The key property of refuge is a sense of safety and protection. Creating or finding a refuge is a common characteristic of children's play. While observing children at play, Kirkby (1989) found that children spent almost half their time (47%) playing in less than

10% of the total play area available. The 10% utilized by the children consisted predominately of natural elements. Children of both genders sought and created refuges within this green space. The behavior of creating refuge can be interpreted as a child seeking and creating stress reducing emotionally restorative spaces. Gender distinctions, in type of play were observed throughout the refuge areas. The type of play observed in the refuge area suggests quieter, more focused interactions between the children. Boys were more likely to engage in adventure-based play in the built refuge area. Small cozy spaces elicited quiet conversations between the girls, but “messaging about” or “fishing” activities for the boys (Kirkby, 1989). Gender differences in time spent outside as a child indicated that girls do not spend as much time outside as boys (Hart, 1979). The time young girls spend outside may be different in quality as well. Girls are less likely to wander in natural setting alone and may have more restrictions placed on the amount of time they can be outside the home (Hart, 1979).

Moore and Wong (1997) showed that aggressive behaviors decline in natural settings when compared with play behaviors observed on an asphalt playground. Aggressive outbursts are a clear sign of psychological stress, especially when these outbursts are seen in children not yet equipped with effective stress coping strategies. The use of natural refuge spaces may represent early emotional connections between soothing and nature. The more natural a playground is, with cozy spaces, access to water, and comfortable places to sit, the more likely the space can be a refuge area or a restorative environment for children.

Restorative Environments and Cognition

A defining characteristic of a natural restorative environment is the space’s ability

to facilitate the increase of attentional energy, resulting in decreased mental fatigue. This is accomplished by allowing the individual to be drawn into soothing aspects of the environment. Attention restoration theory is the cognitive framework developed by Kaplan and Kaplan (1989) to describe the process of recovery from mental fatigue.

Attention restoration theory states that time in nature allows for soft fascination, involuntary attention to an event or thing, to occur. Time away from stressors and moments to quiet our minds allow for the replenishment of attentional energy and restoration of emotional balance (Kaplan, 2001). Depletion of attentional energy results in fatigue, irritability, depression, and difficulty focusing. For example, children diagnosed with attention deficit disorder (ADD) need to work toward attention restoration. Agitation, frustration, and increased stress are common behavioral side effects for children struggling with ADD.

Studies with children diagnosed with ADD found a connection between play in green spaces and a decrease in ADD symptoms. Children exposed to green spaces exhibited an increased ability to attend to a task and to respond to verbal commands (Taylor et al., 2001). Play in nongreen spaces exacerbated ADD symptoms 57% of the time (Taylor et al., 2001). In summary, children diagnosed with ADD exhibited less severe symptoms during and after play in greener spaces.

A national study asked parents to rate the aftereffects of common activities on the expression of ADHD symptoms. Green outdoor activities significantly reduced symptoms when compared to symptom levels after built outdoor and indoor settings (Kuo, 2004). Further research on attention deficit hyperactivity (ADHD) disorder indicates a link between taking a walk in the park and the ability to focus on a task

(Taylor, 2009). Students performed better on digit span backward tasks after taking a 20 minute walk in the park when compared to performance on the same task after taking a 20 minute walk in downtown and neighborhood areas (Taylor, 2009).

These results suggest that exposure to green spaces affects attentional functioning and may have a long-term effect on ADD symptomology when incorporated into a child's routine. Research on the attentional capacity of college students supported the conclusion that exposure to nature through photographs restored attentional capacity (Berto, 2005). Passive exposure to nature through photographs is effective in emotional regulation, stress reduction, and attention restoration (Ulrich, 1979; Ulrich et al., 1991).

The work of Wells (2000) supports the idea that living in nature shapes a child's cognitive development. This research found that natural elements in the home environment improved a child's overall cognitive functioning. The concept of "natural elements in the home" was defined as any space with restorative characteristics such as a view of nature, pictures of nature on the walls, or indoor plants. Although direct contact with nature influences cognitive, social, and emotional development (Hart, 1979; Kahn & Kellert, 2002; Moore & Wong, 1997; Taylor, 2009; Wells, 2000), even passive visual access to green space has been shown to enhance concentration (Berto, 2005; Ulrich et al., 1991).

Development of the Adult Nature Bond

Past experiences in nature leave impressions on the adult and influence current bonds with nature. Significant adults, family members, and formal education have been shown to be influential in the creation of a bond with nature. However, research indicates that simply having time outdoors during childhood can have the greatest impact on later

bonds with nature (Chawla, 1999; Ewert, 2005; Wells & Lekies, 2006). This information underscores the importance of routine, nearby, and accessible nature, in shaping both the child and the adult.

Surveys provide evidence to support the assumption that childhood exposure to nature shapes adult contact with nature. In surveys conducted by Francis and Cooper-Marcus (1991, 1992), adults who sought out natural restorative spaces reported stress and anxiety as the emotional antecedent to seeking contact with nature. These adults also reported the ability to recall at least one significant childhood event in a natural setting.

An exciting piece of research published in *Environment and Behavior* in January 2008 adds new dimension to our understanding of the effect childhood nature contact has on adult nature use. Ward-Thompson, Aspinall, and Montarzino (2008) carried out two studies, one in central Scotland and the other in the East Midlands of England. Using a similar approach to my research study, Ward-Thompson et al. (2008) surveyed participants that were categorized into focus groups and designed survey questions based on the focus group responses. Although the surveys differed slightly, factor analysis showed that the same issues were covered in 63% of the statements from the two surveys (Ward-Thompson et al., 2008).

The results indicate that children who visited green space daily were much more likely to become adults who utilized green space several times a week (Ward-Thompson et al., 2008). Conversely, those who did not frequent green places as children were less likely to become visitors as adults. Ward-Thompson et al. (2008) wrote, “the frequency of childhood visits is a highly significant predictor of how often people visit green places in adult life and was overall the most effective of all demographic and background

variables on which data was collected” (p.124).

Research indicates that childhood experiences in nature shape adult attitudes, autobiography, environmental ethics, behaviors in nature, proenvironmental sentiments, and perception of nature (Hart, 1999; Kals et al., 1999; Staats & Hartig, 2004; Tanner, 1980; Thomashow, 2002). The research also indicated that childhood exposure to nature affected the ability to establish a nurturing/soothing adult relationship with nature. This childhood relationship with nature lays the foundation for using parks and spending time in nature in adulthood (Ward-Thompson et al., 2008).

Positive feelings toward nature are generated by the combination of positive outdoor experiences in childhood and time in nature with others who model a nurturing attitude toward nature itself. If significant adults in a child's life model an attitude of respect for nature, the child is more likely to develop a meaningful relationship with and have positive feelings toward nature well into adulthood (Chawla, 2001; Kals et al., 1999; Kellert & Wilson, 1993).

Coping

The behavior of seeking nature for soothing as a coping strategy for stress is a burgeoning area of research in the field of psychology. Several recent studies have shown a relationship between time in nature and stress reduction (Kaplan, 1995; Staats & Hartig, 2004; Ulrich, 1983). Zeller (2006) interviewed 7 adult participants about their relationship with nature. The participants were asked how they felt about time in nature and whether or not nature played a restorative role in their lives. The participants reported seeking experiences in nature, which created a sense of balance and relief from daily stressors (Zeller, 2006). Participants reported involvement in physical exercise and

movement in green space and that their relationship with nature fulfilled a central psychological need in their lives.

Significant reduction in depression, anxiety, and anger levels were attributed to “green exercise” such as hiking, fishing, and cycling (Pretty et al., 2007). Two hundred and sixty-three adult participants in four different regions of the United Kingdom engaged in a range of green activities. Levels of depression, stress, and tension were measured before and after a green walk. Self-esteem increased in 90% of the participants after a green walk, whereas tension and depression decreased in 71% of the participants (Pretty et al., 2007). Participants reported an improvement in mood after green activities when compared to similar activities conducted in nongreen spaces. Walking in an indoor mall increased feelings of depression (22%), low self-esteem (44%), and tension (50% (Pretty et al., 2007). None of the participants reported negative or detrimental effects from being involved in green activities. Physical activity alone helped to reduce moderate feelings of depression and anxiety (Halliwell, 2005).

A study of elementary school teachers working in Chicago provides additional support for a relationship between the use of restorative environments and stress reduction (Gulwadi, 2000). Teachers reported using two types of restorative environments to reduce their stress: centering spaces (quiet environments to focus inward) and prospecting places (populated environments that allowed for interaction with others). The restorative spaces tended to be places with urban nature such as a park or a courtyard between buildings (Gulwadi, 2000). The teachers reported that contact with outdoor spaces was both curative and preventive; it reduced existing stress levels and helped prevent feelings of stress upon returning to the classroom.

The importance of access to green space for emotional well-being is now being recognized in national politics. The Royal Commission on Environmental Pollution report included a section on green spaces and emotional well-being (Lawton, 2007). The report clearly states the importance of green spaces for the psychological, social, and physical well-being of the urban populous, including both children and adults.

In a study by Kals et al. (1999), nature experiences with significant others are mediated by factors such as indignation, affinity toward nature, and general interest in nature. These three factors were predictors of proenvironmental behavior. The study indicated that being accompanied by a family member during nature experiences in childhood positively predicted a willingness to commit oneself to proenvironmental behaviors as an adult. Interest in nature positively predicted a willingness to be involved in social groups or organizations that support proenvironmental behavior (Chawla, 1998; Hartig et al., 2001; Meinhold & Malkus, 2005). Several adult behaviors in nature are shaped by childhood contact with nature, the use of restorative natural environments for soothing in adulthood as a coping skill may be among those behaviors.

Young adulthood is typically defined as the age range of 18 to 24 years and is well represented in traditional undergraduate college populations. College is a time of great personal growth and challenge for the individual. Existing coping skills and relationships with the environment are tested in new physical and social surroundings. Coping skills that worked well in adolescence may no longer be effective in dealing with the adult demands of college. Support networks such as family, friends, and the well-known environments of childhood may no longer be easily accessible.

College students have one foot in childhood and the other in adulthood. They are

beginning to make decisions about how to cope with stress, starting the creation of an adult identity, and developing an understanding of how to relate to the natural environment as an adult. It is this time of inherent transition that makes these individuals ideal subjects for a study of the connection between a childhood in nature and the creation of an adult relationship with nature. The link between reported childhood contact with nature and young adult contact with natural spaces has not been explored in the context of developing coping skills.

Research Question

The guiding question for this study was, “Is there an association between time in nature in childhood and the intentional use of restorative natural spaces in young adulthood?” The specific inquiries created to explore and answer this question were as follows: Does a positive relationship exist between having a favorite outdoor place during childhood and having a favorite outdoor place as an adult? Will level of greenness of an outdoor favorite place in childhood predict the level of greenness in adult outdoor favorite spaces? Does a relationship exist between using local parks or managed play areas in childhood and adult use of those spaces? Does a positive relationship exist between time in nature during childhood and time in nature as a young adult? Do young adults who use natural restorative environments for coping also report a history of nature contact in childhood?

I predicted that a child who spends more time outside, when compared to other children in the cohort, will grow up to be an adult who spends more time outside when compared to other adults. I also predicted that children with favorite outdoor spaces will become adults who have favorite outdoor spaces and that these spaces contain elements

of a natural restorative environment. I predicted that children who use local parks will grow up to be adults who also use local parks and managed recreation areas. Adults who acknowledge the use of natural restorative environments in their existing coping strategy will report a history of nature contact in childhood.

Method

Subjects

Subjects were selected from the pool of 18 to 25 year old matriculated undergraduates at New England College, a 4-year institution of higher education in the northeastern United States. These subjects were recruited through campus advertising, class announcements, and word of mouth during the spring semester of 2005. After a verbal review of the consent form (see Appendix A), each subject signed an acknowledgment of participation. If, at any time during the research protocol, a subject disclosed a substance abuse problem, a present episode of clinical depression, or a recent suicide attempt, he or she was removed from the study. Only 2 subjects out of 121 were removed from consideration due to these restrictions. One hundred and nineteen (50 women and 69 men) participants completed the research protocol. Subjects were predominately of White racial ethnicity (less than 3% of the subjects were of non-White ethnic background) due to the low diversity of the institution where the research was conducted.

In order to ensure ethical data collection, the proposal for this research was reviewed with the appropriate administration at New England College, the test site. The research protocol was also reviewed and approved by the Internal Review Board at Antioch University New England to ensure ethical research procedures.

Instruments

I created the interview questions for the pilot instrument after an extensive review of the literature on restorative environments (Kaplan et al., 1998; Kaplan, 1995; Kellert & Wilson, 1993; Korpela et al., 2002; Ulrich, 1979). The questions were written and formatted based on the methods and design outlined in Fink's (1995) collection of survey design texts. The questions were then used in a pilot study conducted with 9 college students (5 women and 4 men). These students were from the same birth cohort and were demographically similar to the participants of the larger research protocol. The pilot participants answered a series of open-ended questions (see Appendix F). Their answers were used to create a set of response choices for each question on the written Nature Contact Survey.

Several colleagues, including psychologists and practicing clinicians, reviewed the survey: Dr. Craig Knapp (clinical psychologist), Dr. John Vojtisek (clinical psychologist), and Dr. Louise Chawla (committee member and environmental psychologist). Design changes included the simplification of questions to a multiple-choice format, the rewording of response choices, and the refinement of the Likert scale.

The Nature Contact Survey

Following the pilot survey, I designed the Nature Contact Survey (see Appendix E) to measure child and adult time in nature. The survey was created to better understand and frame the exploration of the connection between a child's exposure to nature and a young adult intentionally seeking natural spaces. This survey allowed me to generate a "restorative environments" score that reflects current time intentionally spent in natural settings for soothing purposes. The restorative environments score is a self-report of the emotional reasons for seeking nature and is separate from the behavioral indicators of

park use, favorite place, greenness, and amount of time in nature. Scores that can be calculated from the survey responses include time in nature, favorite outdoor spaces, access to nature during childhood, quality of childhood nature and use of local parks during childhood and currently.

Response choices were placed on a Likert scale of 1 to 4, with a score of 1 indicating the least nature contact. Questions were written in two sections of the survey to allow the subject to answer a question in regard to childhood experience and then provide the same information in regard to present day experiences. For example, Question 5, “Estimate the amount of time you spent outside as a child” corresponds to Question 14, “Estimate the amount of time you spend outside now, as an adult.” This design allowed for comparison between questions as well as between the past and the present.

Total scores on the Nature Contact Survey ranged from 20 to 82. A score of 20 indicates little or no contact with nature during childhood and continued low contact in young adulthood. Overall scores in the middle of this range indicate some contact with nature either as an adult or as a child. Scores approaching 82 indicate high contact with nature at both points of development. The delineation of score categories was based on the standard deviation of the scores and was developed following an established pattern of clinical assessments such as the State-Trait Anxiety Inventory and Beck Depression Inventory (Barroso & Sandelowski, 2001; Spielberger et al., 1970). One standard deviation above the mean on the instrument was categorized as high nature contact and one standard deviation below was categorized as low nature contact. Scores within one standard deviation above and below the mean were categorized as average nature contact scores.

As described above, the Nature Contact Survey yielded several scores: total nature contact score (indicating the level of a person's contact with nature in childhood and young adulthood), childhood contact score (indicating level of contact between the ages of 6-13 years), access to nature in childhood (indicating type of environment in childhood from urban to rural), quality of nature in childhood (indicating level of greenness and natural elements in childhood environments), restorative environments score (indicating the use of nature for soothing as an adult), an adult contact score (indicating level of contact with nature from the age of 18 to the age of respondent at the time of study), favorite outdoor space as a child and as an adult, level of greenness in chosen favorite outdoor spaces as a child and as an adult, and use of local parks as a child and as an adult.

There were a series of questions on the Nature Contact Survey that addressed restorative environments. A combined score from these questions was used to measure one of the dependent variables, restorative environment use in young adulthood. Favorite place, level of greenness of favorite place, and use of local parks, as a child and as an adult, were measured with one designated question each and answered using a Likert scale. Young adult total nature contact and current use of natural restorative spaces were scores created by combining the answers on several questions. Tables 1 and 2 outline the specific questions and the score category that each question represents.

Table 1.

Questions from the Nature Contact Survey Focused on Childhood Contact With Nature.

#	Question	Score category
4	Circle from the choices below the answer that best describes the physical setting in which you grew up. a) Urban b) Suburban c) Rural Town d) Rural Farm	Access to nature
5	Estimate the amount of time you spent outside as a child. a) 2-5 hours a day b) Less than 2 hours a day c) Less than 5 hours a day d) Less than 1 hour a day	Quality of nature
6	In general, was the time you spent outside as a child, between the ages of 5-12 years old, supervised? Always Most of the time Occasionally Never	Routine nature
7	Were your outdoor activities as a child a) structured by adults – sports, family hiking b) structure at younger ages but unstructured after about the age of 10 c) both unstructured and structured d) unstructured activities – self generated play, peer generated play	Routine nature
8	Did you have favorite outdoor places as a child (circle one) a) Many favorite outdoor spaces b) More than one place c) One special place d) Never had a favorite outdoor space	Favorite place & Quality of nature

If you answered that you “never had a favorite outdoor space” skip this rating scale and go to question #9.

Rate the level of “greenness” of your favorite childhood place.
(Circle one number)

	Urban/Concrete Not Green	Black Top	Grass/Trees	Forested Area Very Green	Greenness in favorite place & Quality of nature
	1	2	3	4	5
9	Did you have access to trees and wooded spaces during your childhood? Always Most of the Time Occasionally Never				Access to nature

10	How many trees do you remember being around the place you had access to as a child? a) acres of woods, too many trees to count b) a wooded area, less than one acre c) a few trees d) no trees	Access to nature
11	How close was your childhood home, or the place you most associate with your childhood to a country roadway, highway or town street? a) more than a mile from a road b) less than 1.5 miles from a road c) less than 200 yards from a road d) less than 50 yards from a road	Routine nature
12	Did you have access to outdoor play equipment as a child? Always Most of the time Occasionally Never	Routine nature
13	Did you frequent or use local parks or managed play areas as a child? Always Most of the time Occasionally Never	Park and recreation area use

Note. The number in the left column indicates the order the questions appeared on the survey. Score category references the area of interest addressed by the question and scoring category in which the question response was included.

20	How often do you access your favorite outdoor place? a) more than once a week b) more then twice a month c) more then twice a year d) less then once a year	Restorative nature use
21	How easy is it to get to your favorite outdoor space? a) very easy, I can access it by foot b) easy, a short distance – less then 15 minutes by car c) difficult, it requires advance planning d) very difficult, it requires extensive travel plans	Restorative nature use
22	What particular feelings inspire you to seek out nature or natural elements in your daily or routine spaces? a) stressed b) happy c) no particular feelings d) I don't seek out nature	Restorative nature use
23	How do you feel when you return from time spent in nature? a) relaxed b) more "clear headed" c) no change d) stressed	Restorative nature use

Note. The number in the left column indicates the order the questions appeared on the survey. Score category references the area of interest addressed by the question and scoring category in which the question response was included.

Reliability analyses conducted on the Nature Contact Survey indicate the overall survey has acceptable reliability ($\alpha = .779$). Subscales within the Nature Contact Survey, the adult nature contact ($\alpha = .715$) and restorative environments ($\alpha = .799$), have acceptable reliability scores. The childhood nature contact subscale obtained an unacceptable $\alpha = .496$. In further exploration of the subscale it became evident that two distinct constructs exist within the subscale, access to nature in childhood (survey questions # 4, 9 & 10) and quality of nature in childhood (survey questions # 5, 8 a and b). The childhood access to nature subscale obtained an $\alpha = .721$ and the quality of nature

in childhood subscale has an $\alpha = .599$.

I used four variables to identify the relationship between childhood nature exposure and intentional adult nature contact: (a) favorite place in nature, (b) level of greenness in the chosen favorite place, (c) use of local parks, and (d) the amount of time spent in nature (with or without a specific activity) during childhood and as a young adult.

The first example of a long-term relationship with nature is the connection between having a favorite outdoor space during childhood (allowing the subject to define “favorite outdoor space”) and having favorite outdoor places in adulthood. Favorite place, restorative space, and childhood space preference are closely related concepts (Korpela et al., 2002). Several questions on the survey asked the subject to report on favorite spaces.

The second indicator of continued relationship is level of greenness specifically in spaces the subject recognizes as favorite outdoor spaces. To understand the level of greenness in both childhood and adult favorite spaces, one question on the survey asked the participant to rate the level of “greenness” of the favorite outdoor space as a child and as an adult. Greenness refers to foliage as well as overall nature content in a designated space.

The third reported behavior that demonstrates an association between the use of nature in childhood and adulthood was the use of local parks or recreation areas. Parks and managed recreation areas are terms used to refer to a wide array of land areas including blacktop school play grounds, athletic fields, woods with marked trails for walking, state or national parks, and neighborhood playgrounds with or without play

equipment.

The fourth indicator of association between childhood and adult use of nature is total time in nature. This was gauged by self-reported time outside during middle childhood (6-13 years) and young adulthood (18-24 years). In my survey, the total childhood nature score reflects types of nature exposure. Two distinct constructs are measured in the childhood nature scores, access to nature and quality of nature. Access to nature measures the type of environment seen in childhood. The type of environment could be urban, suburban, rural town or rural farm. Access to nature subscale also includes the number of trees in or around the childhood home and ease of access to wooded areas. Quality of nature score measures the amount of time outside in childhood, level of greenness in favorite outdoor space, and ability to identify a favorite place. The adult nature scores reflect intentionally seeking nature for emotional soothing (coping) and routine nature exposure.

The fifth piece of data collected to examine the relationship between childhood use of space and intentional adult use of natural space was the natural restorative environment score. This score was calculated from survey questions that directly asked the subjects how often they currently sought nature for soothing.

Analysis

Two-tailed Pearson's correlations were conducted on each pair of variables using statistical software designed for the behavioral sciences (Statistical Package for the Social Sciences: SPSS, Version 16). Table 3 outlines the descriptive statistics for the behavioral indicators measured by the Nature Contact Survey.

Table 3 contains the descriptive statistics for Nature Contact Survey. As

mentioned earlier, total scores on the Nature Contact Survey ranged from 20 to 82, with a low score indicating little or no contact with nature during childhood and continued low contact in young adulthood. Overall scores in the middle of this range indicate some contact with nature either as an adult or as a child; and high scores indicate high contact with nature at both point of development. Restorative Environments scores ranged from 6 to 31. A score of 6 indicates little or no use of natural restorative spaces for soothing. Scores approaching 31 indicate the regular use of natural restorative spaces for soothing.

Adult nature contact scores ranged from 20 to 41. A score of 20 on the adult nature contact scale indicates little or no contact with nature currently, while scores approaching 41 indicate high contact with nature. Child nature contact scores ranged from 14 to 41. A score of 14 indicate little or no nature contact during childhood; scores approaching 41 indicate high contact with nature during childhood. Embedded in the childhood nature contact score is two distinct dimensions of nature contact. Quality of childhood nature is a distinct construct within the childhood nature subscale. Three questions make up this construct: 5, 8 a and b. The quality of childhood nature construct measures length of time outside, favorite outdoor space in childhood and level of greenness in favorite outdoor space. Access to nature is the second construct found in the subscale. The access construct measures physical setting of the childhood home (rural, farm, urban, suburban) access to trees and number of trees surrounding the childhood home. Questions 4, 9, and 10 of the Nature Contact Survey make up the access construct of the subscale.

Single question categories, such as favorite place and use of local parks represented scores calculated by comparing the answer on questions rephrased for past

nature use and current nature use. Single question category scores ranged from 0 to 4, 0 representing no favorite place, no local park usage, and no greenness in favorite place. Scores approaching 4 indicate the use of local parks, high levels of greenness in the chosen favorite place and the ability to identify more than one favorite outdoor place.

Table 3

Descriptive Statistics for the Nature Contact Survey Score Categories.

Score categories	Min score	Max score	<i>M</i>	<i>SD</i>
Composite scores				
Total nature contact	20	80	62.05	10.6
Restorative environ.	6	31	18.64	6.9
Nature contact- child	20	41	33.18	4.3
Access to nature-child	4	12	9.44	1.89
Quality of nature- child	3	13	10.29	2.64
Nature contact- adult	14	41	28.87	7.7
Single question score				
Favorite place - child	0	4	3.06	1.0
Favorite place - adult	0	4	2.32	1.1
Local parks use - child	0	4	2.5	0.852
Local parks use - adult	0	4	1.9	0.855
Greenness - child	0	4	3.34	1.77
Greenness - adult	0	4	2.48	2.1

Results

In an effort to acknowledge potential gender differences in how nature is utilized, the Nature Contact Scores of the men and women were compared using a *t* test. The *t* tests, $t(117) > 1.98$, $p < .05$, two-tailed, conducted on independent samples revealed that no significant difference exists between the mean scores for the men and women in this sample in all but one score category. The *t* scores grouped by gender in each score category are as follows: nature contact total ($t = 0.512$), childhood nature contact ($t =$

0.965), adult nature contact ($t = 0.174$), natural restorative environments use ($t = 0.241$), and favorite outdoor place in adulthood ($t = 0.840$), level of greenness in favorite outdoor spaces in adulthood ($t = 0.178$) and childhood ($t = 1.021$), and use of local parks and managed play areas currently ($t = 1.135$) as well as during childhood ($t = -0.487$). Significant gender differences were found in favorite outdoor place in childhood ($t = 2.19$). In this study, women reported significantly more favorite outdoor places ($M = 3.30$, $SD = 0.814$) compared to the men ($M = 2.88$, $SD = 1.14$). Based on the lack of gender differences, the current data were not sorted by gender when conducting correlations and analysis.

I found a strong positive relationship between childhood time in nature and young adult time in nature. Childhood nature contact was defined as any recalled events in nature prior to the age of 13. The study participants were all young adults (between the ages of 18 to 24 years). Participants reporting high levels of nature contact during childhood were more likely to report spending time in nature ($r(117) = .481$, $p < .01$; Figure 1).

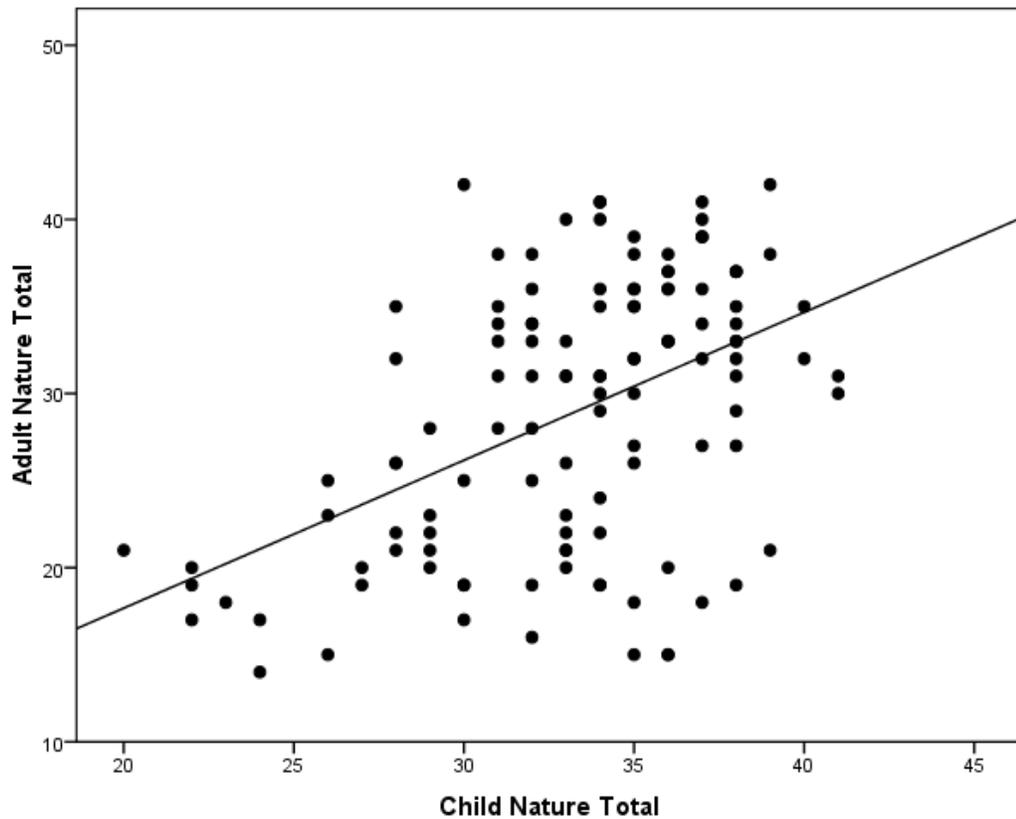


Figure 1. Correlation between adult nature contact and childhood nature contact.

No significant relationship was found between access to nature in childhood and young adult time in nature. I found a strong positive relationship between the quality of the nature experienced in childhood and young adult time in nature. Quality nature contact was defined as the ability to identify an outdoor favorite place, the rating of level of greenness of the identified favorite place and amount of time outside. An association was found between participants reporting higher levels of quality nature contact during childhood and reporting spending time in nature currently ($r(117) = .538, p < .01$; Figure 2).

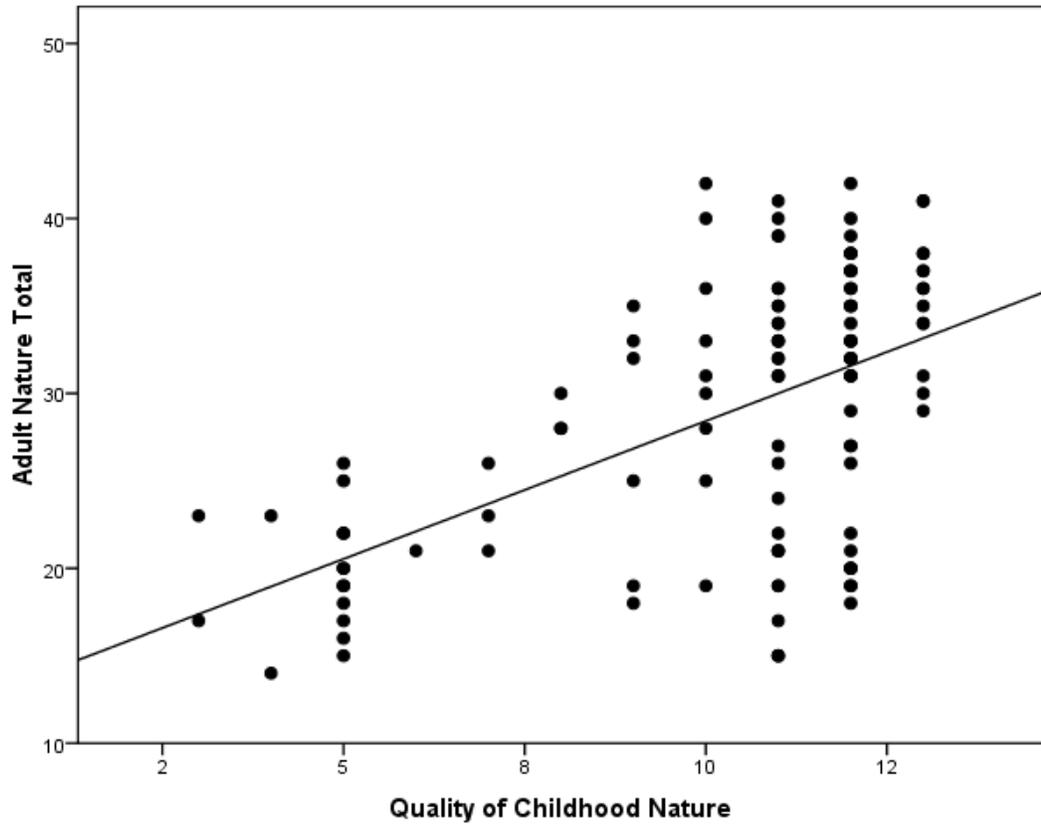


Figure 2. Adult nature contact and quality of childhood nature contact

The Nature Contact Survey assessed if the participant had a favorite outdoor space in childhood and currently in adulthood. Individuals reporting a favorite outdoor place in childhood were more likely to report having a favorite outdoor place as a young adult ($r(117) = .499, p < .01$; Figure 3).

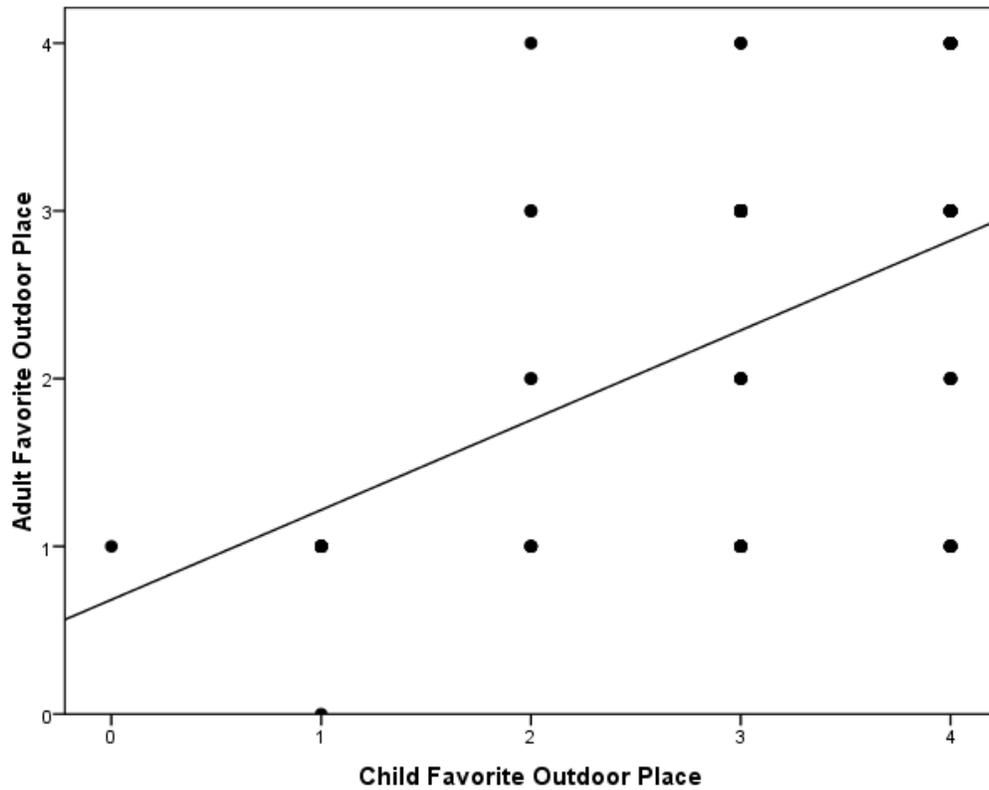


Figure 3. Correlation between adult and childhood favorite outdoor place.

The restorative environments score on the Nature Contact Survey is an aggregate score derived from the responses to a set of questions focused on the soothing qualities of outdoor spaces currently being utilized when experiencing stress. A positive relationship existed between time in nature throughout childhood and utilizing restorative environments currently ($r(117) = .463, p < .01$; Figure 4).

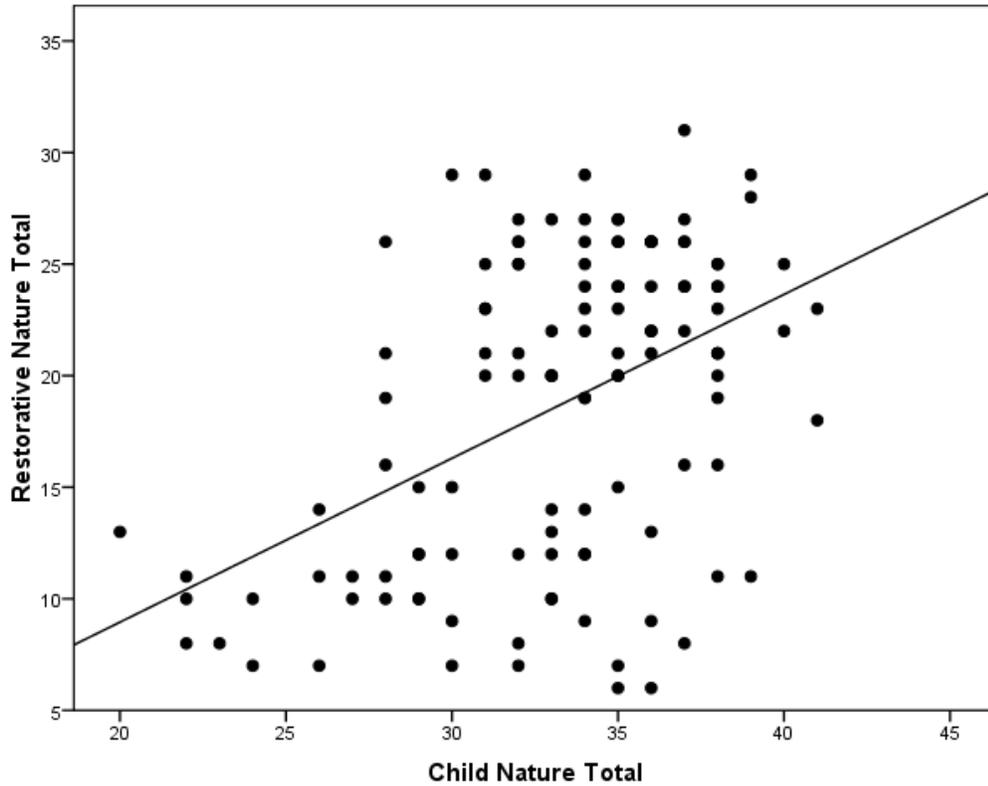


Figure 4. Childhood total nature contact and restorative nature use in young adults.

A positive correlation exists between restorative environment total and the quality of nature experienced in childhood. Participants reporting a high quality of nature contact in childhood were more likely to report being able to identify and utilize restorative environments currently ($r(117) = .562, p > .01$; Figure 5).

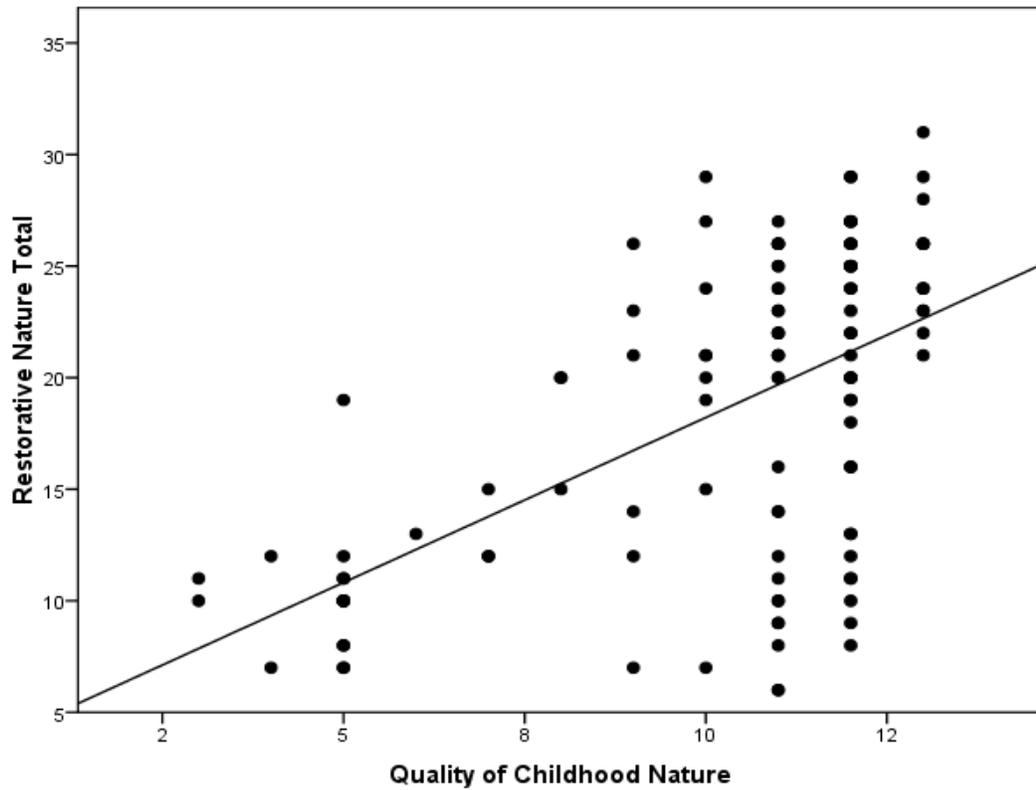


Figure 5 Quality of nature in childhood and restorative nature total

A strong positive correlation existed between having a favorite outdoor place in childhood and current restorative environments use ($r(117) = .506, p < .001$; Figure 6). Favorite outdoor place in childhood was measured using one question on the Nature Contact Survey. The restorative environments use score was calculated from the responses to several questions on the Nature Contact Survey.

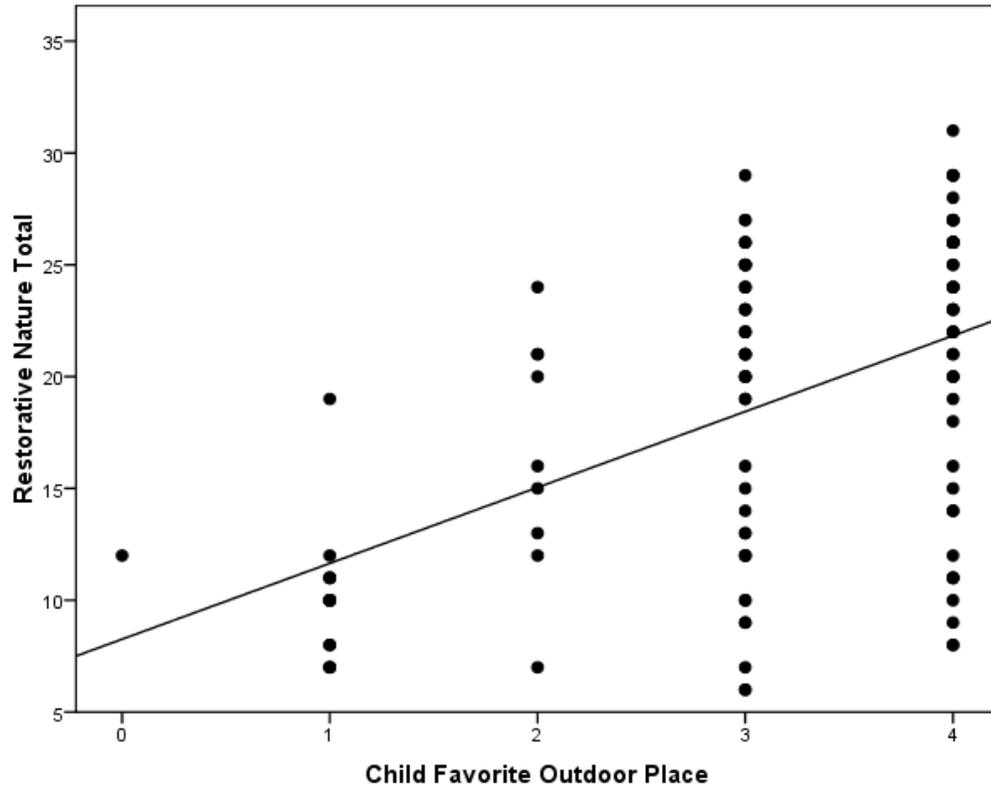


Figure 6. Correlation of adult restorative environments use and childhood favorite place.

I also found that the level of greenness in childhood favorite outdoor space was positively correlated with level of greenness in adult favorite outdoor spaces ($r(117) = .604, p < .01$; Figure 7). Level of greenness in childhood and adulthood was measured using the response to one question each on the Nature Contact Survey.

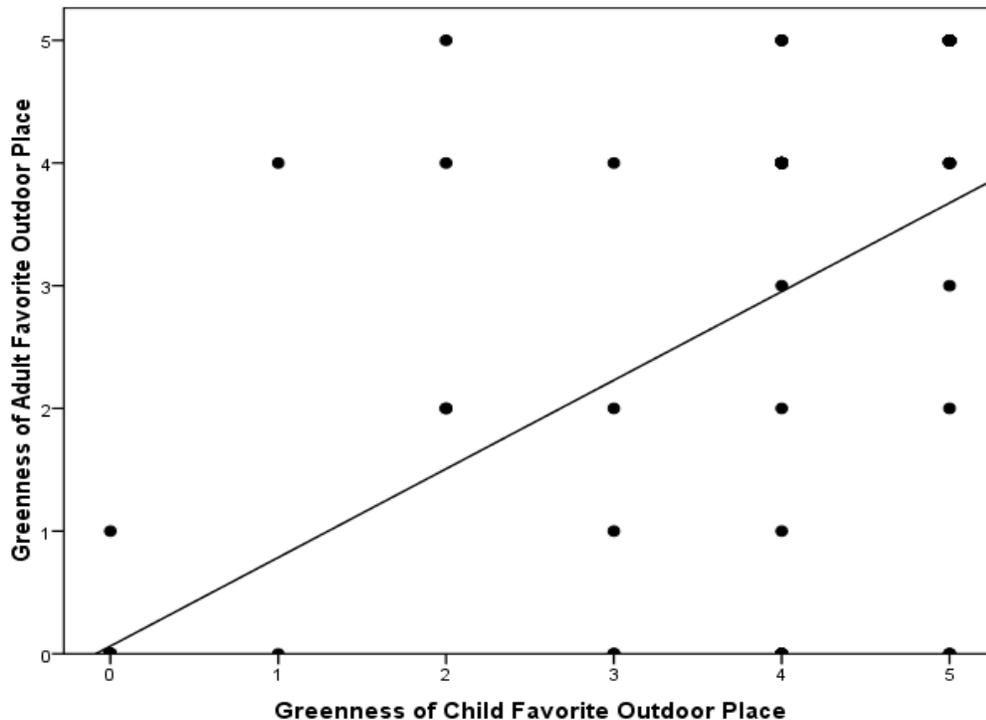


Figure 7. Relationship between greenness of favorite outdoor place in childhood and adulthood.

The identification of a current favorite outdoor space and the use of restorative environments for soothing have a positive significant relationship ($r(117) = .822, p < .001$; Figure 8). Adult favorite outdoor space was measured using one question from the Nature Contact Survey, whereas restorative environments use was measured using the responses to several questions. A statistical relationship between the scores for favorite outdoor space use and restorative environments use was expected, based on the construction of the survey instrument. The question about favorite outdoor place was one of the questions that contributed to the restorative environments score.

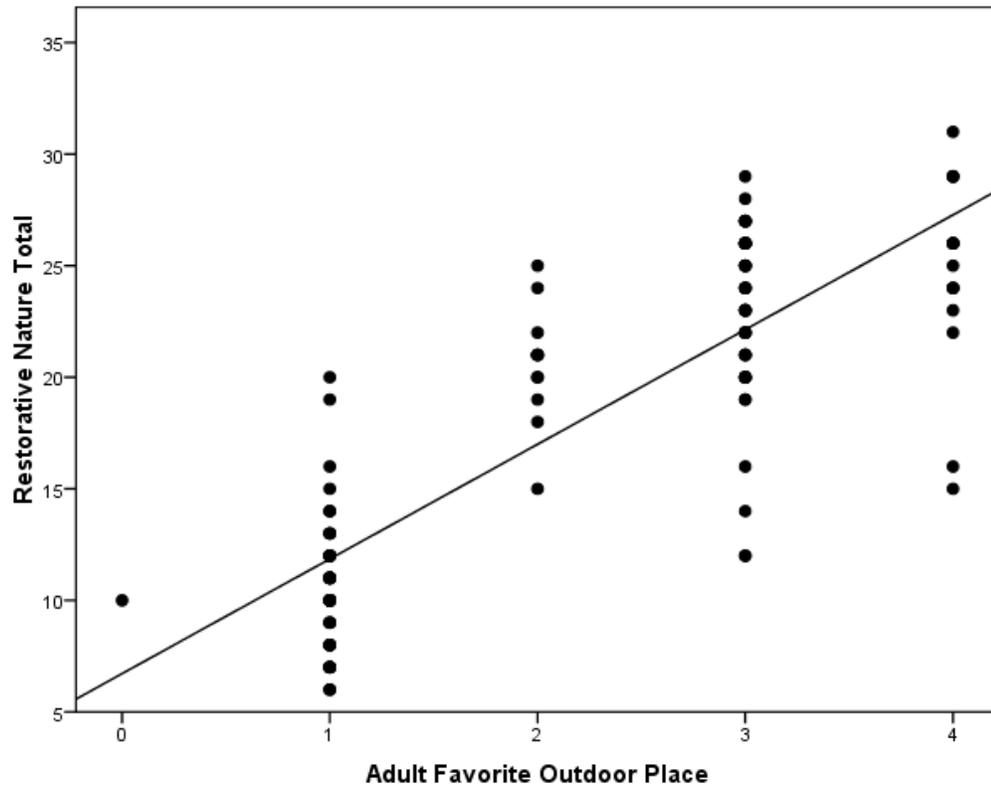


Figure 8. Adult favorite outdoor space and current restorative environment use.

Adults who reported utilizing local parks or other managed play areas as children indicate that they were more likely to use local parks or managed play areas in young adulthood ($r(117) = .494, p < .001$; Figure 9).

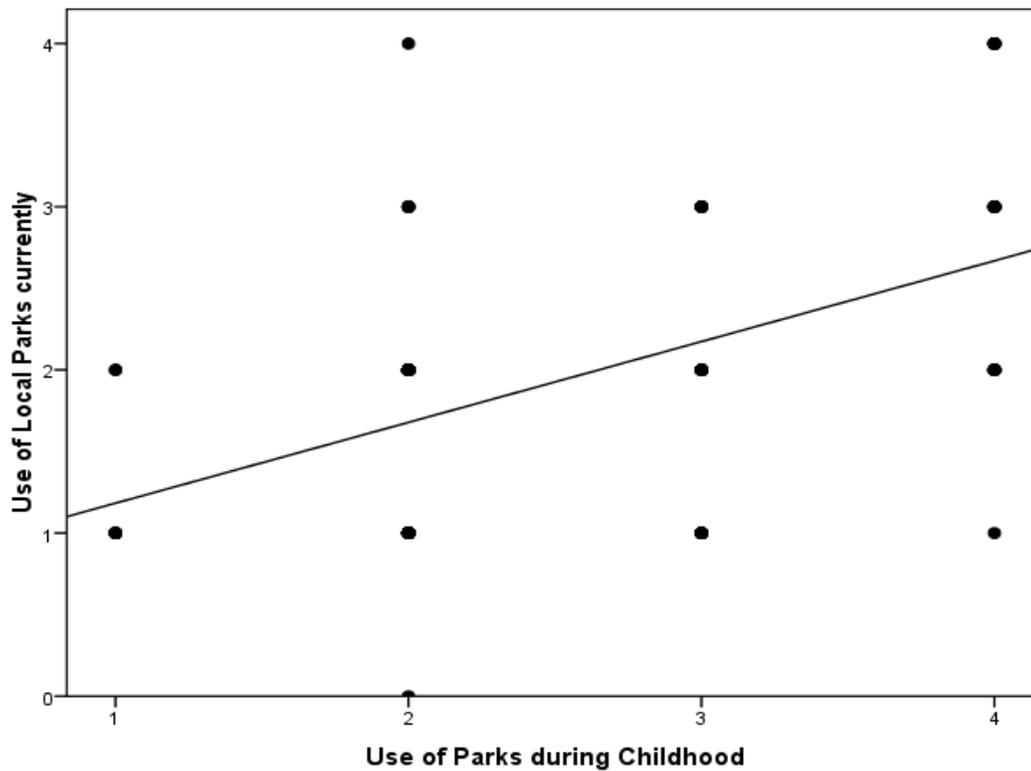


Figure 9. Childhood parks and recreational space usage and adult (current at time of research) use of parks and recreational space usage.

Discussion

My findings supported the hypothesis that time spent in nature during childhood is associated with intentionally using natural restorative environments for soothing in young adulthood. This is a new finding and points to an aspect of a psychological relationship with nature not explored in other research. Arthur (1997, 1998) has written extensively about the breadth and depth of coping strategies in college populations, but does not address the link between childhood nature experience and adult coping skills. Carver (1989) developed the COPE instrument and continues to conduct research on coping skills in college populations, but his work does not recognize contact with restorative natural environments as a coping skill.

Despite the current lack of recognition of the importance of nature contact in coping, many famous child development theorists do recognize contact with nature as critical to healthy development. Gesell (as cited in Crain, 2000) poignantly speaks of the natural environment of his childhood and uses nature metaphors to explain developmental processes. Jean Piaget (as cited in Evans, 1973) writes about his childhood in nature with great fondness and recognition of its effect on his life's work. Both were strong advocates for allowing children time in nature as part of healthy development. My findings underscore the significance of these personal stories and may encourage future research on the relationship between childhood nature contact and adult coping.

A strong positive relationship between having a favorite outdoor place in childhood and having a favorite outdoor place as a young adult was established in this research. These results also indicate a positive correlation between the level of greenness in favorite outdoor space in childhood and in adulthood. This confirms the finding of Ward-Thompson et al. (2008), supporting the conclusion that a relationship with green spaces continues from childhood into adulthood. This information is a unique contribution to our understanding of the relationship between people and nature.

Adult favorite places are often restorative spaces that allow for self-regulation of emotions, and they are often found in nature (Korpela et al., 2001). Specific qualities of restorative spaces are found in children's refuge spaces and may indicate that children's favorite outdoor spaces are also restorative spaces (Kirkby, 1989; Moore & Wong, 1997). The results of my research suggest that quality time in nature including amount of time spent outside during childhood is associated with utilizing restorative environments in

adulthood. The current results also support the conclusion that both children and adults identify favorite outdoor spaces, and suggest that these spaces have restorative qualities that allow for stress reduction and soothing.

Multiple factors influence a child's use of recreational land, including a parent's willingness to allow the child access to the space and the compatibility of the space to the child's interests and capacities (Hart, 1979, 1999). Unlike young children, young adults did not have to rely on other people's willingness to access the space. Two parks and one recreational space are within walking distance from the center of the college campus used in this research. Participants were not asked to clarify if they frequented the local parks and recreation spaces in the vicinity of the college. A strong positive correlation was found between childhood and young adult use of local recreation areas. This finding is consistent with the findings of Ward-Thompson et al. (2008).

Few studies on human-nature relationship have directly confirmed the oft-assumed relationship between amount of time spent outside in nature during childhood as compared to other children, and the time spent in nature during young adulthood as compared to their peers. I found a relationship between the relative amount of time spent in nature during childhood and the relative amount of time spent in nature as a young adult. Cognitive and social developmental theory suggests that past experience shapes adult behavioral choices (Crain, 2005; Erikson, 1993; Thomas, 2001). Research in which adults identified critical childhood events in nature and their current affinity toward nature further supports the link between child and adult relationships to nature (Chawla, 1998, Kals et al., 1999; Korpela et al., 2002).

There are five conclusions we can draw from these findings. First, spending time

outside as a child in green space is associated with spending time outside as a young adult. Second, the same individuals who reported exposure to higher quality nature during childhood were more likely to use natural restorative spaces for emotional soothing. Third, participants reporting having a favorite outdoor place in childhood were more likely to be able to identify a favorite outdoor place as a young adult, and fourth, the level of greenness in both of the spaces identified was similar. Last, young adults who reported utilizing parks and managed play areas as children also reported that they were more likely to use similar spaces as compared to cohort members with limited childhood nature experience.

The Nature Contact Survey is a newly designed assessment instrument and has not been used in other settings or studies. The low reliability score on the Childhood Nature Contact subscale has been adjusted for and a revised Nature Contact Survey has been created to address these concerns (Appendix G). I believe that caution should be used when applying these findings to other settings until the instrument has been tested in a variety of settings. All the data were collected from students attending a small private college in the northeastern United States; thus, the results may be limited in their generalizability outside of this geographical region. Few minority individuals were included in the research group only because the college student body used for the study was not highly diverse. The assessment battery needs to be used in more diverse populations to ensure that the research findings of this sample can be applied to other groups.

The current research has provided several important findings. Young adult college students face academic demands, life stressors, and developmental challenges at a

time in life that allows the research a unique view of the development from child to adult (Arthur, 1998, 1997). The current results reflect this generation's past and current relationship with nature and may not predict this trend in other generations. Time in nature throughout childhood allows for the development of a pattern of contact with nature that extends into adulthood.

There is a public concern about the increased amount of time children are spending indoors compared with children in previous generations. Evidence indicates that today's generation spends less time outside than did previous generations (Louv, 2005; Orr, 2002). The findings of my research suggest that the lack of exposure to nature during childhood may contribute to the reduction of using natural restorative environments as a coping skill during young adulthood.

The same results might be explained by childhood exposure to role models that expressed a relationship with nature for soothing or direct nature experience in organizations that value nature contact such as Boy scouts, Girl scouts, 4-H or summer camp. The survey did not ask individuals to share their individual participation history in community-based organizations. Role modeling from parents and the family of origins ethnic background may shape both childhood and adult relationships with nature. Some cultures place higher value on nature's connection to mental health. These factors were not accounted for in this research but may generate similar findings if separated from simple reporting of childhood time outside.

The next logical step for research is to examine the link between the child-nature bond and the adult-nature bond in more detail. Areas for further exploration include distinctions between individuals involved in structured activities in specific outdoor

spaces (e.g., athletic fields) and those participating in an unstructured activity in natural outdoor space (e.g., walking in the woods). Future research studies should explore the differences and similarities between children growing up in urban environments, and how they use parks vs. the use of parks by children growing up in rural environments. The role of social interactions during contact with nature throughout childhood and adulthood should also be investigated. Ethnic background and cultural history are factors that should be explored to further understand nature and mental health connections.

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CHAPTER THREE

College Students' Coping: Exploring the Relationship Between a Reliance on
Active Coping Skills and Exposure to Nature in Childhood.

Abstract

I explored the relationship between active coping, as defined by the Coping Orientation Problems Experienced (COPE) scale developed by C. S. Carver et al. (1989), and the use of natural restorative environments as a coping skill. Natural restorative environments are outdoor spaces that restore emotional energy, reduce mental fatigue, and promote soothing. One hundred and nineteen (69 men and 50 women) college students completed a Nature Contact Survey that evaluated the use of restorative environments, current contact with nature as well as during childhood, and the COPE scale. The results indicate that there is a positive relationship between the use of active coping skills and nature contact. Time in nature during childhood, time in nature currently as a young adult, seeking restorative natural environments for soothing, and overall time in nature was each positively correlated with the use of active coping skills. In contrast, passive coping strategies were not significantly correlated with nature contact. On the basis of these findings, the use of natural restorative spaces for soothing maybe classified as an active coping skill.

“When faced with a tough decision or when I am upset, I walk through the woods. I work out the problem in my head, weighing the pros and cons of my choices, without my cell or other things to distract me.” This simple statement made by a young woman answering the question, “What do you do when you’re upset?” revealed a history of nature contact as a coping strategy. She used nature for soothing and has incorporated contact with nature into her coping skills. By using focused problem-solving strategies to reduce her stress, this young woman demonstrated the use of active coping skills. My next question, “Did you spend much time outside when you were younger?” was followed by an enthusiastic “Yes, I loved being outside when I was little.”

Anecdotally, I have found that students who include nature contact in their coping skill set have two things in common: They frequently report spending time in nature during childhood and they use active coping skills more often than passive coping skills. I hypothesized that adults who use natural restorative environments for soothing will report contact with nature during childhood. This same group of individuals will also demonstrate a reliance on active coping strategies. My hypothesis is based on the idea that exposure to routine nature (outdoor spaces that are part of daily or routine contact such as green spaces in backyards, school play grounds, or neighborhood parks) during childhood is associated with a likelihood that natural restorative environments will be perceived as soothing and utilized in young adulthood for coping. Natural restorative environments are outdoor spaces that allow for increased emotional soothing, reduced mental fatigue, and increased attentional capacity (Kaplan, 1995).

The progression from childhood experiences in nature to the understanding that contact with nature is soothing, followed by the use of natural space for soothing

indicates an active coping process. Thus, individuals using natural restorative environments to cope with difficulties are more likely to demonstrate a reliance on active coping skills. This chapter begins with definitions of key concepts and an overview of coping skill development, followed by an overview of the relationship between anxiety reduction and restorative environments, and concludes with a summary of the research on college student coping.

Defining Coping

Coping is defined as the thoughts and behaviors used to manage the internal and external demands of situations that are appraised as stressful (Folkman & Moskowitz, 2004). Coping skills make up the behavioral repertoire and cognitive processes used by an individual to manage stress. Coping is also context-specific in that the process of coping is a function of the connection between the person and his or her environment (Hood & Carruthers, 2002).

Two types of coping skills, problem-focused and emotion-focused, are discussed in the literature (Bond & Rosen, 1980; Carver et al., 1989; Kariv & Heiman, 2005; Pritchard & Wilson, 2006). Problem-focused coping skills include outlining the problem, delaying anger, soliciting solutions from others, giving events a positive reinterpretation, planning, and suppressing competing activities. Emotion-focused coping skills include denial, venting emotions, seeking social sounding boards, and participating in religious practices such as praying, reading a religious text, or consulting a religious leader. These skill sets are also referred to as active coping (problem-focused) and passive coping (emotion-focused). Although both passive and active skills can be used for soothing or stress reduction, active skills are more effective for alleviating the symptoms of stress,

such as depression (Mosher & Prelow, 2007).

Coping efficacy is the belief that a positive outcome is possible and that one can deal effectively with both the emotional and cognitive demand of a current stressor (Sandler et al., 2000). The choice of coping skills is directly influenced by the belief of coping ability. Research with adolescents indicates a negative correlation between active coping skills and depression symptoms (Compas et al., 2001). A longitudinal study in Germany found a positive relationship between passive coping skills and depression symptoms (Seiffger-Krenke & Klessinger, 2000). This study also found that overall maladjustment is associated with those coping skills that ignore or avoid the stressor. Adolescents using active coping skills reported less depressive symptoms than did those who used passive coping skills (Herman-Stahl et al., 1995). These studies suggest that active coping skills are more effective in dissipating feelings of stress and depression.

Each person develops different coping patterns. The breadth and depth of these coping skills are based on the individual's personality, the perceived support networks, a positive experience with a specific strategy, and the resources available for coping. Coping resources can be grouped into four categories (Hood & Carruthers, 2002): *physical coping resources*, such as a quiet space, a safe location, or restorative indoor or outdoor spaces; *psychological resources*, such as a positive attitude, belief in a universal ethic, self-confidence, self-esteem, and belief in the future; *social resources*, such as family, friends, cohort groups, other interpersonal connections and social services (e.g., hospitals, police, firemen); and our *lifestyle choices*, including how we live, who we live with, and what or who we live for (Hood & Carruthers, 2002). These four coping resources (physical, psychological, social, and lifestyle) are combined with active and

passive coping skills for managing anxiety and stress.

Physiology of Stress

The interaction between stress and environment is important to the physiology of stress. Hans Selye's (1956) model of the body's reaction to stressful situations is called the general adaptation syndrome. This model recognizes the importance of environmental factors in coping. Selye recognizes our stress response as a three-phase physical process: (a) alarm, in which the body prepares for action and exhibits increased arousal; (b) resistance, the attempt to cope with the stressor; and (c) exhaustion, in which the body can no longer resist the stress and physiological breakdown begins (Selye, 1956).

Selye (1956) acknowledged the role of the environment in shaping neural pathways and the resulting changes in brain physiology that affect an individual's ability to cope with a new stressor. Conditions, such as past experience, that become part of the body and directly influence the way we react physically to new stressful experiences (Solomon & Heide, 2005).

Following this logic, I suggest that negative experiences in a specific environment increase the likelihood that future exposures to that or similar spaces will be stressful. Conversely, positive experiences in a space increase the likelihood that future contact with that space will be positive. These "internal conditions" can encourage or discourage the use of nature for soothing. I predict that children with access to natural restorative spaces within their nature exposure have the opportunity to develop "internal conditioning" that supports the use of coping strategies that incorporate nature in adulthood. Figure 1 outlines the theoretic progression from routine nature exposure in childhood to the development of seeking natural restorative environments in adulthood.

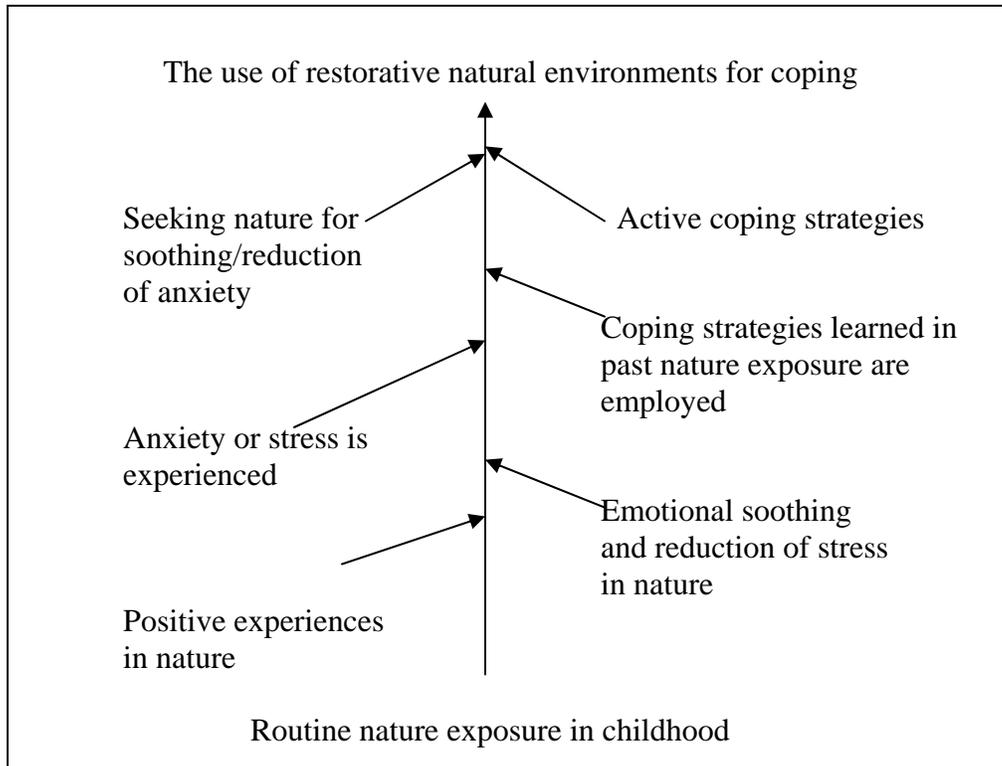


Figure 1. A theoretical model for the use of restorative natural environments.

The process outlined above echoes the ideas put forth by James (1890) and Selye (1956), both asserted that the environment is not neutral and that it possesses qualities that interact with the individual's own experience and emotional history. Past experience shapes current interactions with space.

College students have demanding lives, yet they must be able to negotiate many environments and landscapes successfully while dealing with stress. Contact with nature in restorative spaces creates physical relaxation (Ulrich et al., 1991), cognitive restoration (Berto, 2005) and emotional calm (Kaplan, 1995). Natural restorative environments can help college students address all three potential avenues of anxiety: physiological, cognitive, and emotional.

Anxiety and Restorative Environments

Anxiety produces very clear physical side effects that can be countered by intentional relaxation. In psychotherapeutic practice, it is common to use mental and visual images of nature to reduce both the psychological and physiological effects of anxiety (Jongsma & Peterson, 1995). However, it is not common for a therapist to ask clients how much time they spend in natural settings and how those spaces make them feel. Therapists that treat anxiety without exploring the client's relationship with nature may be missing a critical piece of assessment data and potential treatment information.

As William James so eloquently stated, biological, psychological, and experiential aspects of the human-environment interchange shape the experience of space. He believed that "all spatial knowledge is sensational at bottom", all knowledge is gathered through the sense experience (James, 1981, p. 793). James did not separate the perceiver and environment into discrete entities, but acknowledged that both are undifferentiated parts of the immediate experience (Hammersley & Atkinson, 1985; Heft, 2001). The emotional experience of space cannot be separated from the physical and cognitive experience. This principle suggests that nature contact and our emotions are closely linked.

This interaction happens in small microrestorative environments as well as in large expanses of land. Natural "microrestorative" opportunities within a landscape allows for emotional restoration (Taylor, Kuo and Sullivan, 2001). Microrestorative environments include green spaces between buildings, benches in the shade of a tree, and interior green courtyards. The primary element of microrestorative environment is the ease of access and its incorporation into built landscape.

In the time period since the concept of the restorative qualities of natural spaces was introduced in the 19th century (Heft, 2001), the need for restorative experiences and environments in our daily lives has grown. Our ability to voluntarily focus on several tasks simultaneously is required to meet larger and more complex demands (Orr, 2002). Mental fatigue is the result of uninterrupted periods of voluntary focus (Kaplan & Kaplan, 1989). Without relief, mental fatigue takes a toll on the human psyche (Kaplan, 2001). Depression, anxiety, stress reactions, and exhaustion are the ultimate outcome of unrelenting demands on our mental energy (Selye, 1976).

College Students and Coping

Traditionally aged college students are in a developmental period marked by the transition between late childhood (17 years) and acknowledged adulthood (24+ years). Between 17- and 24- years of age, individuals experience many opportunities to refine existing coping skills and learn new skills to address adult stressors. Coping skills are repeatedly tested, revised, and reinvented in an atmosphere away from childhood peers, parental guidance, and familiar environments.

The development of coping skills is a continuing process; therefore, new skills are kept or discarded with experience. Arthur (1998) explored the relationship between stress, depression, anxiety, and coping strategies in postsecondary students. According to these findings, the degree of emotional distress reported by postsecondary students indicate that many students are not equipped to cope with situations they perceive as demanding. Arthur (1998) also found that different coping strategies are used for different types of problems. Emotionally based coping strategies (passive coping) are used more often to resolve emotionally based stress successfully. Problem-focused

strategies (active coping) are employed continually at varying levels, regardless of the type of problem (Arthur, 1998).

Research on gender differences in coping has yielded mixed results. Research indicates that women rely on emotion-based strategies consistently throughout their academic career. Male students increase their use of emotion-based strategies by the end of the first academic year (Pritchard & Wilson, 2006). Women tend to utilize social support for coping more often than do men (Castle, 2006). Seeking social support is a mixed coping strategy: It is both emotion-based (passive) and problem-solving (active). Both male and female college students use a combination of passive and active coping skills (Hess & Richards, 1999).

Research Question

The current generation of 18- to 24-year olds are ill-equipped to cope with the ever increasing stress of our world (Arthur, 1998; Arthur & Hayward, 1997; Twenge, 2000) and these young adults are spending less time in natural environments when compared to previous birth cohorts (Louv, 2005; Orr, 2002). Is there a relationship between time in nature during childhood, the use of natural restorative environments as a young adult and a reliance on active coping strategies? To answer these questions I designed an instrument to measure contact with nature and correlated the results with responses from a clinical assessment of coping skills.

Method

Subjects

Subjects were selected from the pool of 18- to 25-year olds matriculated at New England College, a 4-year undergraduate institution of higher education in the Northeastern United States. Subjects were recruited through campus advertising, class announcements, and word-of-mouth during the spring semester of 2005. After a verbal review of the consent form, each subject signed an acknowledgment of participation. If at any time during the research protocol, a subject disclosed a substance abuse problem, a present episode of clinical depression, or a recent suicide attempt, he or she was removed from the research protocol. Only 2 subjects out of 121 were removed from consideration due to these restrictions. One hundred and nineteen (50 women and 69 men) participants completed the research protocol. Subjects were predominately of White racial ethnicity due to the low diversity of the institution where the research was conducted. Less than 3% of the subjects were of non-White ethnic background.

In order to ensure ethical data collection, the research proposal for this work was reviewed with the appropriate administration at New England College, the test site. The research protocol was also reviewed and approved by the Internal Review Board at Antioch University New England to ensure ethical research procedures.

Instruments

I designed an instrument to assess the level of nature contact at two points of development. The Nature Contact Survey was created after an extensive review of the literature on restorative environments (Kaplan et al., 1998; Kaplan, 1995; Kellert & Wilson, 1993; Korpela et al., 2002; Ulrich, 1979) and a pilot study. The pilot study

interviews were conducted with 9 college students (5 women and 4 men). Each pilot study participant was asked open-ended questions about his or her nature contact at two points in development, middle childhood and currently.

The pilot subjects were between 18- and 24- years old, the same birth cohort as the research participants. Pilot subjects were also demographically similar to the participants of the research protocol, being White middle-class students attending a rural college in New England. For the current research protocol, the pilot study interview questions were reformatted into written survey questions. The answers generated from the pilot study interviews were used to create a set of written response choices for each question on the written survey. This process increased the likelihood that all possible answer choices were represented in the written survey and that the questions accurately elicited useful responses.

Several colleagues, including psychologists and practicing clinicians, reviewed the survey. These colleagues included Dr. Craig Knapp (clinical psychologist), Dr. John Vojtisek (clinical psychologist), and Dr. Louise Chawla (environmental psychologist and committee member). Design changes included the simplification of response choices to multiple-choice options, the rewording of response choices, and the refinement of the Likert scale.

The Nature Contact survey. The 23-question survey elicited a set of responses about time in nature at two points in the individual subject's lifetime. Questions were repeated in similar language in two sections of the survey to allow the subject to answer a question in regard to childhood experience and then to provide the same information in regard to current experiences. For example, question 5, "Estimate the amount of time you

spent outside as a child” corresponds to question 14, “Estimate the amount of time you spend outside now, as an adult.” This design allowed for comparison between the past and the present.

Overall contact with nature across development was calculated by adding the adult nature contact score to the childhood nature contact score, resulting in the “total nature contact score.” This overall score included the responses to 21 questions on the survey. Childhood nature contact, adult nature contact and restorative nature contact scores were included in this sum.

The “childhood nature contact score” was calculated by summing the scores on 13 survey questions specifically focused on childhood contact with nature. Childhood nature contact scores ranged from 20 to 41. A score of 20 indicates little or no nature contact during childhood. Scores approaching 41 indicate high contact with nature during childhood. Quality of childhood nature is a distinct construct within the childhood nature subscale. Three questions make up this construct: 5, 8 a and b. The quality of childhood nature construct measures length of time outside, favorite outdoor space in childhood and level of greenness in favorite outdoor space. Access to nature is the second construct found in the subscale. The access construct measures physical setting of the childhood home (rural, farm, urban, suburban) access to trees and number of trees surrounding the childhood home. Questions 4, 9, and 10 of the Nature Contact Survey make up the access construct of the subscale.

The “adult nature contact” score was the sum of all questions regarding the greenness of the environment that the individual is in regular contact with, park or recreation area use, and the amount of time currently spent outside in any activity. Scores

ranged from 14 to 41. A score of 14 indicates little or no current contact with nature. A score of 41 indicates high contact with nature.

The “restorative environment score” was calculated using the responses to a set of six questions focused on adult use of natural spaces for soothing. Restorative environment scores ranged from 6 to 31. A score of 6 indicates little or no use of natural restorative environments for soothing whereas scores approaching 31 indicate regular use of natural restorative spaces for soothing.

Total scores on the Nature Contact Survey ranged from 20 to 82. A score of 20 indicates little or no contact with nature during childhood and continued low contact into adulthood. Overall nature contact scores in the middle of this range indicate some contact with nature either as an adult or as a child. Scores approaching 82 indicate high contact with nature at both points in development.

One standard deviation above the mean or higher on the Nature Contact Survey was categorized as high nature contact and one standard deviation below or low was categorized as low nature contact. Scores within one standard deviation above and below the mean were categorized as average nature contact scores. This delineation of score categories was developed following the established pattern of clinical assessments such as the State-Trait Anxiety Inventory and Beck Depression Inventories (Barroso & Sandelowski, 2001; Spielberger et al., 1970).

Reliability analyses conducted on the Nature Contact Survey indicate the overall survey has acceptable reliability ($\alpha = .779$). Subscales within the Nature Contact Survey, the adult nature contact ($\alpha = .715$) and restorative environments ($\alpha = .799$), have

acceptable reliability scores. The childhood nature contact subscale obtained an unacceptable $\alpha = .496$. In further exploration of the subscale it became evident that two distinct constructs exist within the subscale, access to nature in childhood and quality of nature in childhood. The childhood access to nature construct obtained an $\alpha = .721$ and the quality of nature in childhood construct has an $\alpha = .599$.

Coping Orientation for Problems Experienced (COPE) Assessment.

Carver, et al. (1989) designed the Coping Orientation for Problems Experienced (COPE) assessment after recognizing the lack of a theoretic structure to many of the existing clinical measures of adult coping of that time (see Appendix D). Measures prior to the development of the COPE assessment were empirically, not theoretically, structured. Carver et al. (1989) created an instrument using two theoretical models: Lazarus's model of stress, a cognitive model based on attribution and appraisal, and a model of behavioral self-regulation, the conscious and unconscious processes which regulate thoughts, emotions, attention, and task performances. The COPE assessment was reliable as compared to existing instruments and was designed and statistically normed using a college student sample (Carver et al., 1989.).

Thirteen conceptually distinct scales are incorporated into the COPE. The scales are categorized into two types of coping skills: problem-focused (active) coping and emotion-focused (passive) coping. Active coping strategies include positive reintegration, restraint, the suppression of competing interests, planning, and instrumental social support. Passive coping includes focused venting, formal structured religious practice, denial, negative or non-problem-focused reintegration, and mental and behavioral disengagement. As seeking natural restorative environments is not a coping strategy

included on the COPE assessment, this research explores the hypothesis that this is an active coping skill.

The COPE assessment (Carver et al., 1989) indicates the type of coping strategies that the subjects typically employ during times of stress. The results can be expressed in three different formats. The total COPE score reveals the depth and breadth of skills in an individual's coping repertoire. Coping scores can also be categorized as active or passive coping skills. High scores on a specific skill indicate reliance on a specific coping strategy, such as reintegration or the use of humor to reduce stress. Each of the thirteen categories of coping strategies is addressed by four questions, for a total of 52 questions. Each affirmative answer equals one point. A score of 4 in any coping category indicates that the subject frequently uses that particular strategy as a coping mechanism.

Analysis

Two-tailed Pearson's correlations ($df = 117$) were conducted on each pair of variables using statistical software designed for the behavioral sciences (Statistical Package for the Social Sciences: SPSS, Version 16). Correlations were performed on the following pairs of variables: restorative environment use and active coping based on the COPE assessment, adult (or current) time in nature and active coping, childhood time in nature and active coping, overall nature contact and active coping, restorative environments use and passive coping, current time in nature and passive coping, childhood time in nature and passive coping and overall time in nature and passive coping. Table 1 outlines the pair of variables used in each correlation and displays the relationship between the two variables. The t tests conducted on independent samples, $t(117) > 1.96, p < .05$, two-tailed, grouped by gender showed no significant difference

between the mean scores of reported active coping skills ($t = 0.629$) and passive coping skills ($t = 0.250$) usage. Since gender is not a critical factor in the use of passive and active coping skills, the genders were not separated in subsequent data analyses.

A comparison of z scores was conducted to find any outliers in the active coping data. A Mahalanobis distance was conducted on the active coping scores as well. Neither calculation indicated significant outliers in the data despite what visually appear to be outliers on the graphs presented in the results.

Table 1

Correlation Pairs

Variables correlated	Active coping	Passive coping
Restorative environment use	Restorative environment use & active coping scores	Restorative environment use & passive coping scores
Childhood nature contact	Childhood nature contact & active coping scores	Childhood nature contact & passive coping scores
Quality of childhood nature	Quality of childhood nature and passive coping scores	Quality of childhood nature and passive coping scores
Childhood access to nature	Childhood access to nature and passive coping score	Childhood access to nature and passive coping score
Current (adult) nature contact	Current nature contact & active coping scores	Current nature contact & passive coping scores
Total overall nature contact	Total nature contact & active coping scores	Total nature contact & passive coping scores

Results

A positive correlation was found between restorative environment use and a reliance on active coping skills ($r(117) = .222, p < .05$), as seen in Figure 2. Responses to

the restorative environments survey questions were included in the adult nature contact score. Creating the restorative environments score by separating the adult nature contact responses from the total score allowed for a more definitive assessment of the intentional use of nature for soothing.

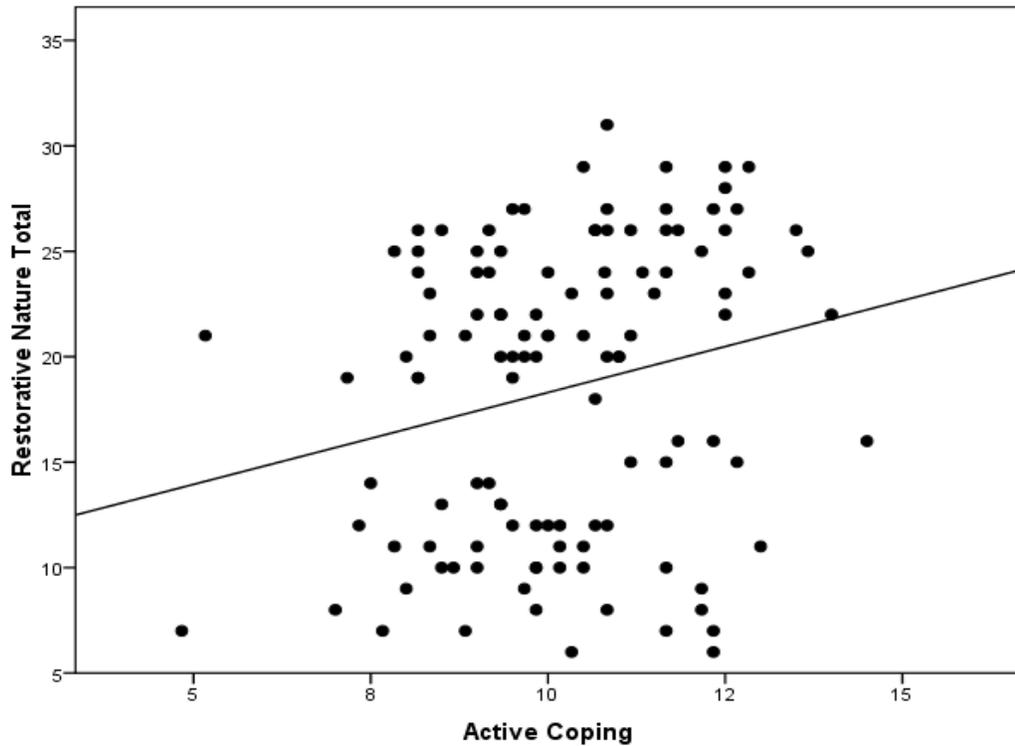


Figure 2. Correlation between restorative environments use and active coping skill total.

Adult nature contact was one aspect of the total nature contact score. This score reflected time in nature currently, in young adulthood. Figure 3 shows the positive relationship found between adult time in nature and a reliance on active coping skills ($r(117) = .272, p < .01$).

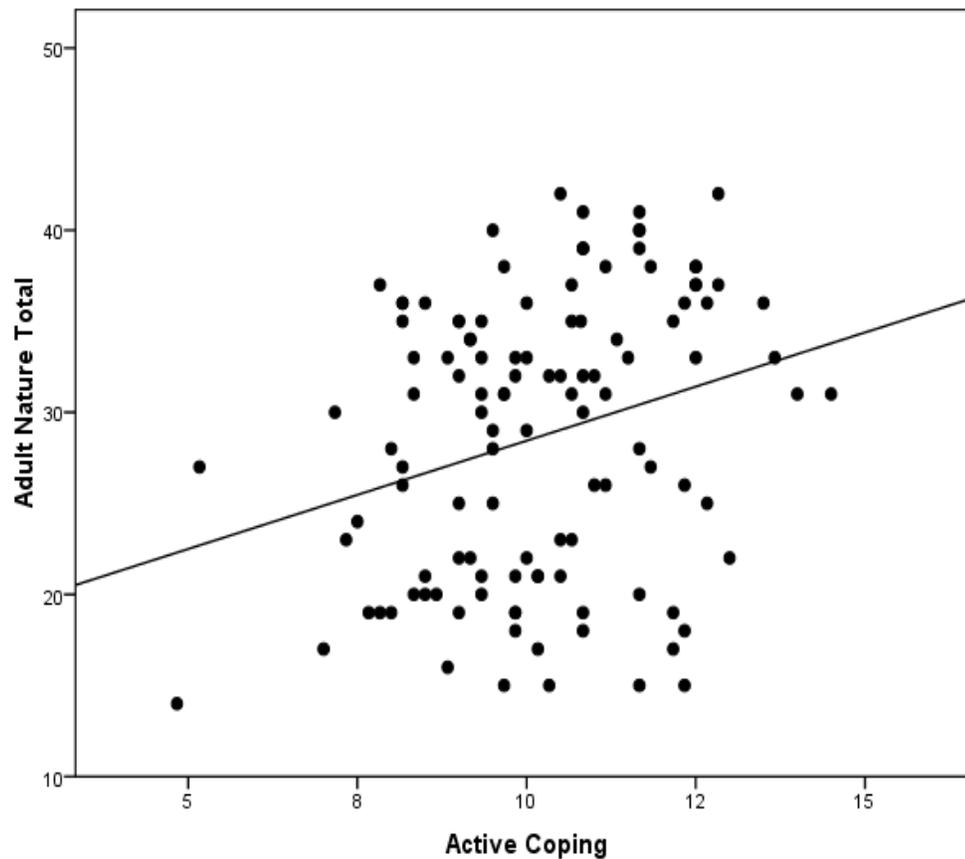


Figure 3. Correlation between adult nature contact and reliance on active coping skills..

The childhood nature score indicates level of contact with nature during middle childhood. The use of active coping skills in young adulthood positively correlated with childhood nature contact ($r(117) = .204, p < .05$; Figure 4).

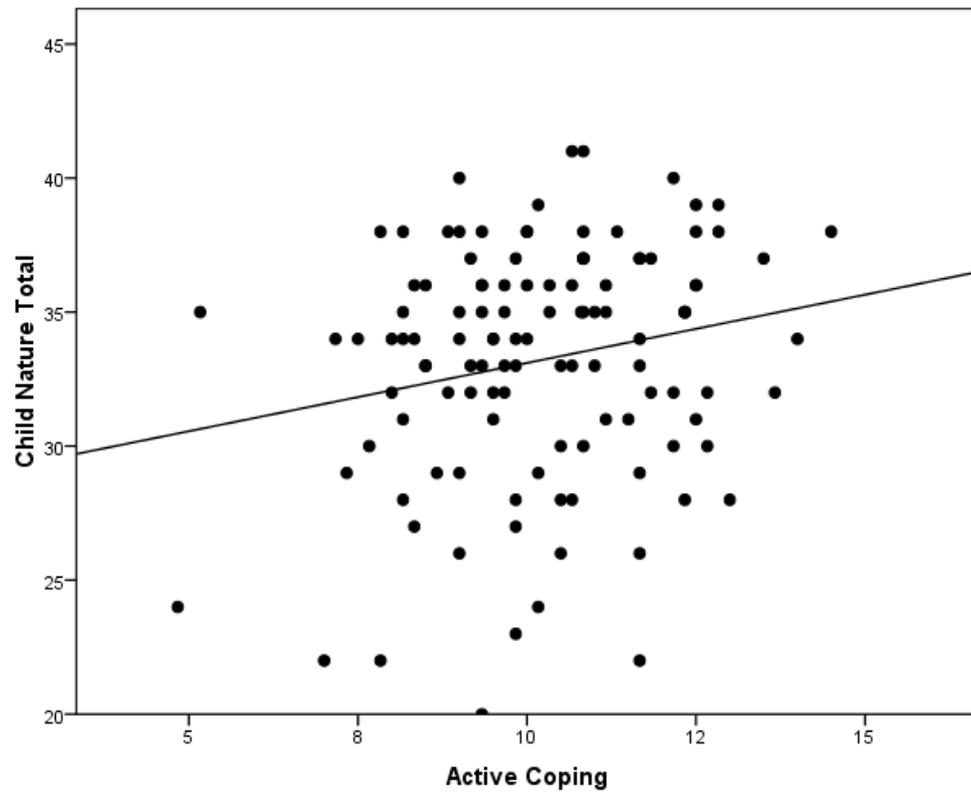


Figure 4. Correlation between childhood nature contact and reliance on active coping skills.

Amount of time outside as child, identification of a favorite outdoor space and the level of greenness in favorite outdoor space make up the construct of nature quality in childhood. Quality of nature contact in childhood positively correlates with a reliance on active coping skills ($r(117) = .248, p < .01$, Figure 5).

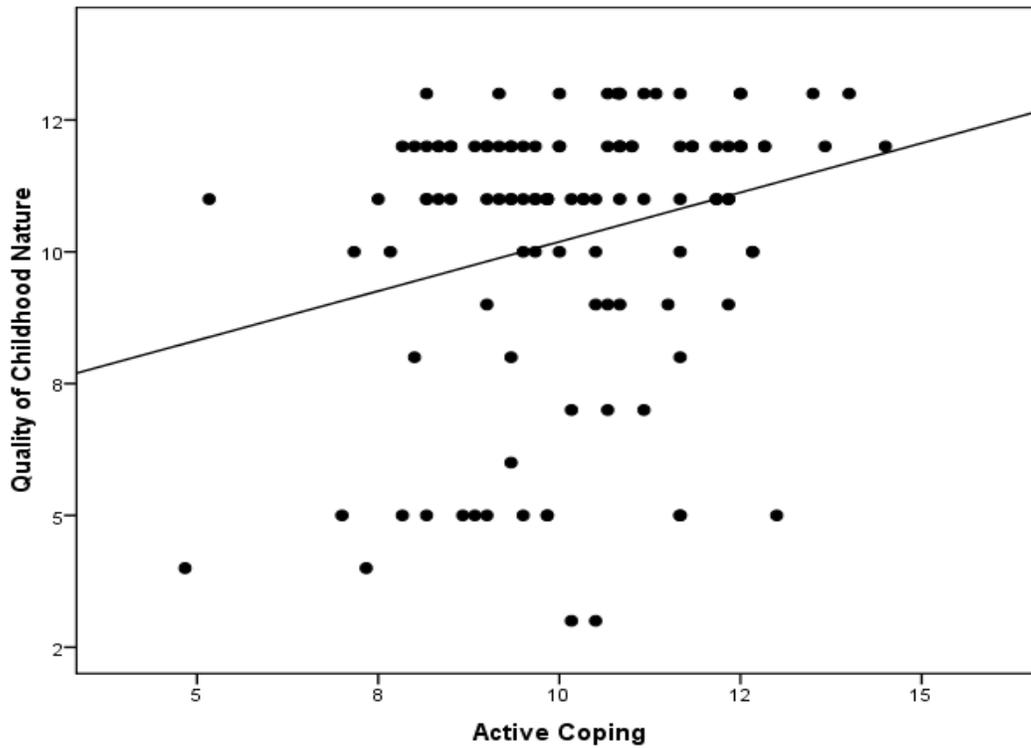


Figure 5. Quality of childhood nature and reliance on active coping.

Total nature contact scores (time spent in nature currently and in childhood) correlated positively with the total active coping skills score ($r(117) = .283, p < .01$; Figure 6) indicates that a relationship exists between time spent in nature at two points in development and a reliance on active coping skills in young adulthood.

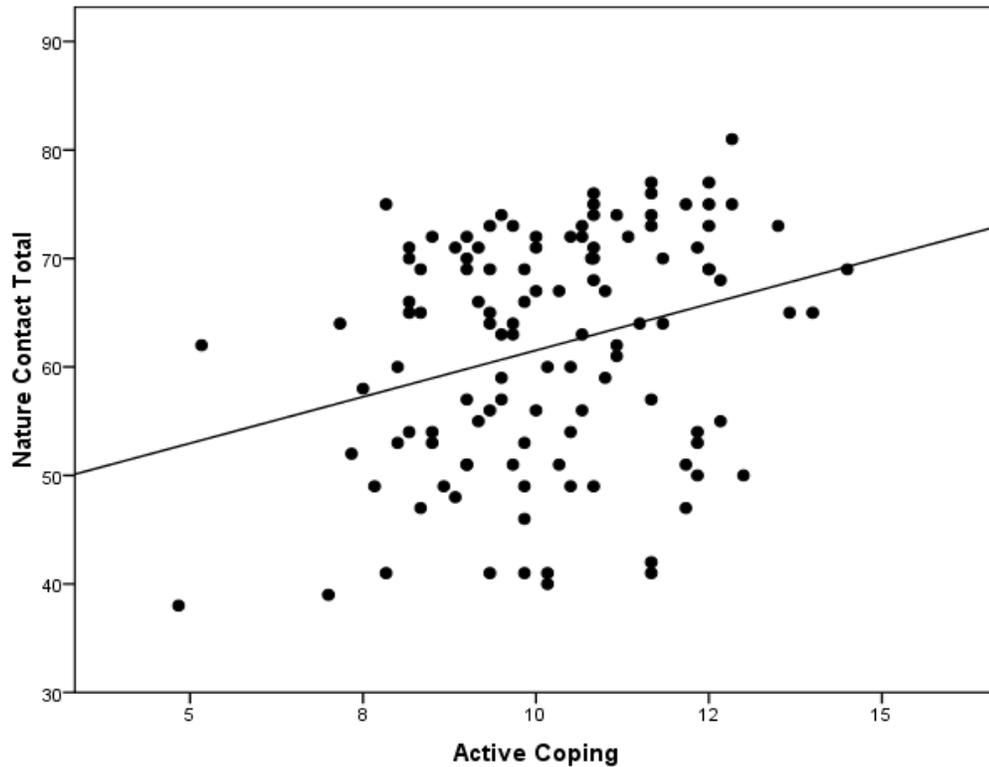


Figure 6. Correlation between total nature contact and reliance on active coping skills.

Passive coping skills included in the COPE assessment are as follows: focused venting, denial, negative or nonproblem-focused reintegration, and mental and behavioral disengagement. The correlation between total nature contact and the passive coping skills score was not significant ($r = -.009$). Natural restorative environment use and total passive coping score was not significantly correlated ($r = -.012$). Childhood nature contact and passive coping was not significantly correlated ($r = .036$). Quality of nature ($r = .074$) and access to nature ($r = .062$) during childhood was not significantly correlated with passive coping. Access to nature during childhood was not significantly correlated to reliance on active coping skills ($r = .068$). Adult nature contact was not significantly correlated with a reliance on passive coping skills ($r = -.024$; Table 2). These results

indicate that a reliance on passive coping skills was not significantly correlated with any category of nature contact measured on the Nature Contact Survey. In contrast, a reliance on active coping skills was positively correlated with each category of nature contact scores. Active and passive coping skills were positively correlated with each other. This relationship acknowledges that individuals utilize skills in both categories of coping strategies.

Table 2

Coping and Nature Contact: Correlations by Category.

Score categories totals	Childhood nature	Adult nature contact	Restorative environments	Total nature contact	Active coping	Passive coping
Childhood nature	–	.480(**)	.463 (**)	.774(**)	.204(*)	.036
Adult nature contact	.480(**)	–	.969(**)	.896(**)	.272(**)	-.024
Restorative environments	.463(**)	.969(**)	–	.863(**)	.222(*)	-.012
Total nature contact	.744(**)	.896(**)	.863(**)	–	.283(**)	-.009
Active coping	.204(*)	.272(**)	.222(*)	.283(**)	–	.446(**)
Passive coping	.036	-.024	-.012	-.009	.446(**)	–

* $p < .05$. ** $p < .01$

Discussion

The question that anchored this research was as follows: “Is there a relationship between time in nature during childhood, the use of natural restorative environments as a young adult and a reliance on active coping strategies?” The results of this study support the conclusion that an association exists between a reliance on active coping skills and exposure to natural environments currently and during childhood. The question, “Does contact with natural environments during childhood affect the coping skills relied on in

young adulthood?” was not definitively answered by the data collected in this study. I established a positive correlation between childhood nature contact and active coping skills but we cannot conclude that contact with nature in childhood is the reason for a reliance on a specific set of coping skills.

This research study focused on determining if an association exists between time in nature and active coping skill development. Correlations between total nature contact and the total passive coping skills score were not significant. This result suggest that individuals who rely on passive coping skills may understand and appreciate the emotional soothing quality of nature, but tend not actively seek natural restorative spaces when stressed. These results also indicate that there is not an association between a reliance on passive coping skills and contact with nature overall at either of the two developmental points assessed. Furthermore, there is not a relationship between passive coping skills and the use of natural restorative environments for soothing. These negative results support the conclusion that seeking natural restorative environments is an active coping skill.

The results of this research directly affect college student populations. Students often move away from home to attend college, leaving behind familiar environs and outdoor spaces used for soothing. Students with little or no previous nature exposure may have the opportunity to learn about the soothing qualities of natural settings once on campus. Peer relationships formed during this time may help to model a reliance on active coping skills that include the use of natural restorative environments, allowing the individual to adopt new skills.

College campuses are often designed to include natural landscapes. Inspired by

Jeffersonian principles of education, the earliest American college landscape designers focused on the natural environment as a key element of the educational experience (Boughman, 1991). In Jefferson's view, outdoor environments were designed to support and enhance the educational process. Early landscape designers used the oldest meaning of academies, a grove of trees where teachers and students met to engage in meaningful discourse, as the guiding design principle (Boughman, 1991). During the 1960s, budget restrictions and a refocusing of education away from the traditional campus changed landscape design on U.S. college campuses. (Boughman, 1991).

My results suggest that a return to a dedication to landscape as integral to the educational process would be beneficial. A small copse of trees with a bench or a quiet tree-shaded walking path between buildings would create *microrestorative* environments. These natural microrestorative opportunities within the landscape design of college campuses may allow for emotional restoration using active coping strategies (Taylor et al. 2001). Creating spaces on campuses that take into account the need for natural places for coping is an area of exploration for landscape designers and environmental psychology researchers.

The factors involved in shaping coping skills include parental modeling of active coping skills, time in nature with a mentor who clearly demonstrated the emotional benefit of nature contact, positive first hand experiences in nature that resulted in stress reduction, and the means and access to nature. These are just a few of the possible variables that affect the development of coping skills. The developmental issues inherent in the transition from child to adult further complicate coping with stress during college.

I conclude that young adults, regardless of gender, who spent time outside as

children are more likely to develop an understanding of nature as soothing. The participants who reported high nature contact as children were more likely to use active coping skills to deal with stress as adults and more likely to identify a natural restorative space. The theoretic model (see Figure 1) is supported through these results. We understand that time in nature is soothing and is inseparable from our physical experience of space (Heft, 2001). Children are not exempt from those experiences. Our history shapes who we are today and what we will become in the future. According to my results, life experiences that include contact with nature are associated with the creation of a meaningful relationship with nature that incorporates natural restorative environments for coping.

Developmentally, college populations are at a critical junction in their emotional growth (Chickering 1993; Perry, 1970). Introducing new coping skills that incorporate natural spaces increases the depth and breadth of skills available to those individuals. The ability to successfully cope with new stressors and new environments closely relates to mental and physical well-being (Pritchard & Wilson, 2006). Increasing access to natural restorative spaces on campus by creating microrestorative spaces may help address the concern expressed by Arthur (1997, 1998) about limited depth and breadth of coping skills in college populations.

These data were collected from a limited sample in the northeastern United States at a private 4-year liberal arts college. Generalizing this information to other populations outside of that demographic should be done carefully. Future research should explore the strength of the relationship between nature contact and coping. The interaction between these factors needs further exploration including whether active coping skills foster the

development of finding natural restorative environments for soothing or whether early contact with nature support the development of active coping?

These results support the hypothesis that natural restorative environments are an important part of active coping skills. The use of these skills was associated with childhood nature contact and current overall nature contact. I believe that the use of natural restorative environments for soothing is an active coping strategy and can be placed in that classification of coping skill. The goal of this research was to determine if an association exist between these variables. Now that this rudimentary relationship has been demonstrated further research is needed to explore the dynamics of the relationship in detail.

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CHAPTER FOUR

Does Contact With Nature in Childhood Affect Trait Anxiety in Adulthood?

Abstract

I explored the relationship between time in nature during childhood and the level of trait anxiety in young adult college students. A sample of 119 (69 men and 50 women) college students completed a Nature Contact Survey designed to assess degree of nature contact during childhood and the State-Trait Anxiety Inventory (STAI) to establish level of trait anxiety (Spielberger et al., 1970). The Nature Contact Survey assessed several aspects of nature contact at two points in development. The STAI yielded scores that reflect state anxiety (transient environmentally induced stress) and trait anxiety (personality aspects that are consistent across environments). Follow-up interviews about nature contact were conducted with 9 participants reporting varying levels of trait anxiety as determined by the STAI (Spielberger et al., 1970). Quantitative results indicate a nonsignificant negative correlation between high levels of nature exposure during childhood and low to moderate trait anxiety levels in young adulthood. A nonsignificant negative correlation exists between current time in nature and low to moderate trait anxiety. Nonsignificant negative correlations were found between the use of natural restorative environments and trait anxiety and between total nature contact and trait anxiety. Qualitative data gathered from interviews echoes the trend found in the quantitative data between nature contact in childhood and trait anxiety. Further research is needed to explore more fully the dynamics of the relationship between childhood nature contact and trait anxiety.

The use of landscape for emotional soothing has its roots in the Victorian era. Therapeutic landscapes found at asylums throughout the New England region of the United States date back to the early 1800s (Hawkins, 1991). Olmstead and Downing designed grounds for hospitals in New York, Boston, and Philadelphia with the belief that the soothing quality of nature helped shattered nerves and that useful labor on the grounds restored the body (Hawkins, 1991). Asylums of the time were noted to have some of the most beautiful landscaping in the nation. One of the assumptions driving this movement in mental health care was the understanding that exposure to nature held emotionally soothing properties. The majority of asylum patients during the 1800s were admitted for anxiety disorders.

Anxiety is a state of being, “a complex blend of emotions and cognition that is much more diffuse than fear (Carson et al., 2000, p. 161).” Anxiety can be categorized as two distinct but interrelated types, trait anxiety and state anxiety. Trait anxiety refers to the personality trait of anxiety, a stable tendency toward being anxious and reflects a worldview that effects how the individual interacts with the environment (Calvo & Cano-Vindel, 1997). State anxiety is more transient and tied to a specific event or environmental occurrence (Barlow, 1988). Typically, state anxiety is brief and stress levels return to “normal” levels soon after exposure to the stressor ends. Trait anxiety persists across environments and shapes how an individual understands the larger world (Curtis & Locke, 2005).

We operate in a world that we trust will not change radically from day to day. What I see out my window today is what I will see tomorrow and someone else looking out of the same window will see the same scene. The world possesses an inherent and

discoverable structure (Heft, 2001). Our emotional experience of a space, whether that response is one of fear, relaxation, or joy, is influenced by the same factors as our sensory or physical experience. Particular environments, such as spaces with natural elements, contain aspects that commonly elicit a sensational experience that is relaxing, anxiety reducing, and emotionally restorative (Roszak et al., 1995). Environments that possess restorative properties allow for emotional equilibrium and increase the mental energy available to attend to a task. The restorative qualities of these spaces are inherent and discoverable aspects of the environment, these spaces are often labeled as “favorite places.”

Current research supports the hypothesis that favorite spaces are emotionally restorative spaces for adults and that these favorite spaces fit the current definitions of a natural restorative space (Kaplan, 2001; Korpela et al., 2001; Staats & Hartig, 2004). Natural restorative spaces are outdoor environments with predominately natural elements that restore our emotional balance, increase attentional capacity, and allow for emotional regulation (Kaplan & Kaplan, 1989). Research has also indicated that past experiences in natural restorative spaces increase familiarity with the space, increasing the restorative effects of the space (Ouellette et al., 2005).

Natural environments possess specific qualities that help shape our ability to sooth as well as our perception of stress (Kaplan, 1995; Ulrich, 1979; Wells & Evans, 2003). In turn, our physiological response to stress is shaped by our prior experiences in coping with a stressor (Solomon & Heidi, 2005). Being in natural restorative environments and exposure to images of nature and memories of nature contact decrease the physical effects of stress (Kweon et al., 2008; Ulrich, 1979; Whall et al., 1997;

Zuckerman et al., 1993).

Repeated exposure to natural restorative spaces may shape trait anxiety by fostering a positive coping experience during early development. Positive coping experience during childhood may stop or slow reported trait anxiety in young adults. Although many research studies explore state anxiety and nature contact, surprisingly little research has examined the relationship between trait anxiety and nature contact. The current research is designed to address this gap in the current knowledge. In order to frame this research question, the theories of anxiety are outlined below followed by a review of anxiety in college student populations and academic perfectionism.

Theories of Anxiety

Theories of anxiety can be categorized as cognitive, biological, and interactive. Cognitive theories of anxiety propose that our body does not differentiate between levels of fear but, rather, that fear is the product of a cognitive process that establishes level of perceived threat. In this cognitive theory, called “attribution and appraisal”, all external stimuli are neutral until assigned either positive or negative attributes by the mind (Barlow, 1988). When our mind fails to make the correct appraisal of a situation by failing to distinguish real from perceived threats, we physically respond as if in danger when, in fact, there is no threat to safety. Cognitive process shapes or dictates the biological response to a stressor (Beck, 1985). Simply stated, it is a misinterpretation of events by the mind that creates the excessive fear reactions commonly attributed to anxiety. The functional-evolutionary theory of restorative environments supports the conclusion that space is appraised within an organized cognitive framework (Kaplan & Kaplan, 1989). Soothing is a cognitively initiated response to the restorative quality of

natural spaces.

Biological theories of anxiety postulate that anxiety is the result of neurochemical imbalances. Sometimes the neurochemical messages alert the brain that danger exists when, in fact, the situation is benign. An environmental stressor triggers a cellular response through the nervous and endocrine systems to prepare the body for action. The stressor causes an instantaneous and simultaneous response through the body. Without an immediate and understood threat, the physical response can seem confusing, out of control, unpredictable, and disquieting. The mind will try to “make sense” of the experienced physical sensations by fixating on elements of the environment that may not be the cause of stress (Carson et al., 2000). If an individual is in her car while experiencing anxiety, in the future, she may avoid driving on that particular road out of fear that another attack might be triggered.

There is biological fact to support this intuitive assumption. Schore (1996) researched the physiological changes in neural pathways that resulted from environmental stress (trauma). Driving down the same road where the initial episode of heightened anxiety occurred may in fact trigger a new or different neural pathway in the brain. I believe this may indicate the possibility for neural pathway changes in response to positive interactions with the environment such as might be found in natural restorative spaces.

Fox et al. (2005) explored the relationship between inhibition of behaviors when under stress and the neural systems involved in the experience and expression of fear in children. This research explored the presence of a link between behavioral inhibition (the expression or suppression of expressing fear) and anxiety disorders in older children.

This is one of the few studies that focus on biological aspects of anxiety in a developmental frame.

Interactive theories of anxiety address both the cognitive and biological components. According to this theory, we have biologically determined anxiety thresholds and we have a set of learned responses or strategies to cope when the threshold is crossed (Barlow, 1988). According to interactive theory, trait anxiety is the result of repeated struggles between emotions and thoughts that cross the threshold of tolerance to create physical stress. Transactional theory (Lazarus, 1966) places the emphasis on the process of identifying psychological processes that link the person and the environment. Stress is the product of both the environment and the individual and this influences coping behavior and visa versa (Kelly, 2006). Natural restorative environments support a positive link between person and environment thus allowing the individual to cope more effectively with stress.

Each of these three theories (cognitive, biological, and interactive) places a different level of importance on past experience, physiology, and emotional state as factors in anxiety reactions. Regardless of the theoretic perspective, each theory allows for the potential of natural restorative environments to reduce anxiety.

Types of Anxiety

Regardless of their etiology, two distinct types of anxiety are acknowledged in the literature. State anxiety is a momentary state of being stressed or tense and does not represent a stable aspect of the individual's personality (Cahill, 2004). Trait anxiety is an "acquired behavioral disposition" and "reflects an individual's past experience and is manifested by consistent responses toward a particular object or event" (Ewert, 1988, p.

108). Considerable research indicates that individuals with elevated levels of trait anxiety are at higher risk to develop anxiety disorders (Calvo & Cano-Vindel, 1997). I use the term “anxiety” specifically to mean trait anxiety throughout this research. In this research, I singled out one aspect of child development, childhood time in nature, and explored its connection to reported trait anxiety in a sample of young adult college students.

College Students and Anxiety

College brings additional stressors to the challenges and milestones young adults between 18 and 25 years deal with in the course of normal development. Individuals who choose to attend college face a set of stressors specific to this environment, stressors they share with the cohort with whom they enter college. “Cohort” is a term used to signify a group with one or more defining characters. College students can be grouped into several types of cohorts such as: student athletes, history majors and seniors. One student can belong to all or none of these cohorts.

Research into the connection between family influence and increased anxiety levels has been inconclusive, but historical research into birth cohort (the group of people born in a particular year) reveals a trend (Twenge, 2000). College students belonging to the birth cohorts of 1952 and 1993 reported increasing levels of anxiety (Twenge, 2000). Adults entering college in 1950 following World War II faced different campus issues than students going to college in 1970, during the Vietnam War. Laptop computers, instant messaging, cell phones and hand held computers systems are ubiquitous on college campuses today. All of these devices were unheard of in 1970. Thus, students entering college today are dealing with greater technological complexity and attentional

demands than previous college generations, leading to increased anxiety, as compared to college students of previous decades.

College students suffering from anxiety are at higher risk for depression, physical illnesses related to prolonged stress, and suicidal behaviors (Carson et al., 2000; Twenge, 2000). High levels of trait anxiety were also linked to a reported increase in somatic complaints (sleep and respiratory problems) and a decrease in overall psychological health in a college population (Calvo & Cano-Vindel, 1997). Students often experience heightened stress around academic demands and academic stress is particularly experienced in college populations.

Academic Stress

In addition to the life stressors experienced by the birth cohort, academic stress is specific to individuals who choose to attend college. For example, college students at Princeton University indicated anxiety over academic struggles and fears about the future as the most stressful issues they face (Klagsbrun, 1992). These kinds of academic stresses come from both internal and external sources. Internal stressors, such as perfectionism, exacerbate external stressors, such as class schedules, assignments, exams, and class preparation. Perfectionism in college students is defined as the setting of unrealistic standards and the drive to achieve those standards (Conroy et al., 2007). Recurrent and persistent dissatisfaction with academic performance and themselves led to performance anxiety, social anxiety, writer's block, inefficient study habits, and depression (Halgin & Leahy, 1989).

A more recent study by Arthur & Hayward (1997) expanded on these findings. Socially oriented perfectionism (perfectionism driven by the expectations of others) was

associated with increased depression, anxiety, alcohol consumption, eating disorders and poor academic performance. The perceived stress and sense of helplessness felt by students attempting to attain unrealistic standards led to decreased academic performance and college dropout (Bond & Rosen, 1980; Schwarze et al., 2003).

My research explored the potential relationship between trait anxiety in college populations and nature exposure during middle childhood. Is it possible that college students reporting a history of time in nature during childhood are less prone to increased levels of trait anxiety? Does time in nature during child development shape the expression of trait anxiety? The hypotheses of this research include the following: Young adults reporting high contact with nature as children will have low to moderate trait anxiety scores. Young adults reporting high contact with restorative nature will report low to moderate trait anxiety scores.

Research Question

Evidence suggests that current generations are reporting increased levels of anxiety (Arthur, 1998; Arthur & Hayward, 1997; Twenge, 2000). The environment we live in plays a role in the development of anxiety (Solomon & Heide, 2005), people are spending less time in nature (Orr, 2002), and nature contact can shape our emotional state (Kaplan, 2001; Ulrich et al., 1991). Does lack of contact with nature during development affect the formation of trait anxiety as reported in young adulthood? More specifically, do young adults reporting high contact with nature as children have low to moderate trait anxiety scores as young adults? Do adults reporting high contact with nature currently report low to moderate trait anxiety scores?

Method

Subjects

Subjects for my research were selected from the pool of 18- to 25-year old matriculated undergraduates at a 4-year institution of higher education in New England (New England College, Henniker NH). These subjects were recruited through campus advertising, class announcements and word-of-mouth during the spring semester of 2005. After a verbal review of the consent form, each subject signed an acknowledgment of participation. If, at any time during the research protocol a subject disclosed a substance abuse problem, a present episode of clinical depression or a recent suicide attempt, he or she was dropped from the subject pool. Only 2 subjects (out of 121) were removed from consideration due to these restrictions. One hundred and nineteen (50 women and 69 men) participants completed the research protocol. Subjects were predominately of White racial ethnicity (less than 3% of the subjects were of non-White ethnic background) due to the low diversity of the institution where the research was conducted. I selected 9 subjects to participate in the follow-up interviews from the 119 subjects to represent the three levels of trait anxiety (high, moderate, and low trait anxiety).

In order to ensure ethical data collection, the research proposal for this work was reviewed with the appropriate administration at New England College, the test site. The research protocol was also reviewed and approved by the Internal Review Board at Antioch University New England to ensure ethical research procedures.

Instruments

In order to evaluate time spent in nature as a child and as an adult, I created the Nature Contact Survey after an extensive review of the literature on restorative

environments (Kaplan et al., 1998; Kaplan, 1995; Kellert & Wilson, 1993; Korpela et al., 2002; Ulrich, 1979) and a pilot study. The pilot study interviews were conducted with 9 college students (5 women and 4 men). Each pilot study participant was asked open-ended questions about his or her nature contact at two points in development.

The pilot subjects were between 18- and 24- years old, the same birth cohort as the research participants. Pilot subjects were also demographically similar to the participants of the research protocol, White middle class students attending a rural college in New England. The answers generated from the pilot subjects interviews were used to create a set of written response choices for each question on the Nature Contact Survey. This process increased the likelihood that all possible answer choices were represented in the written survey and that the questions accurately elicited useful responses.

Several psychologists and practicing clinicians reviewed the survey. The reviewers were Dr. Craig Knapp (clinical psychologist), Dr. John Vojtisek (clinical psychologist), and Dr. Louise Chawla (environmental psychologist and committee member). Design changes included the simplification of questioning to multiple-choice options, the rewording of response choices, and the refinement of the Likert scale.

Questions were repeated in similar language in two sections of the survey to allow the participant to answer a question with regard to childhood experience and then to provide the same information in regard to current experiences. For example, Question 5, “Estimate the amount of time you spent outside as a child” corresponded to Question 14, “Estimate the amount of time you spend outside now, as an adult.” This design facilitated comparison between the past and the present.

The “childhood nature contact score” was calculated by summing the scores on 13 survey questions specifically focused on childhood contact with nature. Childhood nature contact scores ranged from 20 to 41. A score of 20 indicates little or no nature contact during childhood whereas scores approaching 41 indicate high contact with nature (nature experienced in ones daily routine like a back yard, play ground, front lawn or along the edge of a roadway) during childhood.

Quality of childhood nature is a distinct construct within the childhood nature subscale. Three questions make up this construct: 5, 8 a and b. The quality of childhood nature construct measures length of time outside, favorite outdoor space in childhood and level of greenness in favorite outdoor space. Access to nature is the second construct found in the subscale. The access construct measures physical setting of the childhood home (rural, farm, urban, suburban) access to trees and number of trees surrounding the childhood home. Questions 4, 9, and 10 of the Nature Contact Survey make up the access construct of the subscale.

“Adult nature contact” score was the sum of the responses to all questions regarding the greenness of regularly contacted environment, park or recreation area use, and the amount of time currently spent outside in any activity. Scores ranged from 14 to 41. A score of 14 indicates little or no current contact with nature. A score of 41 indicates high contact with nature.

The “restorative environment score” was calculated using the responses to a set of six questions focusing on adult use of natural spaces for soothing. Restorative environment scores ranged from 6 to 31. A score of 6 indicates little or no use of natural restorative environments for soothing. Scores approaching 31 indicate regular use of

natural restorative spaces for soothing.

The “total nature contact” scores on the Nature Contact Survey ranged from 20 to 82. This score was the sum of the child nature contact and adult nature contact totals. A score of 20 indicates little or no contact with nature during childhood and continued low contact into adulthood. Overall nature contact scores in the middle of this range indicates some contact with nature either as an adult or as a child. Scores approaching 82 indicate high contact with nature at both points in development.

One standard deviation above the mean or higher on the Nature Contact Survey was categorized as high nature contact and one standard deviation below or lower was categorized as low nature contact. Scores within one standard deviation above and below the mean were categorized as average nature contact scores. This delineation of score categories was developed following the established pattern of clinical assessments such as the State-Trait Anxiety Inventory and Beck Depression Inventory (Barroso & Sandelowski, 2001; Spielberger et al., 1970).

Reliability analyses conducted on the Nature Contact Survey indicate the overall survey has acceptable reliability ($\alpha = .779$). Subscales within the Nature Contact Survey, the adult nature contact ($\alpha = .715$) and restorative environments ($\alpha = .799$), have acceptable reliability scores. The childhood nature contact subscale obtained an unacceptable $\alpha = .496$. Upon further exploration of the scale it became evident that two distinct constructs exist within the subscale, access to nature in childhood and quality of nature in childhood. The childhood access to nature subscale obtained an $\alpha = .721$ and the quality of nature in childhood subscale has an $\alpha = .599$.

State-Trait Inventory

To measure trait anxiety levels of my subjects, I used the State –Trait Inventory (STAI). The STAI was designed by Charles D. Spielberger, Richard L. Gorsuch, and Robert E. Lushene in 1970 to distinguish the temporary state of anxiety from more stable personality traits of anxiety (see Appendix C). Vanderbilt University undergraduates were used in the development and construction of the instrument. Test-retest reliability was high for the trait anxiety form (A-Trait) of the assessment ranging from .73 to .86. Test-retest reliability was much lower for the state anxiety (A-State) assessment section, ranging from .16 to .32. This was an expected result, as trait anxiety should be stable across testing situations whereas state anxiety will fluctuate.

One portion of the questionnaire asked questions about state anxiety whereas the other addresses trait anxiety. Scores on the trait anxiety inventory were used in the statistical analysis. Individual scores for both state and trait anxiety were placed into three categories of results; high, moderate, and low anxiety. Results on this inventory allowed for the distinction between the level of anxiety during testing (state) and the level of anxiety inherent to the individual (trait). Only the trait anxiety scores were of interest for this research, but the testing protocol required that both parts of the assessment tool be given during administration, thus the state anxiety scores were collected, but not used.

Scores on the State-Trait Inventory ranged from a low score of 20, indicating little or no trait anxiety, to a high score of 80 indicating extreme levels of trait anxiety as indicated in Table 1. In clinical terms, scores above 60 on the Trait Anxiety Inventory are a cause for concern and require a therapist to explore further the possibility of an anxiety disorder.

Table 1

Trait Anxiety Classification for College Students as Derived From the State-Trait Anxiety Inventory Manual (Spielberger et al., 1970).

Trait Anxiety Classifications	Male Score Range	Female Score Range
High Anxiety	47.98 and above	50.55 and above
High Moderate Anxiety	47.97-38.81	50.54-40.41
Moderate Anxiety	38.80	40.40
Low Moderate Anxiety	38.79-29.61	40.39-30.26
Low Anxiety	29.62 and below	30.25 and below

Semi-Structured Interview

College students were interviewed to gain an understanding of how past experience shapes current anxiety levels. The narrative collected from nine college students was used to explore the connection between trait anxiety and past and current ways the individual utilizes natural spaces. Interviews from the pilot study, which are included in the quantitative analysis, were recruited through verbal advertisement done by faculty who expressed an interest in the research. Four of the nine interviews were recruited by expressed invitation from the researcher. These four individuals were invited to participate to assure that interviews were conducted with individuals obtaining trait anxiety scores in all score categories.

The interview used open-ended questions about childhood memories of nature, present outdoor favorite places, and current exposure to natural settings (see Appendix F: Semi-structured Interview Questions). A specific set of questions was asked in a predetermined order. If an individual gave a response that needed further explanation or

suggested additional inquiry to follow a new train of thought I would ask questions not specifically in the predetermined script. This allowed for a more informal semi-structured interview style while assuring that a specific set of questions were covered with each participant.

Interviews took place in either my office or classroom set aside for that purpose. Both spaces had the individual sitting across from me at a table and had natural light, plants and windows. Interviews were recorded after obtaining written consent and an expressed verbal understanding of the consent form. The content of the questions were created after an extensive review of the literature on natural restorative environments, anxiety in college student populations and college student development (Arthur, 1998, 1997; Chickering, 1993; Kaplan & Kaplan, 1989; Perry, 1970; Twenge, 2000; Ulrich, 1979). Each question was written in an open-ended design, allowing participants to respond in a conversational manner (Yin, 1994). The questions themselves were developed after review of the literature on survey design and qualitative data collection (Marshall & Rossman, 1999; Mitchell, 1980; Polkinghorne, 1988; Shrader-Frechette, 1994; Yin, 1994).

Analysis

The use of a sequential mixed research design allowed me to establish the existence of an association between the variables through quantitative methods before collecting phenomenological experience through interviews, thus allowing for a deeper understanding of the findings (Miller & Fredericks, 2006). This quantitative dominant approach, in which statistical data determined which subjects were included in the interviews, established a statistical association between the variables, allowing the

interview responses to give voice to the statistical data. According to Miller & Fredericks (2006), this design is most commonly used in medical research and has recently begun to be applied to research in the social sciences.

An advantage of this type of mixed design is the ability to see overall trends in the data using correlations and to highlight the statistical outcomes with individual experiences and personal voices using interview data. Qualitative data preserve the words and emotions of true-life events, contrasting and complimenting the statistical connections of observed events (VanBrunt, 2005). Quantitative methods allow for greater external validity, whereas qualitative methods allow for greater transferability (Miller & Fredericks, 2006). The mixed method of a quantitatively dominant sequential design allows for an increased level of external validity, while the individual voices add depth by increasing the meaning and transferability of the research findings.

Two-tailed Pearson's correlations ($df = 117$) were conducted on each pair of variables using statistical software designed for the behavioral sciences (Statistical Package for the Social Sciences- SPSS, Version 16). Correlations were performed on the following pairs of variables: restorative environment use and trait anxiety, adult (or current) time in nature and trait anxiety, childhood time in nature and trait anxiety, overall nature contact and trait anxiety. Interview answers to 5 specific questions were placed on a table matrix in order to visually display emerging patterns of participant responses. The participants are not identified by gender nor is the information gleaned from the interviews separated by gender.

Twenge's (2000) research found a gender difference in anxiety reporting. College-age women are more likely to report anxiety and stress than their male

counterparts. College men are more likely to report anger or grief as a manifestation of stress (Twenge, 2000). Gender is also a moderating factor for the effects of both trait and state anxiety. In one study by Cahill (2004), high trait anxiety in women was associated with decreased reaction times and decreased distractibility. Low trait anxiety resulted in increased reaction time and increased distractibility (Cahill, 2004). In the same study, men reporting low trait anxiety displayed decreased distractibility and decreased reaction times. High trait anxiety male participants displayed increased reaction time and increased distractibility (Cahill, 2004).

When the responses collected in this research were separated by gender, the subsequent analysis did not support the conclusion that anxiety levels differ by gender. An independent sample t test conducted on data grouped by gender, $t(117) > 1.96$, $p < .05$, showed no significant difference between the mean scores of trait anxiety for this sample in which $t = 1.029$. Therefore, gender was not treated as a separate variable in the statistical analysis.

Results

Quantitative Data

No significant relationships were found between the following pairs of variables: childhood time in nature and trait anxiety (Figure 1; $r = -.111$), access to nature during childhood and trait anxiety (Figure 2; $r = -.031$), quality of nature in childhood (Figure 3; $r = -.156$), total nature contact and trait anxiety (Figure 4; $r = -.138$), current time in nature and trait anxiety (Figure 5; $r = -.141$), and trait anxiety and time in natural restorative environments (Figure 6; $r = -.124$). Each of these nonsignificant associations indicate a slight negative trend. These data supported the null hypothesis in each case presented

here. Time in nature during childhood was not related to reported levels of trait anxiety in this sample. Time spent in nature at the point in time when the participant completed the survey was also not related to reported levels of trait anxiety.

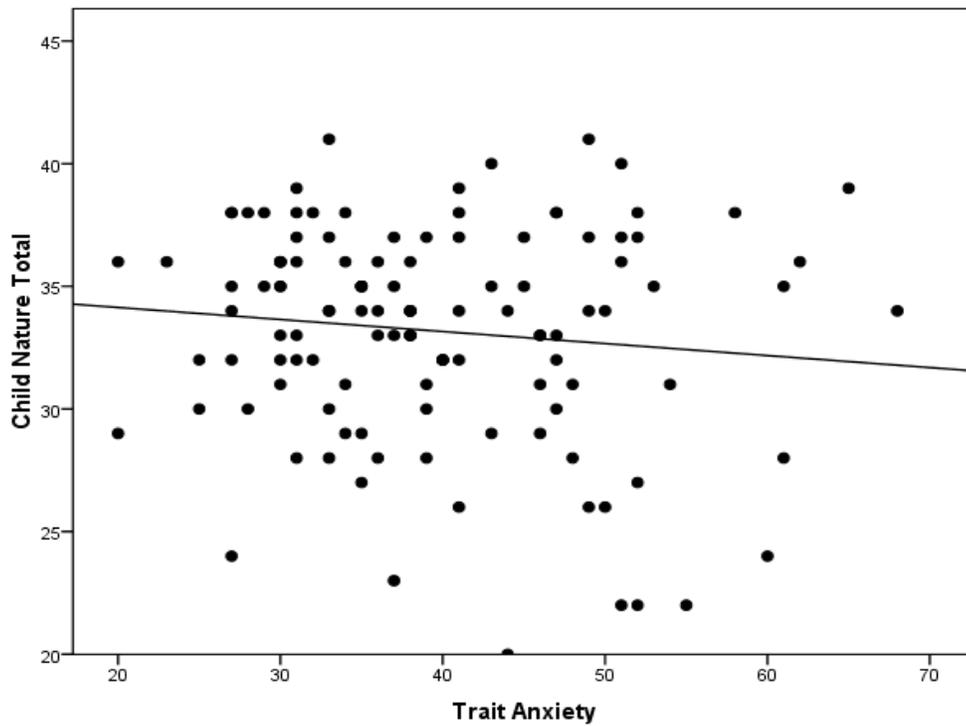


Figure 1. Child nature contact total and trait anxiety ($r = -.111$).

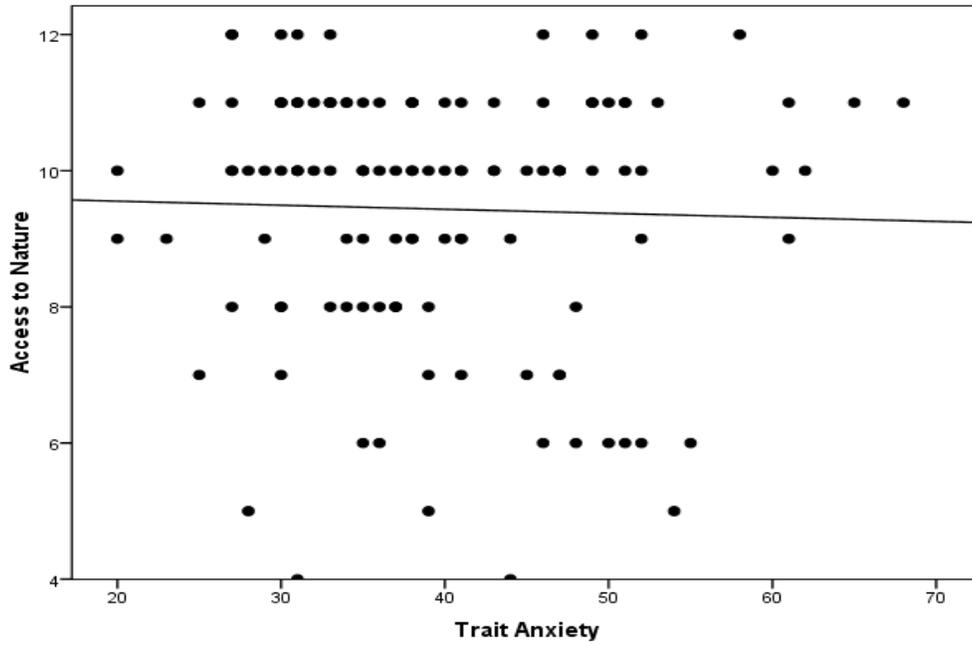


Figure 2. Access to nature in childhood and trait anxiety($r = -.03$)

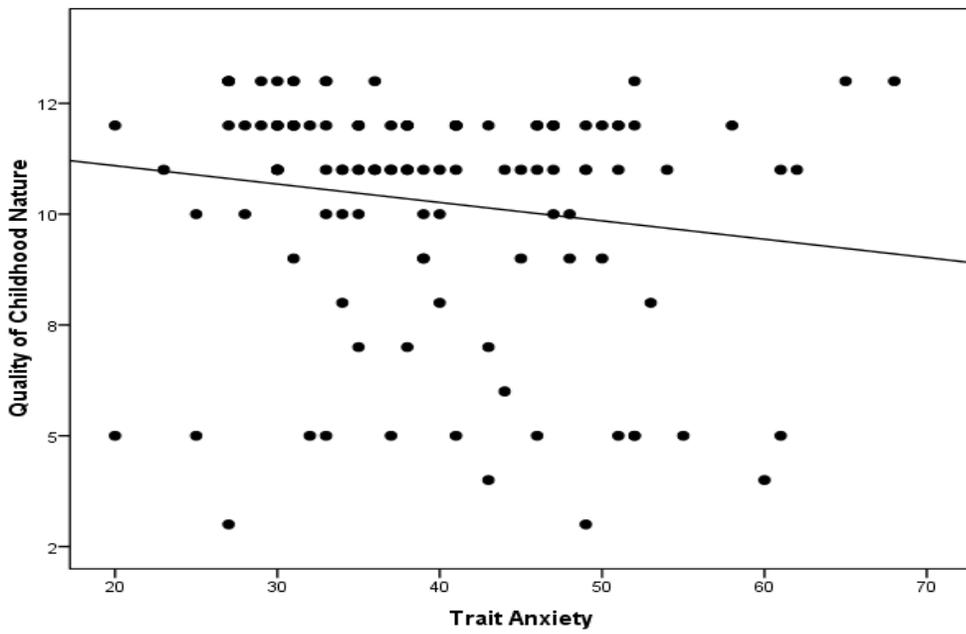


Figure 3. Quality of childhood nature and trait anxiety ($r = -.156$)

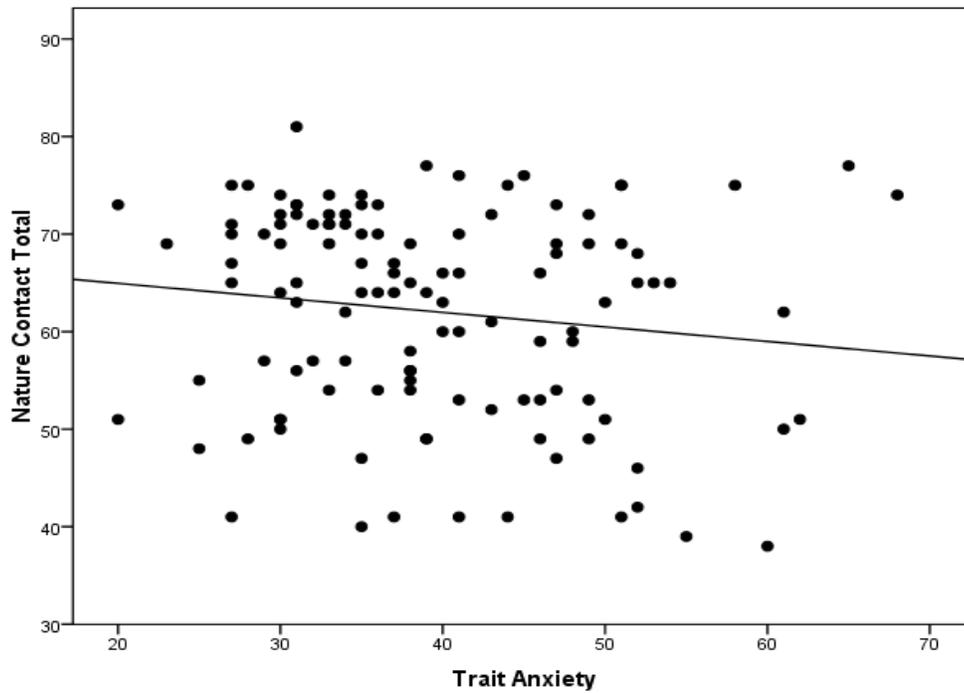


Figure 4. Nature contact total and trait anxiety ($r = -.138$).

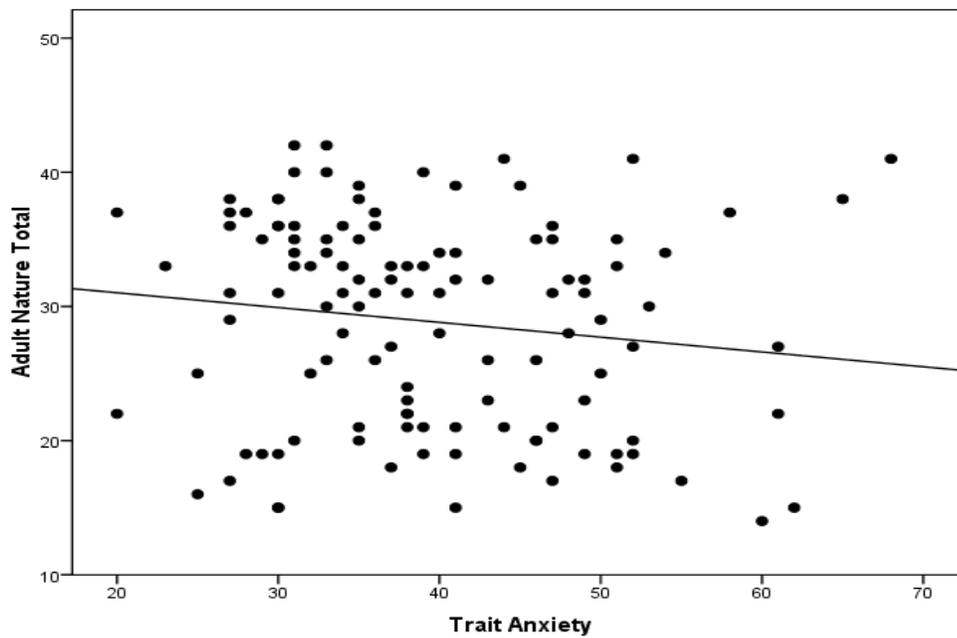


Figure 5. Adult nature contact total and trait anxiety ($r = -.141$).

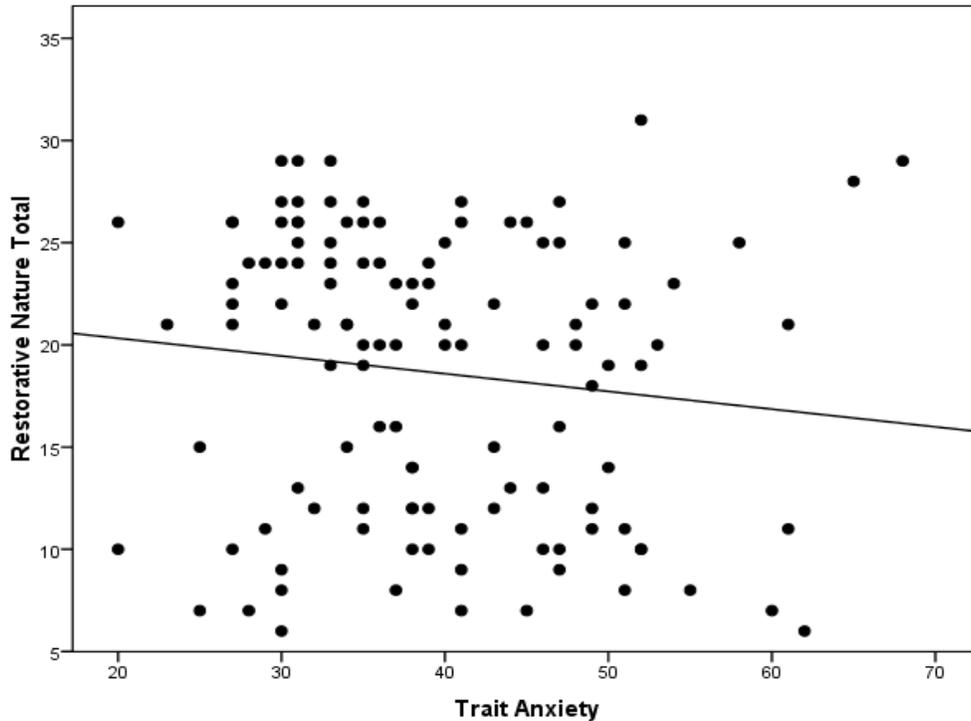


Figure 6. Restorative nature total and trait anxiety ($r = -.124$).

Qualitative Data

All subjects in the low anxiety group (4) and many of the subjects in the moderate trait anxiety group (3) used sports and physical activity to relieve stress. This group also reported high to moderate nature contact scores. The high trait anxiety group (2) reported occasional physical activity and little or no nature contact. None of the subjects interviewed in the high anxiety group were physically active at the time of the study and all reported little or no time in nature during childhood or currently.

One question asked the participant to talk about his/her favorite outdoor space as a child and now. This question, along with the question about time outside as a child and time outside as an adult, allowed the participant to talk about nature exposure at two points of development. Physical activities often take place outside and exercise by itself

can help relieve the physical symptoms of anxiety (Halliwell, 2005). Table 2 includes physical activity to acknowledge its importance in understanding reported trait anxiety.

I found an inverse trend in the narrative, such that high physical activity was associated with low to moderate anxiety level (Table 2). In addition, the identification of a favorite outdoor place as a child and as an adult appears to have an inverse relationship with anxiety. Each row in the table references a different individual interview.

Table 2

Summary of the Narrative Responses From Five Interview Questions.

Trait score	Time outside as a child	Time outside now	Physical activity	Favorite place as a child	Favorite place now
High Anxiety Subjects					
64	< 1 hour a day	Very little	None	Yes	No
53	< 1 hour a day	Very little	None	No	No
Moderate Anxiety Subjects					
40	< 30min per day	1-2 days per year	Basketball 2-3 times per month	No	Yes
34	1 hour a day – only organized sports	1-2 days per year	Multiple Sports	No	No
35	2-3 hours a day – usually sports	Little or none per day	Basketball	No	Yes
Low Anxiety Subjects					
29	3-5 hours a day	> 2 hours a day	Basketball 3-4 times a week	Yes	Yes
29	2-5 hours a day	> 30 min per day	Dance & Basketball	Yes	Yes
27	5-7 hours a day	1-2 hours a day	Canoeing daily	Yes	Yes
25	5-7 hours a day	1-2 hours a day	Soccer 3-4 times a week	Yes	Yes

Discussion

Previous research has shown that exposure to natural restorative environments reduced the immediate effects of anxiety (Kaplan & Kaplan, 1989; Korpela et al., 2001; Roszak et al., 1995; Ulrich, 1979; Ulrich et al., 1991). The current research explored the long-term effect of nature exposure on the formation of trait anxiety. Results from the quantitative aspects of this study showed a slight, but not statistically significant, association between time spent in nature and low to moderate trait anxiety reported as an adult. Information gained through interview indicates a trend toward lower reported anxiety levels when more time is spent outside during childhood.

Interactive theories of trait anxiety are among the most widely accepted in the current literature. Medical research techniques have advanced our knowledge of brain functioning and provide increasing support for an interactive theory of anxiety (Solomon & Heide, 2005). The results of my research suggest that future studies will be needed to address the potential interaction between environmental experience, child development, and trait anxiety.

Understanding the etiology of trait anxiety is critical for therapists working with college student populations. Trait anxiety increases risk for depression, poor academic performance, inefficient study habits, and disturbed eating patterns (Halgin & Leahy, 1989). If a relationship does exist between increased time in nature and a reduced risk for high trait anxiety, I believe it should be nurtured. None of the information in this research suggests that time in nonthreatening nature is psychologically harmful. Based on my findings, I would recommend that a conversation about a patient's relationship with

nature be included in the initial intake interview. In my experience, I have found that students are very interested in talking about this topic and that they are willing to incorporate natural elements in treatment, regardless of their past nature exposure.

Physiological research supports the conclusion that events in our environment can permanently change our brain's ability to cope with stress (Solomon & Heide, 2005). I believe that the relationship between time in nature and trait of anxiety has more complexities than this study is able to explain. Role modeling from important others in a persons life, cultural attitudes toward the express of anxiety, genetic predisposition toward anxiety and personality factors may each influence the development of trait anxiety. These factors were not accounted for in this research. Future research in brain function may be able to pinpoint regions of neurological development that are influenced by exposure to nature.

The limitations of this research include the self-report design of the Nature Contact Survey. Memory is fallible and the survey asked participants to recall events that occurred years in the past. Participants were allowed to define favorite place in their own terms, and all information reported about child nature contact is self-reported from memory. No limit was placed on what the interview participants included in the category of "physical activity." However, it must be acknowledged that the question was asked following several questions that focused on time spent outside. The resulting list of activities may be biased toward outdoor sports and other physical activities. To confirm or explore the existence of an association between time in nature and trait anxiety, further research is necessary.

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CHAPTER FIVE

Reflections and Conclusions

This research was the product of simple curiosity. It started with the clinical question, “Why are some clients’ able to find “natural restorative nature” among their coping tools whereas others can not?” During my years of clinical work, I have observed a relationship between the use of natural restorative environments and a reliance on active coping. Along with this realization came the knowledge that most of the individuals that used natural restorative nature reported spending time in nature as children. Thus, the formal research question began to take shape. Does a childhood in nature shape adult coping skills? Specifically, is a childhood time in nature associated with the likelihood that natural restorative environments will be used for soothing in young adulthood? Simply stated, does a childhood in nature matter?

In order to explore this question, several assumptions needed to be tested. First, a relationship between childhood time in nature and adult time in nature needed to be established. Second, a relationship between active coping skills and the intentionally seeking of natural restorative environments needed to be explored. Third, the connection between childhood nature contact and current anxiety levels needed to be scrutinized. This progression of inquiry allowed me to create a bridge between childhood nature contact and adult coping strategies.

Having reviewed literature in the fields of restorative environments, child development, coping and college student mental health, and having conducted my own research to address the questions, I offer this chapter as conclusion and reflection. My

reflections are based on the results of the previous chapters, cited literature, and my own experience as a clinician.

I begin with a review of the research hypothesis, objectives, and results. My interpretation and reflections follows with a review of the relevant literature. This chapter concludes with a review of potential limitations of the data and future research considerations.

Research Objectives and Focal Questions

Each of the preceding chapters explored a different set of research questions and the results of each section of the research are combined here to address the research hypothesis. My hypothesis states that time in nature during childhood is associated with the likelihood that natural restorative environments will be used as an active coping strategy during young adulthood. The research question: “Does a childhood in nature encourage the use of natural restorative environments as a coping strategy in young adulthood?” is more fully explored here as the conclusions from previous chapters are integrated.

Chapter 2 entitled, “Does a Childhood in Nature Matter”, discusses the results of the Nature Contact Survey, a survey I developed to explore levels of nature contact at two points of development. Results from this survey indicate that young adults reporting using local parks and recreation areas during childhood were more likely to use similar spaces as an adult. Adults reporting that they have a favorite outdoor place in childhood reported having a favorite outdoor place as an adult. Levels of greenness in each of the identified favorite outdoor spaces were positively correlated. Subjects reporting use of natural restorative environments for soothing at the time of this research were more likely

to report high levels of nature contact during childhood. Results from this chapter clearly indicate that time in nature during childhood influences an adult relationship with nature.

Chapter 3 entitled, “College Students Coping: Exploring the Relationship between a Reliance on Active Coping Skills and Exposure to Nature in Childhood”, supported the conclusion that individuals who use active coping skills are more likely to utilize natural restorative spaces than individuals who rely on passive coping. Active coping strategies are considered to be more effective at reducing anxiety and the symptoms of stress when compared to the effectiveness of avoidant or passive coping strategies (Suls & Fletcher, 1985). The conclusion from these findings was that seeking nature contact is significantly related to a reliance on active coping skill.

The results outlined in chapter 4 titled, “Does Contact with Nature in Childhood Affect Trait Anxiety in Adulthood?”, indicate that trait anxiety was not associated with time in nature as a child or as a young adult. Nature contact in childhood and as a young adult appears to directly affect the ability to utilize nature as a coping strategy but not the development of trait anxiety itself.

My research hypotheses were partially supported by these results. Time in nature during childhood is associated with the likelihood that natural spaces will be accessed and used as a coping strategy during young adulthood. The relationship between the development of trait anxiety and time in nature during childhood is unclear. What do these results mean for educators, psychologists, parents, architects, and therapists?

Interpretations and Implications

The results from the present research and the existing literature clearly show a relationship between nature, anxiety, and coping. My results indicate that children who

spend time outside become adults who spend time outside. The current research expanded upon the findings of Ward-Thompson et al. (2008) by exploring the concept of favorite outdoor place and level of greenness in the spaces identified, which allowed for a better understanding of the type of nature space study participants experienced.

Greenness refers to the self-reported amount of vegetation in the areas reported as “favorite outdoor space.” Adults reporting moderate to high levels of nature contact in childhood were likely to report high to moderate levels of nature contact as adults. Park and outdoor recreation area usage was positively correlated in both my research and in Ward-Thompson’s (2008) study. In addition, I found that greenness level in childhood favorite place and adult favorite place are positively correlated. The identification of a favorite outdoor space in childhood and the use of restorative environments for soothing as an adult were also positively correlated. Favorite space and restorative spaces are positively correlated in studies with adults (Korpela et al., 2001).

Children also seek spaces that offer emotional restoration. Kirkby (1989) demonstrated that children create refuge in green spaces when given the opportunity to do so. Refuge is by definition a space that is nonthreatening and contains emotional restorative qualities. Emotional regulation through contact with nature has been found in both children (Thurber & Malinowski, 1999) and in adults (Korpela, 1989, 1992). Research has shown that past experiences in natural places shape how and if nature is sought (Scopelliti & Guiliani, 2004). My findings demonstrated not only the importance of nature contact during childhood, but also the importance of allowing children to find soothing spaces in nature as an entry to finding natural restorative spaces for coping later in life.

Time outside during childhood has many social and psychological benefits for children (Korpela et al., 2002; Moore & Wong, 1997; Terry et al., 2001; Thurber & Malinowski, 1999; Wells, 2000; Wells & Evans, 2003). Only a limited number of the research studies have explored the psychological benefit of nature exposure for college students at times of stress. Typically these studies involve viewing nature passively, watching a slide show of nature scenes or reporting on preference for one environment over another. Recent research compares the heart rate of individuals looking out of a window to view a green space with the heart rate of individuals viewing a plasma screen displaying the same green view in real time and a blank wall. The window view resulted in a more restorative response when compared to the plasma screen display and a blank wall (Kahn et al., 2008). I asked participants to recall time in nature during childhood and currently, individuals reported on contact with nature itself. My research is among the first to explore an association between nature contact in childhood and the development of coping skills in young adulthood.

Contact with nature has been demonstrated to help self-regulate negative affect (Zeller, 2006) and is acknowledged as a place where people try to resolve their problems (Francis & Cooper-Marcus, 1991). My research supports inclusion of the use of natural restorative environments into a recognized coping skill set. Active coping skills are aimed at problem-solving and typically demonstrate an intentional act on the part of the individual. Passive coping skills are avoidant or non-problem-focused skills. Typically, these skills may help the individual reduce the immediate feelings of anxiety but do little to deal with of the underlying cause of anxiety (Carver et al., 1989). My research shows the intentional act of seeking natural restorative environments for soothing was positively

correlated with coping skills that are considered active. The use of natural restorative environment was negatively correlated with passive coping skills. These results support the use of natural restorative environments as a coping strategy and, more specifically, as an effective active coping skill.

Many college students struggle with mental health issues unique to their age group. Eating disorders are often the result of depression, negative self-awareness, and avoidant coping skills (Schwarze et al., 2003). Test anxiety and perfectionism were correlated to uncontrolled anxiety in college populations (Arthur & Hayward, 1997). Alcohol use and abusive drinking patterns were related to poor or maladaptive coping skills (Borman, 2005; Dawson et al., 2005; Fraser & Tucker, 1997). Coping styles and the type of coping skills utilized changes as a student progresses through college (Pritchard & Wilson, 2006). Anxiety, test performance, and perfectionism continue to be issues of increasing clinical importance for college populations (Arthur & Hayward, 1997; Henninger, 1999).

My research supports the introduction of nature contact into the college students' routine as one avenue to reduce anxiety. Currently, there is no evidence to suggest that the introduction of natural restorative spaces during college is detrimental to the individual's mental health. In my experience, I have recognized that students with a history of nature contact may access this coping strategy more frequently when compared to students with little or no nature contact history. None of the information collected in this study suggests that there is an inability to use natural restorative environments for coping if there is no nature contact during childhood. Considering the outcome of my research, I would encourage further exploration of the effect of introducing natural

restorative environments to students struggling with anxiety. I would strongly support therapists' use of restorative nature in psychotherapy with college students.

Research in the area of natural restorative environments focuses on how nature is used to soothe a current state of anxiety (Ulrich, 1984; Ulrich et al., 1991). My research explored the connection between nature contact in childhood and the development of trait anxiety in adults. The development of trait anxiety is complex. Trait anxiety is a physical response moderated by cognitive factors (Calvo & Cano-Vindel, 1997). A slight nonsignificant negative trend found in the quantitative data was matched by a slight negative trend in the qualitative data. These findings indicate the employment of effective active coping skills rather than the abatement of the development of anxiety. One conclusion is that nature contact in childhood affected coping skill development but not the development of trait anxiety itself. Future research will be needed to understand the interaction between the development of trait anxiety and nature contact at various points in human development.

Childhood experiences shape the adult brain and brain chemistry, and can effect the development of personality traits such as anxiety (Erikson, 1993, Schore et al., 1996; Solomon & Heide, 2005). Personality is shaped by a multitude of factors including brain chemistry and past experience. Future research on the ability of natural restorative environments to shape the formation of trait anxiety needs to begin with a clarification of the relationship between the variables. Clarification of how or if contact with natural restorative environments shapes the development of trait anxiety would facilitate better understanding of the role nature plays in brain development.

Clinical Implications

There are numerous clinical implications of this research. As a therapist, this work can influence the choice of treatment approaches, the questions asked during therapy sessions, and how the environment is modeled to help others cope. Therapy offices can incorporate nature into the built environment, creating a soothing space, thus allowing clients to experience restorative nature during sessions. This type of direct modeling can be intentional with the articulated benefit of helping the client develop coping strategies. I receive numerous comments from clients about how much they like my office and I attribute this to the view of the woods and trees outside two large windows and the abundance of plants that surround the therapy space. My former clients ask to use my office during finals weeks to decompress. Termination of therapy sometimes includes letting clients take a cutting from a plant of their choice.

Typically, therapists record a history during an intake session, but the questions rarely address relationships with nature or childhood experiences in nature. I will concede that these types of questions may not be appropriate, depending on the client's emotional state during intake. I would encourage fellow therapists to explore how and when this information is incorporated into diagnosis and treatment. The results of this research support the idea that therapists should inquire about time in nature during childhood, current contact with natural restorative spaces, identification of a favorite outdoor place as a natural restorative space and how and if the client utilizes these spaces when stressed.

Treatment goals can include taking a walk outside, adding posters of nature to indoor environments, caring for a plant, finding and utilizing a natural restorative space. Our ultimate goal as therapists is to make ourselves unnecessary to the patients' coping

strategies, teaching the client alternate strategies to create a wider and deeper coping skill set.

Educational Considerations

Recently research on children and contact with nature has indicated the benefit of nature contact to cognitive skills such as attentional capacity (Berto, 2005; Taylor et al., 2001). Time outside during the school day is frequently curtailed due to safety concerns, a drive to use the time for teaching, or staff budget cuts that reduce the staff available to monitor playgrounds. The results of this research suggests that children who are not given access to outside when stressed, tired, or simply in need of attentional restoration are less likely to utilize nature as a coping strategy later in life. Elementary and middle school aged children have schedules that are controlled by adult authority figures. They have limited input into their daily routine. Thus, it is critical for the adults in a child's life to create the opportunity for time in natural restorative space. Teachers are important models for young children but even teachers struggle to create their own restorative space in the school settings (Gulwadi, 2000). Most of the teachers in Gulwadi's (2000) study indicated little or no restorative opportunities in the school setting and fewer still reported having the opportunity for contact with natural restorative space on the school grounds. If the adults who are purposing seeking restorative experience are having difficulty finding this in the school setting, what is the message we are giving young students about self-care and coping?

Attention Deficit Disorder (ADD) continues to be an issue for elementary and middle school students and can directly affect the classroom climate. Time in nature during and outside of school hours reduced ADD symptoms (Taylor et al., 2001). This

research supports allowing students contact with nature not only for the immediate benefit but also in order to develop skills for future emotional and attentional restoration. My research indicates a far-reaching impact when we limit children's access to natural restorative spaces. Limiting this coping resource in school settings effects how we model self-care, how teachers support individual development in nature, and the likelihood that children with limited nature contact at home will utilize nature for soothing.

Architecture on the College Campus

Many college campuses across the United States show beautiful open green spaces on their admission brochures and tour guides make sure to bring perspective families to the “money shot,” the view of the covered bridge, the new athletic field, the historic chapel on campus etc. But in the daily lives of students on campus, they are often exposed to views of brick walls, the smoking area of the residence hall next door, cement walls with small windows, and spaces that have no natural scenic value. Recent research supports the conclusion that even passive access to a view of nature is beneficial to students academic performance and overall mental well-being (Taylor et al., 2002). Sexual assault and physical safety are issues for architects of college campuses but appropriate landscape design can help to create a sense of safety in the environment (Kuo, et al., 1998).

Campus building design often appears to be driven by cost, as well as durability and maintenance concerns. If architects truly want to support the academic pursuits of the institutions for whom they design, they need to incorporate natural restorative spaces. Public spaces support the mental health of the individuals who use them. They also create community cohesion and enhance safety (Thriftt, 2005). Architects can support the

mental health of the students who use the campus space by incorporating natural views, increasing nature access, and creating natural restorative spaces while increasing safety for the community.

Limitations and Future Considerations

This research was conducted on a small liberal arts campus in the Northeastern United States with limited visible minority representation and limited cultural diversity. The results are meaningful within this context and generalizations outside these parameters should be done cautiously until further evidence supports the conclusions of this small sample. This is exploratory research identifying a relationship between contact with nature and the development of coping skills. The current results supported an intuitive understanding of the importance of nature to our psychological well-being in all stages of human development. I am encouraged by these findings. My highest aspiration is that this research will help parents to guide their child's use of natural restorative spaces, college students to understand how to utilize nature for soothing, therapists to incorporate nature in treatment, and architects to identify and use nature-based issues. Ultimately, I hope that education will truly move "outside the classroom" and allow students to access nature as an effective coping and attentional strategy.

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Appendix A: Consent form

Anxiety and Coping Strategies Study

Consent to participate in the research study.

Researcher: M.J. Raleigh; Antioch New England Graduate School doctoral student in Environmental Studies Department

I am asking you to take part in a research study on college students and anxiety.

I am a graduate student in the Environmental Studies Department of Antioch New England Graduate School. The study will explore anxiety and coping strategies in college students for my dissertation.

You will not receive treatment as part of this research project.

Whether or not you are being treated for anxiety by a therapist, you can volunteer for this study. You will be asked a series of questions. If at anytime during this research you feel you would benefit from therapy, I will be happy to help with a referral.

The study will consist of two parts. If you volunteer for the first part of the study, you will undergo a series of surveys.

The assessments will ask questions about substance use, depression, anxiety, and your past and give you several psychological tests to learn more about you and your overall well-being. This section of the study will take about 45 minutes and will take place in a classroom setting.

If you are eligible and choose to participate in the second part of the study you will

be interviewed about your past and present ability to deal with stress and this interview will be audiotaped.

If you are selected I will contact you separately and I will ask questions about your childhood, your stress levels, how you deal with stress, how you feel about nature, and about your favorite places. During this session, we will talk about the stressors in your life and how you deal with them. This consent includes permission to audiotape the interview section of the study. This section of the study will take about one hour.

There are no major risks in being in this study.

The psychological assessments, and interview, involve minimal risk to the volunteer. There is minimal risk in discussing past anxiety producing events or personal strategies for dealing with stress. Some of the questions may make you feel slightly uncomfortable, if you recall uncomfortable situations or events. If you experience any significant distress while answering questions during the study, I can help you locate suitable treatment if you wish to do so and continuation of the research will be discussed. You may terminate your participation in this research at any time without any repercussions.

The study may benefit those who participate.

If you participate you may get some benefit from the experience. You may learn more about yourself and your anxiety levels.

I will protect your confidentiality.

I will protect all information about you and your participation in this study. No

one else, including the counseling center staff, will have contact with you or access to any personal information about you. I will not identify you in person in any of the research material (interview, survey, etc.) or final products.

The interview section of the study will be audiotaped.

If you are chosen for an interview, the session will be audio taped. I will listen to the tapes and write down our conversation for further analysis. Once the research is finished, all tapes will be erased. Quotes will be used in the final data analysis, but no identifying information will be included.

I may end your participation for a number of reasons:

1. You report a traumatic event occurring in a natural environment.
2. You request termination of the interview or physical/psychological problems arise, which would interfere with the study.
3. You report a severe substance abuse problem.
4. You report a recent episode of severe depression or a suicide attempt.
5. If you and I decide, for any reason it is in your best interests.

If you have any uncomfortable feelings about the interview, you may call the counseling center at New England College (603) 428-2253 or call Contoocook Valley Counseling (603) 428-3336, or call me directly at (603) 428-2905.

If you have questions about the research, you may contact my advisor, Dr. Beth Kaplin at 603-357-3122 or me or write her at:

Environmental Studies Department

Antioch New England Graduate School

40 Avon Street

Keene, NH 03431

You have rights as a research volunteer.

- Taking part in this study is voluntary. If you do not take part, you will have no penalty.

- **You may stop taking part in this study at any time.** You may stop participating at any time, with no penalty or loss of any benefits to which you are otherwise entitled.

If you have any questions about your rights as a research volunteer, call or write:

Director of Research

Dr. George Tremblay

Antioch New England Graduate School

40 Avon Street

Keene, NH 03134

(603) 357-3122, ext. 236

george_tremblay@antiochne.edu

Consent Statement:

I have read and understand the information above. The researcher has answered all the questions I had to my satisfaction. She verbally reviewed and gave me a signed copy of

this form. I consent to take part in the Anxiety and Coping Strategies Research Study.

Signature: _____ **Date:** _____

Witness: _____ Date: _____

Appendix B: Demographic Data Sheet

This sheet was collected after subjects checked that all the information was complete and all the subject numbers match but before assessment material was handed in. This information will be in separate files from the assessment results to assure the subjects anonymity while the data is being analyzed and used to ascertain subjects overall mental status, background information and possible exclusion from the study.

Intake

Research Study on Anxiety and Nature

Subject # _____

Date: _____

DOB: _____

Sex: M or F

G.P.A.: _____

Student Status: (circle one) Full time or Part time Commuter or Residential

Academic Concentration: Major: _____ Minor: _____

Year in school: Fr So Jr. Se Grad: 1 2 3 4 years

Have you experienced any of these feelings over the past several days?

___ Withdrawal from others

___ Chronic physical problems with no apparent cause

___ An inability to interact with others

___ Feelings of inability to deal with stress

___ Prolonged feelings of hopelessness

___ Inability to focus on a task

___ Inability to eat, nausea or change in your eating pattern

___ Inability to sleep or change in your sleeping pattern

___ Light headedness, dizziness or blurred vision

___ Shortness of breath or difficulty breathing

Have you:

___ been diagnosed with anxiety

___ tried to kill yourself in the last six months

___ been diagnosed with depression

___ been hospitalized for a drug related incident

Rank order 1-5 the following support networks according to how comfortable you feel sharing stressors, conflict or concerns with them:

___ Family members

___ Friends

___ Significant Other

___ Counselors, Psychotherapists or Doctors

___ Religious or Spiritual leaders

Appendix C: State-Trait Inventory

It is a violation of copyright law to copy or include a psychological assessment instrument in its entirety in a dissertation proposal. The following questions are samples of the Y Form of the State-Trait Inventory

State-Trait Anxiety Inventory (1970)

This is a 40-question assessment using two forms within the one instrument, each form is on one side of the assessment sheet.

STAI FORM Y-1

Subjects are instructed to blacken in the appropriate circle to the right of the statement that most closely indicates how they feel right now, at this moment.

	not at all	somewhat	moderately so	very much so
1) I feel calm	1	2	3	4
3) I am tense	1	2	3	4
11) I feel self confident	1	2	3	4
17) I am worried	1	2	3	4

STAI FORM Y-2

Subjects are instructed to blacken in the appropriate circle to the right of the statement that most closely indicates how they generally feel.

	almost never	sometimes	often	almost always
31) I have disturbing thoughts	1	2	3	4
36) I am content	1	2	3	4

39) I am a steady person 1 2 3 4

40) I get in a state of tension or turmoil as I think over my recent concerns and interests

1 2 3 4

Appendix D: Coping Orientation Problems Experience (COPE)

We are interested in how people respond when they confront difficult or stressful events in their lives. There are lots of ways to try to deal with stress. This questionnaire asks you to indicate what you generally do and feel when you experience stressful events. Obviously different events bring out somewhat different responses but think about what you usually do when you are under a lot of stress.

Respond to each of the following items by placing the number that represents your answer choice on the line provided next to the question you are answering. Use the response choices listed just below. Please try to respond to each item separately in your mind from each other item. Choose your answers thoughtfully, and make your answers as true FOR YOU as you can. Please answer every item. There are no "right" or "wrong" answers, so choose the most accurate answer for YOU--not what you think "most people" would say or do. Indicate what YOU usually do when YOU experience a stressful event.

- 1 = I usually don't do this at all
- 2 = I usually do this a little bit
- 3 = I usually do this a medium amount
- 4 = I usually do this a lot

- ___1. I try to grow as a person as a result of the experience.
- ___2. I turn to work or other substitute activities to take my mind off things.
- ___3. I get upset and let my emotions out.
- ___4. I try to get advice from someone about what to do.
- ___5. I concentrate my efforts on doing something about it.
- ___6. I say to myself "this isn't real."
- ___7. I put my trust in God.
- ___8. I laugh about the situation.

- ___9. I admit to myself that I can't deal with it, and quit trying.
- ___10. I restrain myself from doing anything too quickly.
- ___11. I discuss my feelings with someone.
- ___12. I use alcohol or drugs to make myself feel better.
- ___13. I get used to the idea that it happened.
- ___14. I talk to someone to find out more about the situation.
- ___15. I keep myself from getting distracted by other thoughts or activities.
- ___16. I daydream about things other than this.
- ___17. I get upset, and am really aware of it.
- ___18. I seek God's help.
- ___19. I make a plan of action.
- ___20. I make jokes about it.
- ___21. I accept that this has happened and that it can't be changed.
- ___22. I hold off doing anything about it until the situation permits.
- ___23. I try to get emotional support from friends or relatives.
- ___24. I just give up trying to reach my goal.
- ___25. I take additional action to try to get rid of the problem.
- ___26. I try to lose myself for a while by drinking alcohol or taking drugs.
- ___27. I refuse to believe that it has happened.
- ___28. I let my feelings out.
- ___29. I try to see it in a different light, to make it seem more positive.
- ___30. I talk to someone who could do something concrete about the problem.
- ___31. I sleep more than usual.
- ___32. I try to come up with a strategy about what to do.
- ___33. I focus on dealing with this problem, and if necessary let other things slide a little.
- ___34. I get sympathy and understanding from someone.
- ___35. I drink alcohol or take drugs, in order to think about it less.
- ___36. I kid around about it.
- ___37. I give up the attempt to get what I want.
- ___38. I look for something good in what is happening.
- ___39. I think about how I might best handle the problem.
- ___40. I pretend that it hasn't really happened.
- ___41. I make sure not to make matters worse by acting too soon.

- ___42. I try hard to prevent other things from interfering with my efforts at dealing with this.
- ___43. I go to movies or watch TV, to think about it less.
- ___44. I accept the reality of the fact that it happened.
- ___45. I ask people who have had similar experiences what they did.
- ___46. I feel a lot of emotional distress and I find myself expressing those feelings a lot.
- ___47. I take direct action to get around the problem.
- ___48. I try to find comfort in my religion.
- ___49. I force myself to wait for the right time to do something.
- ___50. I make fun of the situation.
- ___51. I reduce the amount of effort I'm putting into solving the problem.
- ___52. I talk to someone about how I feel.
- ___53. I use alcohol or drugs to help me get through it.
- ___54. I learn to live with it.
- ___55. I put aside other activities in order to concentrate on this.
- ___56. I think hard about what steps to take.
- ___57. I act as though it hasn't even happened.
- ___58. I do what has to be done, one step at a time.
- ___59. I learn something from the experience.
- ___60. I pray more than usual.

COPE scoring procedure

Scales (sum items listed, with no reversals of coding):

Positive reinterpretation and growth: 1, 29, 38, 59

Mental disengagement: 2, 16, 31, 43

Focus on and venting of emotions: 3, 17, 28, 46

Use of instrumental social support: 4, 14, 30, 45

Active coping: 5, 25, 47, 58

Denial: 6, 27, 40, 57

Religious coping: 7, 18, 48, 60

Humor: 8, 20, 36, 50

Behavioral disengagement: 9, 24, 37, 51

Restraint: 10, 22, 41, 49

Use of emotional social support: 11, 23, 34, 52

Substance use: 12, 26, 35, 53

Acceptance: 13, 21, 44, 54

Suppression of competing activities: 15, 33, 42, 55

Planning: 19, 32, 39, 56

Appendix E: Nature Contact Survey

Coping and Nature Survey

Subject #: _____

Please answer the following questions to the best of your ability. If you do not see your answer choice listed in the response choices, choose the response that most closely approximates your answer.

1) Please place a check next to the most current stressors in your life.

___ completing academic work on time

___ doing well on exams

___ family tension

___ feeling good about my self

___ paying tuition

___ having money for social activities

___ roommate/classmate conflicts

___ not fitting in socially

2) Please place a check next to activities you are involved in outside of class

___ College sports teams

___ Sports activities that are not part of the college athletic program

___ Art, music or other creative outlets

___ Social activities with peers

___ Student government, social and/or civic clubs

3) Circle the activity you are most likely to do when you are feeling stressed or anxious:

a) Seek time alone

b) Seek out family or friends

- c) Seek time with others outdoors
 - d) Seek time alone outdoors
- 4) Circle from the choices below the answer that best describes the physical setting in which you grew up:
- a) Urban
 - b) Suburban
 - c) Rural Town
 - d) Rural Farm
- 5) Estimate the amount of time you spent outside as a child
- a) 2-5 hours a day
 - b) less than 2 hours a day
 - c) less than 5 hours a week
 - d) less than 1 hour a week
- 6) In general, was the time you spent outside as a child, between the ages of 5-12 years old, supervised? (Circle one)
- Always Most of the time Occasionally Never
- 7) Were your outdoor activities as a child
- a) structured by adults – sports, family hiking
 - b) structured at younger ages but unstructured after about the age of 10
 - c) both structured and unstructured
 - d) unstructured activities – self generated play, peer generated activity
- 8) Did you have favorite outdoor places as a child? (Circle one)
- Many favorite More than one One special place Never had a favorite

outdoor spaces place

outdoor space

If you answered that you “never had a favorite outdoor space” skip this rating scale and go to question number #9.

Rate the level of “greenness” of your favorite childhood outdoor place. (Circle one number)

Urban/Concrete

Black Top/Park

Grass/Trees

Forested area

Not Green

Very Green

1

2

3

4

5

9) Did you have access to trees and wooded spaces during your childhood? (Circle one)

Always

Most of the time

Occasionally

Never

10) How many trees do you remember being around the places you had access to as a child?

a) acres of woods, too many trees to count

b) a wooded area, less than one acre

c) a few trees

d) no trees

11) How close was your childhood home, or the place you most associate with your childhood, to a county roadway, highway or town street (a driveway does not constitute a roadway)?

a) more than a mile from a road

b) less than 1.5 miles from a road

c) less than 200 yards from a road

d) less than 50 yards from a road

12) Did you have access to outdoor play equipment as a child? (Circle One)

Always

Most of the time

Occasionally

Never

13) Did you frequent or use local parks or managed play areas as a child? (Circle One)

Always

Most of the time

Occasionally

Never

14) Estimate the amount of time you spend outside now, as an adult

- a) 2-5 hours a day
- b) less than 2 hours a day
- c) less than 5 hours a week
- d) less than 1 hour a week

15) How many trees are around the place you live now?

- a) acres of woods, too many trees to count
- b) a wooded area, less than one acre
- c) a few trees
- d) no trees

16) How close is your home or the place you most closely associate with home, to a county roadway, highway or town street (a driveway does not constitute a roadway)?

- a) more than a mile from a road
- b) less than 1.5 miles from a road
- c) less than 200 yards from a road
- d) less than 50 yards from a road

17) Do you frequent or use local parks or managed areas when you go outdoors? (Circle One)

Always

Most of the time

Occasionally

Never

18) When you're feeling bad, where do you go to feel better? Circle the place you would most likely go when upset.

- a) Your own room or bedroom
- b) Friends room

- c) Family home
- d) Indoor sports facility
- e) Athletic fields
- f) Outdoor natural setting
- g) Out walking/hiking in nature

19) Do you have a favorite outdoor place now? (Circle One)

Many favorite outdoor places More then one place One special place Don't have a favorite outdoor place

If you answered that you “don’t have a favorite outdoor space” skip this rating scale and go to question number #20.

Rate the level of “greenness” of your favorite outdoor place. (Circle one number)

Urban/Concrete	Black Top/Park	Grass/Trees	Forested area
Not Green			Very Green
1	2	3	4
			5

20) How often do you access your favorite outdoor place?

- a) more then once a week
- b) more then twice a month
- c) more then twice a year
- d) less then once a year

21) How easy is it to get to your favorite outdoor space?

- a) very easy, I can access it by foot
- b) easy, a short distance - less then 15 minutes by car
- c) difficult, it requires advanced planning

- d) very difficult, it requires extensive travel plans
- 22) What particular feelings inspire you to seek out nature or natural elements in your daily or routine spaces?
- a) stressed
 - b) happy
 - c) no particular feelings
 - d) I don't seek out nature
- 23) How do you feel when you return from time spent in nature?
- a) relaxed
 - b) more "clear headed"
 - c) no change
 - d) stressed

Scoring the Nature Contact Survey:

21 responses choices are weighted (all questions excluding 1 & 2)

- 1) All response choices have been generated from the pilot study data. All questions with an alphabet choice response: a=4,b=3,c=2,d=1
- 2) Reverse scoring for questions 6 and 4
- 3) Word responses are placed on a Likert scale:
 - all the time/always/many =4,
 - most of the time/structured when younger/more than one=3,
 - occasionally/both structured and unstructured/one=2,
 - never/no favorite outdoor space/unstructured=1.
- 4) Greenness rating scales have been added to two questions on the survey, 8 & 19. This information is not part of the statistical analysis but is important to understanding how close to a natural restorative space the place a subject designated as a “favorite place” truly is. The scale is rated from “Not Green” (Urban/Concrete) to “Very Green” (Forested Area), although this requires some level of personal interpretation the direction of the scale is easy to follow.
- 5) Questions 1 and 2 are background information gathering questions.

Childhood contact can be calculated by summing the scores on only the questions pertaining to childhood nature contact (questions #4-13, 8a& 8b). Scores for childhood contact with nature range from 11-44, 11 indicated little contact with nature and 44 indicating extensive contact.

Adult nature contact scores range between 9- 36. A score of nine indicates little present day contact with nature, 36 indicating regular contact with nature. Scores are

calculated by summing the scores on questions 14-23, 19a & 19b (excluding question #18).

Restorative nature score is calculated by summing the response choices on questions 14,18,19 a&b, 20 –23. Scores can range from 6-31, 6 indicates little or no use of restorative environments for soothing and a score of 31 indicates frequent use of natural restorative environment for emotionally soothing.

Appendix F: Semi-structured interview questions

- 1) Please describe some of the current stressors in your life. Please give 3 or 4 examples of recent stressors and what caused them.
- 2) What kinds of things do you do to handle stress in your life?
- 3) Please list activities you are involved in such as: hobbies, interests, out of class activities, membership in clubs or organizations etc.
- 4) Describe how you feel, how your body reacts, when you are stressed.
- 5) Describe the physical space and natural environment you grew up in, or the space and environment you most associate with your childhood.
 - a) Did you have access to trees and wooded spaces?
 - b) How many trees do you remember being around the places you had access to as a child?
 - c) How close was your childhood home to a roadway? Was it a highway, a town road, a dead end etc.?
 - d) Did your childhood home include a fenced in backyard?
 - e) Did you have access to play equipment?
 - f) Did you frequent or use local parks or managed play areas as a child?
- 6) Please estimate how much time you spent outside, as a child (5-12years old). (2-5 hours a day, less than 2 hours a day, less than one hour a day, less than 5 hours per week, less than one hour per week)
- 7) What did you do when you were outdoors as a child?
- 8) Were you on pavement, grass, gravel, in a forest, near water etc.?
- 9) Did you have a favorite place in childhood? If yes describe that space.

- 10) Describe your favorite place now? How often do you access that space? How easy is it to get to that space?
- 11) How would you define nature?
- 12) Do particular feelings inspire you to seek out nature or natural elements in your space, and if so, what are those feelings?
- 13) How do you feel when you return from time spent in nature? Are there other places outside of nature that can make you feel the same way?
- 14) Describe your relationship with nature now.
- 15) Is it different than your relationship with nature as a child? If so, how is it different?
- 16) Please share one story from childhood that took place in a natural setting.
- 17) Please share one story that recently took place in a natural setting.

Appendix G: Nature Contact Survey (Revised)

Coping and Nature Survey

Subject #: _____

Please answer the following questions to the best of your ability. If you do not see your answer choice listed in the response choices, choose the response that most closely approximates your answer.

1) Please place a check next to the most current stressors in your life.

___ completing academic work on time

___ doing well on exams

___ family tension

___ feeling good about my self

___ paying tuition

___ having money for social activities

___ roommate/classmate conflicts

___ not fitting in socially

2) Please place a check next to activities you are involved in outside of class

___ College sports teams

___ Sports activities that are not part of the college athletic program

___ Art, music or other creative outlets

___ Social activities with peers

___ Student government, social and/or civic clubs

3) Circle the activity you are most likely to do when you are feeling stressed or anxious:

a) Seek time alone

- b) Seek out family or friends
 - c) Seek time with others outdoors
 - d) Seek time alone outdoors
- 4) Circle from the choices below the answer that best describes the physical setting in which you grew up:
- a. Urban
 - b. Suburban
 - c. Rural Town
 - d. Rural Farm
- 5) Did you have access to trees and wooded spaces during your childhood? (Circle one)
- Always Most of the time Occasionally Never
- 6) How many trees do you remember being around the places you had access to as a child?
- a) acres of woods, too many trees to count
 - b) a wooded area, less than one acre
 - c) a few trees
 - d) no trees
- 7) Estimate the amount of time you spent outside as a child
- a) 2-5 hours a day
 - b) less than 2 hours a day
 - c) less than 5 hours a week
 - d) less than 1 hour a week
- 8) Did you have favorite outdoor places as a child? (Circle one)

Many favorite outdoor spaces More then one place One special place Never had a favorite outdoor space

If you answered that you “never had a favorite outdoor space” skip this rating scale and go to question number #9.

Rate the level of “greenness” of your favorite childhood outdoor place. (Circle one number)

Urban/Concrete	Black Top/Park	Grass/Trees	Forested area
Not Green			Very Green
1	2	3	4
			5

9) In general, was the time you spent outside as a child, between the ages of 5-12 years old, supervised? (Circle one)

Always Most of the time Occasionally Never

10) Did you have access to outdoor play equipment as a child? (Circle One)

Always Most of the time Occasionally Never

11) Did you frequent or use local parks or managed play areas as a child? (Circle One)

Always Most of the time Occasionally Never

12) Estimate the amount of time you spend outside now, as an adult

- a) 2-5 hours a day
- b) less then 2 hours a day
- c) less then 5 hours a week
- d) less then 1 hour a week

13) How many trees are around the place you live now?

- a) acres of woods, too many trees to count

17) How often do you access your favorite outdoor place?

- a) more than once a week
- b) more than twice a month
- c) more than twice a year
- d) less than once a year

18) How easy is it to get to your favorite outdoor space?

- a) very easy, I can access it by foot
- b) easy, a short distance - less than 15 minutes by car
- c) difficult, it requires advanced planning
- d) very difficult, it requires extensive travel plans

19) What particular feelings inspire you to seek out nature or natural elements in your daily or routine spaces?

- a) stressed
- b) happy
- c) no particular feelings
- d) I don't seek out nature

20) How do you feel when you return from time spent in nature?

- a) relaxed
- b) more "clear headed"
- c) no change
- d) stressed

Scoring the Revised Nature Contact Survey:

18 responses choices are weighted (all questions excluding 1 & 2)

1) All response choices have been generated from the pilot study data. All questions with an alphabet choice response: a=4,b=3,c=2,d=1

2) Reverse scoring for questions 3 and 4

3) Word responses are placed on a Likert scale:

all the time/always/many =4,

most of the time/structured when younger/more than one=3,

occasionally/both structured and unstructured/one=2,

never/no favorite outdoor space/unstructured=1.

4) Questions 19 and 20 word responses on the Likert scale:

I don't seek nature/stressed= 0

No particular feelings/no change = 1

Happy/more "clear headed" = 2

Stressed/relaxed = 3

5) Greenness rating scales have been added to two questions on the survey, 8 & 16. This information is part of the statistical analysis, it is important to understanding how close to a natural restorative space the place a subject designated as a "favorite place" truly is. The scale is rated from "Not Green" (Urban/Concrete) to "Very Green" (Forested Area), although this requires some level of personal interpretation the direction of the scale is easy to follow.

6) Questions 1 and 2 are background information gathering questions.

Total Nature Contact scores range from 11 – 64, 11 indicating little access to nature in childhood and in young adulthood and 64 indicates regular contact with green natural spaces in childhood and currently.

Scales embedded in the survey:

Childhood nature contact scale can be calculated by summing the scores on only the questions pertaining to childhood nature contact (questions #4-11, 8a& 8b). Scores for childhood contact with nature range from 5-28, 5 indicated little contact with nature and 28 indicating extensive contact.

Childhood access to nature scale scores range from 3-12, 3 indicating little access to nature in childhood, 12 indicates easy access to natural spaces. Quality of childhood nature scores range from 3-12, 3 indicating little time in green or wooded spaces during childhood, 12 indicating regular time in green natural spaces.

Adult nature contact scores range between 6- 36. A score of 6 indicates little present day contact with nature, 36 indicating regular contact with nature. Summing the scores on questions 3, 12-20, 16a & 16b calculate scores.

Restorative nature score is calculated by summing the response choices on questions 12, 16 a&b, 17 - 20. Scores can range from 3-30, 3 indicate little or no use of restorative environments for soothing and a score of 30 indicates frequent use of natural restorative environment for emotionally soothing.