Understanding Environmental Deficit Phenomenon:

Influences Affecting Children's Connectedness to Nature

by

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A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science,
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College of Arts and Sciences,
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Date of Approval:
October 31, 2011

Keywords: recess, environmental education, stewardship, socialization

DEDICATION

"Unless someone like you cares a whole awful lot, nothing is going to get better. It's not."

--- Dr. Seuss, *The Lorax*

This work, and everything else I will ever do, is dedicated to my son, Jett Nicholas Eugene Bates. No one could work this hard for a cause in which he or she didn't believe. My dearest Jetty, there is no greater cause on Earth than you. I will make this world a better place for you to live. I love you beyond any expression of words and you are still the very best thing that has ever happened to me.

This work is also dedicated to all the little citizens of MissBatesopolis, and a few young men and women who shaped the way I think about what children need to learn. To Abraham, the animal rights activist, Michael, the meteorologist, Takarius, the gardener, Dimonique, the visionary, Jonah, who is probably still exploring the feasibility of a Mars colony, and Brianna, who thought I was an awesome teacher because we didn't use the textbook. I believe that you are special and knowing each of you has changed my life forever.

And lastly, this project is dedicated to my grandmother, Ruby Helen (Blanton) Bates. If I can manage to be half of what you are, I'll be a lucky woman indeed.

ACKNOWLEDGEMENT

I would like to acknowledge the people who have shaped me personally, and throughout my brief professional and academic career. First, my parents, James and Melissa Bates, who know me well and love me anyway. As a child, I myself felt connected to nature because you took me camping, and we planted sunflowers in the back yard. We crunched snow under our boots and put out bird seed in the winter. Because of you, I became a child who cared about the world around me. Thank you for joining my 2nd grade boycott against a banana company that polluted the rain forest, and later, seeing me off as I went to the rain forest myself.

My first experience with teaching came unexpectedly in high school, when I tutored a classmate through our geometry course. In her recommendation letter to the University that I later attended, my math teacher later said that I fostered cooperation with such an innate grace that my peers were not embarrassed to ask me for help, and said that my integrity is beyond reproach. The effect that positive words can have on someone's drive to succeed is profound. Mrs. Elizabeth Koller, I kept a copy of your recommendation letter and I read it many times while writing this thesis. It was the nicest thing anyone ever said about me and I work very hard to live up to your praise.

I would also like to acknowledge my teaching mentor, Ms. Diane Erwin, who gave me my famous tie dye lab coat and believed in me even back then.

My Co-Chairs on this project, Dr. Joseph Dorsey and Dr. Michiko Clutter, guided me in very different ways through the labyrinth that is a master's thesis. Dr. Dorsey has the unique ability to create a team of people who are as different from one another as east is from west. Dr. Dorsey, your value for the unique contribution of diverse experts is the keystone that makes a multidisciplinary project such as this one possible. Thank you for believing in me when a lot of people didn't believe my ideas would be fruitful, and for believing in a project that was too big for us to conquer alone. Thank you for occasionally listening to me whine, and supporting me through triumphs and setbacks. Your strength, your guidance, and your rational encouragement are what made this project successful. I will forever be indebted.

Dr. Clutter, thank you especially for the immense amount of data analysis through which you guided me. I am not even a student in your department, but you undertook a huge commitment to help me complete this project. Thank you for recruiting the data analysis team for this project as well. I learn so much from you in even the briefest amounts of time and I am truly honored to have been able to work with you.

I would like to acknowledge the above mentioned data analysis team for their amazing work in record time. A.J., Rebecca, and David, I would still be entering that data into the computer had you not joined this project. Thank you for all of your time completing training, sorting, filing, labeling, deciphering handwriting, and organizing a usable set of data from hundreds of surveys.

My wife deserves more than an acknowledgement; she deserves a standing ovation. Leiseane, thank you for all the little things. Thank you for the plate of food that's in the refrigerator when I worked way too late. Thank you for the clean clothes in the laundry room that I didn't have time to wash. Thank you for bringing the lunch I walked out the door and left. Thank you for the fed, bathed, and toothbrushed child waiting for me to come home and do the fun part of the bedtime routine. Life is so much sunnier because you're here, but what's more, this work would not have gotten done without you in my corner.

The one person who didn't care whether I finished this work or not is probably the most important motivator I had. I could not allow my child to grow up unprepared to participate in the protection of the Earth and of his own wellness. Jetty, I will make this world the best possible place for you to live, if I have to replant forests tree by tree. But I think the most effective way to change people is to advocate for the teaching of your generation. You will be the agents by which change occurs. So when this project seemed insurmountable, I still knew that I couldn't afford to stop this work. Through this research I am fighting for you, and without you, I would have stopped when it got hard.

And lastly, I would like to thank my academic mentor, Dr. Barnali Dixon, who has saved me from imminent failure more times than anyone should have had to. You've been my teacher, my boss, my advocate, my mentor, and, as necessary, my swift kick in the behind. Thank you for the office space, the good council, and the example of everything I hope to be. If I had not met you, I would never have finished this work, and I am very lucky to know you.

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ABSTRACT

The contemporary generation of young people experiences a childhood unlike any other previous generation. Federal funding for high achievement on standardized tests in the areas of reading and math have resulted in a narrowed school curricula focusing predominantly on these two subjects, and leaving little instructional time and resources for hands-on learning and unstructured time outdoors. Furthermore, children report spending less time outdoors and note that their parents are too busy to take them out to play. These circumstances at school and at home may indicate a decreasing value for nature experiences held by the adults who supervise children, which could affect their perceptions of connectedness to nature. The combination of lack of value for experiences in nature at school and at home may be contributing to a decrease in children's connectedness to nature, a process which can be called Environmental Deficit Phenomenon. The primary objective of this study was to identify a relationship among the beliefs supporting children's nature experiences from a child's home and school settings and children's perceptions of connectedness to nature. Data was collected from 78 families and 19 teachers in the form of three surveys: 1) of students in third to sixth grade regarding their perceptions of connectedness to nature, 2) of the students' parents regarding their perceptions of children's nature experiences, and 3) of the students' teachers, regarding the classroom curriculum, including green initiatives and the amount of unstructured time spent

outdoors. Relationships among home and school influences and children's perceptions of connectedness to nature were measured with a series of models of hierarchical regression at an alpha level of 0.05. A significant relationship was found between the amount of recess, defined as unstructured time spent outdoors during the school day, and the outcome of children's connectedness to nature. Additionally, the amount of unstructured time spent outdoors contributed to children's connectedness to nature above and beyond the beliefs supporting children's nature experiences from the children's primary caregivers. These findings serve as an initial empirical data to demonstrate the important roles of family and school influences in shaping children's connectedness to nature. Currently, the environment is deteriorating. Children who feel connected to nature will become the adults who drive environmental policies to protect the future world. Identifying key predictors in children's connectedness to nature ensures that the present generation can give its youth the tools to advocate for environmental, and consequently, personal wellness.

CHAPTER 1: INTRODUCTION

The human connection to nature, while ever present, has evolved over time. The way in which humans see nature stems from the prehistoric beginnings of agrarian societies, where, for the first time, nature was perceived as separate from the human existence (Shepard, 1998). The separation continued through history in the form of an increasingly utilitarian view of nature, and the dualistic existence of a natural, non-manmade world outside the space inhabited by humans (Cronon, 1995).

The earliest root of the word *nature* comes from the Greek word *physis*, meaning the intrinsic characteristics that plants, animals, and other features of the world develop of their own accord. The first recorded use of the word is in Homer's The Odyssey, in reference to a plant. The Latin translation *natura* refers to intrinsic qualities and innate disposition (Collins English Dictionary, 2009), but Isaac Newton first used the term "nature" in reference to the physical world not made by humans in *Mathematical Principles of Natural Philosophy* (1687), one of the first systematic studies of the environment. The word *nature* has been expanded in scientific terms to mean "the world and its naturally occurring phenomena, together with all of the physical laws that govern them" and also, "living organisms and their environments" (American Heritage Science Dictionary, 2002). Antonyms of *natural* include both *man-made* and *artificial*

(Roget's Thesaurus, 2011) which imply that nature is not the world constructed by humans, but rather the living and nonliving elements outside of human control.

The environment, defined as where we "live, work, and play" (Notovtny, 2000) is comprised of components that are natural, as well as components that are manmade. Because the indoor environment is man-made, most of the natural elements of the human environment are outdoors. Existing research shows that children are spending increasingly less time outdoors (Schwenk, 1998; Loukaitou-Sideris, 2010). Out of sight and out of mind, the natural environment continues to deteriorate (Morales, et al., 1995; Colborn et al., 1996; Knobeloch et al., 2000; Criss, 2004; Mindell et al., 2005; Geelen et al., 2009). To best combat this deterioration, individual citizen's beliefs must shift to a more environmentally-centered approach to drive policy in an environmentally friendly direction (Oelschlaeger, 1991; Saylan and Blumstein, 2011). This must include positive environmental beliefs at an individual level, since environmental problems are most quickly and comprehensively solved at local levels (O'Leary et al., 2004). Since studies have shown that childhood beliefs influence the attitudes toward the environment that people have as adults (Grønhøj & Thøgersen, 2009), we must nurture pro-environmental beliefs in children for long term attitude shifts. Childhood beliefs are shaped by the values transferred via home and school socialization (Maccoby, 2007) so these are the agents by which changes can occur. Therefore, identifying the home and school factors related to children's connectedness to nature is critical to creating the children who as adults will value the environment, and drive meaningful environmental policy.

An adult's beliefs are developed during childhood through the socialization of values at home (John, 1999; Maccoby, 2007; Whitbeck & Gecas, 1988) and at school Grusec & Davidov, 2007. Therefore, in order to create adults who hold the positive environmental beliefs, the home and school settings must socialize environmental values into children. Positive environmental beliefs begin with a relevant connection to nature (Saylan and Blumstein, 2011). This childhood connection to nature, carried over into adulthood, will create the citizens who will enact and follow positive environmental policies in the future.

For the purposes of this study, it is assumed that exposure to nature, both directly and integrated into other activities, indicates a value for it. A value for the environment is built from positive environmental attitudes and beliefs. Beliefs are the building blocks of conscious thought in which a person regards a concept as true or untrue, but this this does not require reflection as to why (Schwitzgebel, 2010). Attitudes are a more complex and culturally based position that implies having some experience with the topic at hand (Tuan, 1974). Systems of beliefs and attitudes make up a person's values, "principals, standards, or qualities considered worthwhile or desirable" (American Heritage Stedman's Medical Dictionary, 2011). Applying the relationship between beliefs, attitudes, and values to parental influences on children's connectedness to nature, a parent who believes that nature experiences are beneficial to children will have a positive attitude toward exposing children to nature. This is evidence that the parent values nature experiences for their children. In this study, parental beliefs regarding children's nature experiences are measured, along with their

intentionality to expose their children to nature. If parents have a positive attitude toward exposing children to nature, they will report intentionality to perform this behavior. The combined beliefs associated with children's nature experiences and intentionality to expose children to nature will show evidence of a value for nature in a child's home environment. School environments show evidence of a value for nature by including nature themes in the curriculum, undergoing green initiatives, and giving children recess time outdoors.

This study has several components. First, a literature review presents evidence to support a claim of lack of connectedness to nature in contemporary youth, the history of the human-nature relationship and the roles of home and school in children's connectedness to nature, and why such a connectedness is important. In this context, the present study focuses on identifying key family and school factors associated with children's connectedness to nature. The objective of this study is to identify the role of family and school environmental values, as measured by reported beliefs and practices in shaping children's connectedness to nature. Specifically, this study examines the relationship between parental beliefs supporting children's nature experiences, intentionality to expose children to nature, the school curriculum, green initiatives, and recess and children's connectedness to nature.

CHAPTER 2: REVIEW OF THE LITERATURE

Environmental Deficit Phenomenon: A Lack of Connectedness to Nature

Direct and frequent experience with the outdoors is almost a thing of the past (Saylan and Blumstein, 2011) as most of the human population lives in urban areas inaccessible to natural space (Louv, 2005). Louv uses the term uses the term “Nature Deficit Disorder” to explain the disconnect from nature experienced by contemporary children. The socialization agents by which children obtain the values that shape their beliefs- the home and school environments- are placing increasingly less value on the natural, non-manmade environment (Louv, 2005). Therefore, children’s connectedness to nature could be affected. Additionally, parents overstructure their children’s activities (Louv, 2005) and many fear that the dangers – from wild animals, strangers, and risks of injury - of allowing children to play outside alone are not worth the potential benefits (Saylan & Blumstein, 2011). The decrease in children’s nature experiences is not only occurring at at home. Nature experiences are also declining at school. Many schools have eliminated recess from the school day (Pellegrini, 2005), and severely curtailed the time spent teaching natural science (Finch, 2009), and the quality of the environmental education provided to American youth is also lacking (Saylan & Blumstein, 2011). The failure to expose children to nature through diminished experiences at home and at school may lead to a lack of value for nature. The combined lack of time spent in nature

at home and at school could indicate a decline of value for nature from the home and school environments, which may create a generation of children who do not see nature as a relevant part of the everyday experiences and do not possess the attitudes necessary to drive environmental action (Saylan & Blumstein, 2011). In order for nature to be a relevant part of the lives of young people, children must be exposed to natural environmental processes that affect their lives (Shepard, 1998), given meaningful experiences outdoors (Louv, 2005), and socialized to view nature as important (Grønhøj & Thøgersen, 2009). However, nature – the non-manmade world - can not be relevant to the lives of all citizens unless every citizen has access to it (Oelschlager, 1991). For this to occur, nature cannot be seen as a far away and dualistic entity, separate from the human experience (Cronan, 1995).

Nature's Location in Contemporary America

William Cronan (1995) describes the view of early Europeans in America, that that nature is that which is wild and untouched by civilized people. In "Whose Nature? The Contested Moral Terrain of Ancient Forests", James Proctor (1995) describes William Cronan's opinion that nature has been regarded as a place of sanctity, where people can visit to experience a relationship with the divine. This gives nature a feeling of remoteness, certainly with no connection to the everyday places where people work, live, and play. Cronon (1995) states that "wilderness embodies a dualistic vision in which the human is entirely outside the natural". The concept of nature being a remote place means that human beings do not reside in nature, and it is not connected to people's

everyday lives. It is place that is magical and sublime. Cronon argues that, in this view of nature, “we imagine that this experience of wonder and otherness is limited to the remote corners of the planet, or that it somehow depends on pristine landscapes we ourselves do not inhabit”. The question then arises as to why people should protect nature. Does it carry inherent value? Should people protect it because it is useful? The “nature as a wild, other place” viewpoint leaves these questions subject to debate.

Giovannia Di Chirro in “Nature as Community: The Convergence of Environment and Social Justice” (1995) states that, if the environment is seen as a remote wilderness, the effects of pollutants in urban areas are not seen as environmental issues. The poor and people of color, are disproportionately affected by urban environmental hazards such as smog, lead paint, and unclean drinking water (Di Chirro, 1995). Nature, previously only seen as a wilderness, is a commodity outside of the familiar home environment, and would not be accessible to the disadvantaged minority populations. If the environment is not viewed as the areas in which people live, work, and play, these concerns that affect human health will go ignored by environmentalists (Di Chirro, 1995). Di Chirro (1995) states that this disconnect between urban areas and the view of a separate nature makes environmental advocates seem out of touch with real and immediate societal issues. Furthermore, it loses the urban population as environmental supporters. The concepts of social justice and environmental issues have not previously been viewed to overlap, but Di Chirro suggests that the two issues are intertwined. If nature were exclusively a place that humans

did not inhabit, this intertwining would not occur. Therefore, nature - elements of a physical environment that are not man-made- must also exist in urban areas, and urban citizens also can have a connectedness to nature. If not, Di Chirro claims, why would they advocate for its protection? Under the Novotny (2000) definition of nature as the places where we "live, work, and play," all people, including urban dwellers, can experience nature, and can have a connection to the non-manmade elements of the world for which humans must take collective responsibility. This concept of nature has changed over time.

The Perception of Nature and the Human Experience: Past and Present

Environmental thought has always supported a connectedness to nature. However, since the perception of value for nature has changed over time, the connection is different depending on how people value nature at a given point in history. Prehistoric, humans had a different perspective of nature than our contemporary society does. Pleistocene humans did not separate nature from themselves (Shepard, 1998). Shepard claims that the Pleistocene human lived *in* nature, rather than *on* it, hunting and gathering food and nomadically moving in response to environmental changes and food availability. Pleistocene humans, according to Shepard (1998) were fully connected to nature in that they saw the environment as part of themselves, a perspective that was permanently altered when early humans changed from nomadic to sedentarily agricultural. Humans who farmed and domesticated livestock created the first civilizations permanently separating themselves from nature.

Humans began to empirically and systematically study nature during the Scientific Revolution generally between the late 1400s to the mid 1700s (Shapin, 1996), in which several key changes in science took place. The Earth, for example, which was previously believed to be the center of the Universe, was proven actually to revolve around the sun (Shapin, 1996). Key ideas during the Scientific Revolution lead to an empirical studies of the world around humans, displacing myth and legend with logical tests for assumptions. By the end of the Scientific Revolution, researchers had built a body of knowledge that explains the makeup of all substances on Earth from elemental particles, and the microscope had been invented to examine living and nonliving components not visible the naked eye (Shapin, 1996). The connection between human beings and nature changed two-fold. First, humans began to look at nature as a series of systems to be studied. Also, humans realized that complex natural world, not all of which was living, existed outside of human manipulation.

The ability to understand the relationships between natural phenomena lead to the harnessing of natural resources for human use. For example, in her essay, “Reinventing Eden: Western Culture as a Recovery Narrative”, Carolyn Merchant states that, beginning with the first Europeans in North America, nature was seen as a commodity for the wealthy (Merchant, 2003). They saw before them a vast expanse of land, and on it, dense forests of valuable wood and animals with valuable fur (Merchant, 2003). Though some new arrivals divided and bounded the land (Cronon, 2003) for their permanent settlement, others hunted, logged, and took their spoils back to Europe to sell (Cronon, 2003).

Either way, nature was a commodity waiting to be taken, regardless of the fact that Native Americans already inhabited and used the land. Carolyn Merchant (2003) explains that most white people "perceived [Native Americans] as the functional equivalent of wild animals" (Page 144). Removing the Indians, then, Merchant states, was seen as necessary to serve greater purposes such as farming the land, and harvesting the natural resources. European settlers through colonial times and even through Revolutionary America, Merchant (2003) claims, believed that people were not supposed to reside in the wilderness, and as such were not wild. People who did reside in the wilderness, the Native Americans, were not seen as people more connected to nature, but rather were regarded to be somehow less human than the "civilized" settlers.

By Revolutionary American times (the 1760s to later 1770s) the Western part of what is now the United States consisted of 13 English colonies. Burdened by colonial rule, Revolutionary Americans influenced by political philosophers such as Jean Jacques Rousseau (1762) linked good citizenship with environmental orientation. Rousseau (1762) referred to the natural environment as the ideal location for development of proper human thought (Wraight, 2008), associating the concept of human nature – as in, the intrinsic properties of a human being – with natural space. Rousseau's *The Social Contract* (1762) begins famously with the lines, "Man is born free, but everywhere he is in chains," which reverberated the oppression felt by British colonists. According to Rousseau, the natural state of man is to freely exist in a civil society, but that a society greedy for power bound people of the time to unhappiness (Wraight,

2008). Following *The Social Contract*, Rousseau published another book, *Emile* or *On Education* (1762), which explained the teaching required to create citizens for a civil society. In *Emile*, Rousseau explains that children should spend their early years in direct contact with nature, postponing formal education until adolescent years, so that the natural state of a person can be properly developed (Rousseau, 1762). Direct contact with nature, especially for children, Rousseau claimed, produces citizens capable of living under democratic sovereignty (Wraight, 2008). Rousseau's ideas were well received in colonial America (Good & Teller, 1969), helping to fuel the American Revolution, and proclaimed that contact with the non-manmade world developed the intrinsic goodness of human beings.

The Industrial Revolution sought to use scientific discoveries to help in the economic development of the scientist's countries (Stearns, 2007). Whereas previously, scientist and philosophers studied of their own accord (and head the independent wealth to do so), scientists of the Industrial Revolution time were often employed by their government and had a public role (Frader, 2006). Governments offered financial grants to scientists for the first time (Frader, 2006). Scientists followed the Newtonian philosophy of independent forces of nature: manmade concepts of matter including gravity, electricity, and magnetism. Using understanding of these concepts, scientists could explain much of the phenomena on earth (Sterns, 2007). Industrial scientists sought to harness these natural powers to further growth and business development.

In response to the Industrial Revolution, Romanticists (approximately from the mid 1700s to the mid 1800s) argued that non-living natural forces were not separate explanations for all of the phenomena on Earth; rather, that they were related and could together more accurately provide an understanding of the processes that shape existence (Cunningham and Jardine, 1990). An example was the study of the relationship between heat and light. During the Romantic period, connections were also made between structure of organic molecules and their physical and chemical properties (Cunningham and Jardine, 1990). Romantic scientists in general believed in the relationships among phenomena that were previously believed to be separate (Holmes, 2008). Outside of the study of science Romantics in general believed in the connection between human "forces" and non-human, *natural* forces (Holmes, 2008).

This gave rise to the Transcendental movement, in which it was believed that humans were not simply a sum of the forces, but rather, that humans transcended a mathematical existence in contact with the divine. Transcendentalists emphasized an "original relation to the Universe" (Poirier, 1990). More extreme than direct and frequent contact *with* nature, Emerson and Thoreau sought to live *in* nature (Gura, 2007) and professed the value of a simpler life. First, in Thoreau's *Walden* (1997), the author explains his choice to live in solitude in the woods for more than two years: to "learn the lessons it had to teach". Though Thoreau visited the town of Concord regularly, he wrote *Walden* from the observations about nature and its connection to the person from his rented cottage in the woods. He emphasized the importance of living off of

the land, and, feeling that he was, as an inhabitant of the woods, in communion with other animals. Transcendentalists did not necessarily universally believe in living in solitude, but another experimental living situation was designed at Brook Farm in the 1840s, as a utopian society in natural space (Gura, 2007). Members of the utopia lived under the ideal of pooled labor for communal good, and did whatever work they felt compelled to do, including teaching children, who attended the private school founded there (Myerson, 1987). The experiment ended because it proved to be economically unsustainable (Francis, 2007).

There was a definitive shift in environmental thought following the Civil War (1861 to 1865). The separation of nature from the everyday human experience is rooted in the philosophy of nature as a pristine "other" place, devoid of human civilization (Cronon, 1995). Concurrently, trend of vast resource consumption to the point of environmental exploitation continued as Europeans expanded west, still in search of natural resources as a means to wealth. By this time the Bison of the North American west were hunted to near extinction (Isenburg, 2005) and many tribes of Native Americans had been forcibly displaced (Wilson, 2003) while their land had been appropriated for settlement by United States citizens, changing it forever. John Muir experienced nature by walking through America: from New England down to Florida and, eventually, all the way to California. While walking during the Civil War Era (1861 – 1865), Muir actually ran into the Civil War, witnessing in the violence a stark contrast to the serene nature around the human activity. This solidified Muir's belief that nature – the non-manmade world- was inherently good, and people, by contrast, were

inherently bad (Teale, 1954). Muir believed that nature should be protected from human interference- because the wild, inherently good, and therefore different from land inhabited by corrupted humans (Teale, 1954). The Muirst perspectives about nature and the human experience depicted the natural world as a place to visit as an example of a perfect and harmonious existence, but not a place where humans belong. Exemplifying this, Muir persuaded the United States government, under the Presidency of Theodore Roosevelt, created the first National Park in 1872 to protect "pristine" environment from human desecration (Runte, 1997).

Not all of Muir's contemporaries agreed with his perspective. Also under the Roosevelt administration, Gifford Pinchot, Chief of the U.S. National Forest Service, developed a plan to maintain Federal control of government land while allowing private businesses to cut down trees within given limitations for a fee (Miller, 2004). Pinchot, in disagreement with Muir and preservationists, argued that nature should not be preserved strictly for scenery; it should be conserved, properly maintained and used wisely. Reflecting this opinion, Pinchot supported the damming of the Hetch Hetchy Valley in Yosemite National Park, altering the natural space to better utilize water for human purposes (Miller, 2004). Pinchot's successor, Aldo Leopold, further asserted that all lands should be scientifically maintained by both Federal government and private landowners to maintain and preserve species diversity (Meine & Berry, 2010). Following observations of the impact of land changes to accommodate automobiles, Leopold advocated against the more utilitarian concept of nature held by Pinchot, toward the Land

Ethic, a view of nature as a biotic community to be prevented from harm (Meine & Berry, 2010). Leopold claimed that the human connection to nature – as in the non-manmade world- was that of a citizen to a community, and that the best environmental decisions tended to preserve the homeostasis of that community (Meine & Berry, 2010).

The social role of science changed dramatically during World War II, changing the relationship between nature and humans again. Never before in history was science developed as a tool of warfare on such a widespread level, manipulated for the sole purpose of inflicting harm on other people (Harris and Paxman, 2002). A domination of nature at the expense of others had never been attempted previously. During this time, the United States developed and used the first nuclear bomb, manipulating the non-manmade elements and forces of physics into a weapon, (Badash, 1995) actively and intentionally destroying the environment to suit the purpose at hand.

The long term effects of this manipulation of non-manmade elements were yet unstudied, as the emphasis was to win the war. Later, the long term and devastating effects of nuclear radiation were evident, prompting world leaders to agree in the Test Ban Treaty that the benefits of nuclear capabilities do not outweigh the effects to human and environmental life (Badash, 1995). The understanding of a connectedness between the self-created world of humans and nature, those things that are not manmade, was beginning. This was followed by studies such as that of the relationships between the pesticide DDT on the shells of birds' eggs and on the prevalence of human birth defects

(Carson, 1962). Contemporary understanding of the human-nature relationship is such that, while technological manipulation of nature by humans is possible, it is not sufficiently understood and can be dangerous (Colborn et al., 1996). Furthermore, harm to nature adversely affects human quality of life, through direct exposure with toxins in the air (Mindell et al., 2005; Geelen et al., 2009) and water (Morales, et al., 1995 Knobeloch et al., 2000; Criss, 2004), and in the long term bioaccumulation of harmful chemicals in the human body (Colborn et al., 1996). For this reason, scientists and community activists are calling for more study into the relationship between humans and the natural – non-manmade- world for a better understanding of the effect of human interaction on long term ecological and human health (Colborn et al., 1996; Saylan & Blumstein, 2011; Steingraber, 2011). How humans perceive nature plays a critical role in this understanding. In order to be compelled to change behaviors that are causing environmental deterioration, citizens need a relevant connection to nature (Saylan and Blumstein, 2001), which is why the individual connection to nature is so important.

However, citizens have increasingly lost the direct responsibility for environmental decision-making, which may have led to a decrease the individual connection to nature. Since the creation of the first National Park in 1872, the Federal government increasingly assumed the role of environmental protection and management. The Federal government, in its role of overseeing interstate commerce (United States Constitution Article I, Section 8, Clause 3), supersedes states' sovereignty and can limit the rights of state governments and individuals

for the public good (United States Constitution Article I, Section 8, Clause 18). As a result, environmental issues involving land for private and public use, pollution, and species conservation became bureaucratized matters of continually evolving legal precedent. In 1903, the reservation of Pelican Island in Florida marked the first example of Federal land specifically set aside for a non-marketable form of wildlife, the brown pelican, and was the beginning of the National Wildlife Refuge System of the United States (NWRS History, 2011). The protection of nature was no longer left to citizens of the United States, but deemed as a task to be completed by a stronger authority. By 1966, property owners' rights to land were limited by the Endangered Species Protection Act (U.S. Department of Environmental Protection), which was immediately followed by the 1970 creation of the Federal Environmental Protection Agency to research and assess environmental issues, recommend environmental legislation to Congress, and enforce existing environmental legislation (U.S. Department of Environmental Protection). The creation of a governmental department to study and limit the ways in which citizens can utilize the environment acknowledges that human interference changes the environment, and limits the freedom of property owners in order to protect species of plants and animals, as well as the health and safety of other citizens. The human connection to nature no longer existed on an individual basis, but was controlled by an "environmental elite" (Oelschlager, 1991) who had the authority to make environmental decisions for other people.

Oelschlager (1991) argues that a further expansion of the "environmental elite" is the only people who have access to natural space preserved by the government: those who can afford to go there. Oelschlager states that natural space must be accessible to all citizens. Some argue that returning to the life of the Pleistocene human, living *in* the world rather than *on* it, will preserve the world for future generations (Shepard, 1998), while others argue for environmentally friendly growth (United Nations, 1987), but both agree that environmental resources are being used by the human population faster than they can be replenished. A contemporary understanding of the human and nature experience is that humans, while civilized, are still natural animals (Oelschlager, 1991) who collectively share and individually interact with natural space. For this reason, environmental advocates insist that all citizens should be a part of environmental decision-making, and that the Federal oversight of environmental issues should give way to community based environmental decisions (O'Leary et al., 2004). A safe natural environment enhances the wellbeing of the community (O'Leary et al., 2004), so all citizens should be a part of the decision-making involving nature, where people "live, work, and play" (Novotny, 2004). Shepard (1998) states that raising citizens committed to protecting the Earth can be achieved by upbringing contemporary youth more like the youth of the Pleistocene: exposing children to natural processes shape everyday life, and treating nature as an entity not separate from the human experience. Following Rachel Carson's groundbreaking work *Silent Spring* (1962), citizens began to advocate for a role in environmental decision making, first time reflecting the environmental value of

individuals. This demonstration of collective environmental awareness from individual citizens is exemplified in the first Earth Day in 1970 (EarthDay.org). Demonstrations such as Earth Day show that citizens do want to become part of environmental decision-making, and environmental theorists say that this is the most effective means of environmental protection. The current state of the environment requires long term solutions to combat environmental degradation; attitudes and policies must shift to a more environmentally-centered approach. How adults perceive the environment will play a critical role in the enactment of policies designed to protect the non-manmade world.

The Importance of Children's Connectedness to Nature

Environmental orientation, a combination of both attitudes and behaviors, stems in part from having contact with nature as a child. Meyers (1997) surveyed college students from a variety of backgrounds, who were either environmental studies majors, or majors in other areas and found that all students, regardless of major, who cited childhood experiences in nature also indicated a concern for the environment. However, environmental studies majors more frequently described meaningful identification with a natural place as adults (Meyer, 1997).

Adult attitudes and perceptions drive public policy related to the environment (Saylan & Blumstein, 2011). Raising adults to have positive environmental attitudes may result in an increase in environmental stewardship, which will drive more pro-environmental policy. Environmental stewardship is the

responsibility for environmental quality shared by all those whose actions affect the environment (EPA Innovation Action Council, 2005). It is an attitude that results in more environmentally friendly behaviors such as efficient use of natural resources and protection of ecosystems (EPA Innovation Action Council, 2005). As Saylan and Blumstein (2011) described in their examples of environmentally aware children, an awareness does not always bring about meaningful change in behaviors. Environmental stewardship requires seeing the welfare of the natural world as relevant to the individual and collective human experience (Saylan & Blumstein, 2011).

A person possessing the attitudes of environmental stewardship may have several influences. Tanner (1980) surveyed the staff of the National Audubon Society, Sierra Club, National Wildlife Federation and The Nature Conservancy and to identify influences affecting their choices to work for environmental protection groups. Respondents identified frequent contact with natural areas, and influences of parents and teachers as key contributors to their choice to work for environmental protection groups (Tanner, 1980). Subsequent research (Peterson & Hungerford, 1981) was more specific indentifying causes of environmental empathy, not necessarily an action such as choosing to work for an environmental protection group. However, the results were similar: a love for the natural environment which with an individual had frequent contact, and the influences of family and important adults were the most predominantly reported reasons for pro-environmental orientation (Peterson & Hungerford, 1981). By the 1990s, participants in similar surveys also mentioned a concern for the

environment based on negative experiences such as environmental catastrophes, nuclear threat, and cruelty to animals (Palmer, 1993) where this had never been mentioned before. Still, respondents surveyed still most frequently describe exposure to natural areas and parental influences as the influences on their commitment to environmental protection (Chawla, 1998). People have a positive attitude toward the environment and regard it as relevant to their personal lives, will engage in more pro-environmental behaviors, whether or not they choose to work for an environmental agency (Saylan & Blumstein, 2011). Concern for the environment as an adult in general, regardless of whether or not the adult works in the environmental field, is influenced both by contact with nature (Piaget, 1983; Myers, 1997), and the socialization to believe that this contact was valuable (Maccoby, 2007). Therefore, raising children to feel connectedness to nature will prepare the future generation to address the long term environmental problems facing Earth currently and in the future.

The Role of the Home Environment in Children's Connectedness to Nature

Since the home environment provides the first permanent place for human experience, connectedness to nature, which will create positive environmental beliefs in adulthood, begins first in a child's home. Children, depending on age and developmental level, can engage with the natural world in limited understanding of the effects of human interaction with the environment. Exploring the environment is important to child development. The exploration of the world outside the self begins in infancy with recognizing a human face: the infant's first environment Tuan (1999). In recognizing a face, an infant realizes

that something exists outside of himself (Tuan, 1999), placing people conceptually within the environment. And because children learn by connecting new knowledge to what they already know (Vygotsky, 1978), the exploration continues from this point on as a child expands his conception of "environment" through direct contact with his surroundings. The separation of people from the environment that Shepard (1998) claims did not occur in prehistoric societies must be learned as the child grows older, through cognitive and socialization processes. Child psychologist Jean Piaget (1954) claims that as young children grow, they process the world egocentrically, that is, they understand connections first in terms of themselves. This is illustrated in a cross-cultural study (Kahn, 2002) of children in the Brazilian rainforest, Portugal, and Houston, Texas. Kahn, an environmental psychologist, predicted that the children from the Brazilian rainforest would express a more biocentric viewpoint when asked questions about why it is or is not acceptable to pollute a nearby river. That is, the Brazilian children, living literally within natural space, would be more likely to assign nature an intrinsic value, indicating concerns for its wellbeing aside from any economic or anthropocentric usefulness. Contrary to Kahn's prediction, 95% of the Brazilian children's responses were anthropocentric, reflecting how trash in the river would harm child or town. One child, for example, reasoned that it is not acceptable to throw trash in the river because if the river were clean, he could swim in it (Kahn, 2000). In fact, children in urban Houston and children in the Brazilian rain forest both described their connection with nature in anthropocentric terms (Kahn, 2000) indicating that they connect nature to their

understanding of self in mostly the same way. This egocentric cognitive state, according to Piaget (1954) is normal, in children, and as Kahn (2000) describes, limits the understanding of processes of nature that do not necessarily include human beings.

A transitionary point is a cognitive leap in which children learn to take the perspective of others, occurring at around 7 years of age (Piaget, 1954). This is still not free of the egocentric viewpoint of children, but rather a point in which children understand that people and other things may experience similar emotions to themselves in a similar situation. Kahn (2002) describes this *isomorphic biocentric reasoning* where children consider the perspective of animals as if they were considering the perspective of themselves, judging a negative environmental action unfair to the affected living thing. An example from the Kahn (2002) study is his description of one of the children's responses to a question about an oil spill, where the child expressed that fish and animals have the right to live, just as people do, and that it was unfair to kill them in such a way.

In addition to learning through direct contact with their surroundings, children learn by imitating the behaviors of adults around them (Vygotsky, 1978), and are socialized as to whether those behaviors are acceptable. Socialization, defined as the processes by which young people are taught the necessary skills, values, and behavioral that are deemed important to their culture (Brim, 1966) involves a transfer of socially acceptable behaviors and beliefs from a socialization agent to a child, who internalizes the concept (Maccoby, 2007).

Children are influenced by generational-specific socialization factors such as the media and peer groups (Grusec & Davidov, 2007), but children's primary socialization agents are their parents, who have the largest impact on socialization outcomes (John, 1999; Maccoby, 2007; Whitbeck & Gecas, 1988). As is the case with other types of attitudes, parents' environmental values are positively associated with the environmental values of their children, and these values are transferred primarily from parent to child (Grønhøj & Thøgersen, 2009), which means that parents with positive environmental values will likely socialize these values into their children. Although parents are the primary socialization agents of children, children are also given experiences in school that may influence their beliefs.

Schools' Support of Children's Connectedness to Nature

Early American schools supported a connectedness to nature indirectly, by not inhibiting the connection from taking place. Jean Jacques Rousseau, whose book, *Emile*, or *On Education*, asserts that children should be taught less from books and more from their interactions with the world, with an emphasis on developing the senses, and the ability to draw inferences from them (Boyd, 1911). Under this philosophy, a child should attend school after experiences in the natural world have made him "an active and thinking being" (Rousseau, 1762). Though Rousseau (1762) did not give a definite age for when he believed formal schooling should begin, early Americans sent children to school in Northern states as early as age five or six (Good & Teller, 1969). Though the duration of the school year varied widely, typically between 3 and 6 months long,

it by no means prohibited children from having play time to spend outdoors, especially because attendance was not mandatory (Good & Teller, 1969). The curriculum was comprised at least of literacy (reading and writing) and arithmetic components, and sometimes Latin (Good & Teller, 1969). Southern states, comprised mainly of vast plantations owned by a single family, paid tutors for the landowner's children, who had their lessons at home. The curriculum was subject to the availability of a tutor and the discretion of the patron, usually the father of the students (Good & Teller, 1969), so it was limited to subjects relevant to becoming heirs of the plantation.

Formal education was considered costly to a family until the Lancasterian movement of the early 1800s, which operated under the philosophy that education could be widely instituted in a cost-effective way. The use of textbooks were de-emphasized and literacy and mathematics skills were taught using only a blackboard, and slates and chalk for the children. While a low-cost school system meant that more families could afford the cost of educating their children, these schools produced marginal results among pupils, causing theorists throughout the United States to call for educational reform (Good & Teller, 1969).

At no point in the history in the United States was the system of education deemed to be sufficient by theorists of the time. The Progressivist movement, following the development of Lancasterian schools, expanded the curriculum past literacy and arithmetic, and added the subjects of history and geography and enrichment subjects, particularly singing (Good & Teller, 1969). The public

schools as we know them were called common" schools (Kaestle, 1983). Common schools were funded by local property taxes, charged no tuition, were open to all white children, and were governed by local school committees who had at least some say in the content of the school curriculum (Kaestle, 1983). Laws of compulsory attendance for students -generally between the ages of 6 and 16 years of age- were passed in every state by the year 1918 (National Conference of State Legislatures). Southern states assigned black students to different schools with markedly inferior funding to schools that white students attended, until the United States Supreme Court deemed this practice unconstitutional in 1954. As a result of this ruling, public schools were to be open to all students of any ethnicity (The Leadership Conference, 2001).

With changes as to whom was served by the developing public school system, also came changes of what was taught and how. Literacy and mathematics were core components of the earliest American schools (Good & Teller, 1969), but the first organized system of education, the Lancasterian schools, did not use textbooks, and relied on rote memorization and recitation (Good & Teller, 1969). In the one-room schoolhouse students of all ages and abilities were taught by a single teacher, usually an unmarried woman (Cuban, 1993). Though Rousseau (1762) urged early Americans to allow children to learn by direct contact with nature, no environmental education was implemented in public schools until the late 1800s, when reformists of the Lancasterian schools advocated for the addition of geography to the curriculum (Good & Teller, 1969). The Nature Study movement of the early 1900s was the first

evidence of formal environmental education in American public schools (Saylan & Blumstein, 2011), but the term is misleading because this movement did not support the actual study of nature as much as it focused on establishing a moral link to natural space (Saylan & Blumstein, 2011). The Nature Study Movement used fables about animals to teach children moral lessons (Cornstalk, 1911), but also spurred adult interest in reading about nature and prompted a greater public interest in the writings of Emerson and Thoreau (Saylan & Blumstein, 2011).

Though not part of the school day, environmental education appeared, at least for boys, in the form of an enrichment club called the Boy Scouts of America. Founded in 1910 with both U.S. President William Howard Taft as the honorary President and former President Theodore Roosevelt as the honorary Vice President of the organization, the Boy Scouts sought to teach good citizenship, and instill in young boys moral values (Boy Scouts of America). The sister organization, Girl Scouts U.S.A., was founded two years later, with an emphasis not only on good citizenship, but on gender equality (Girl Scouts U.S.A.). Boy and Girl Scouts ascend in rank within the organization by earning badges in activities that promote leadership, community service, and physical fitness. May such activities also involve practicing conservation and preservation of the environment, such as planting trees and gardens, and volunteering at local preservation sites in the community (Boy Scouts of America). The Scouts organization not only educates youth about environmental issues and encourages them to make a positive environmental impact, but also socializes them to belief that the environment is important (Boy Scouts of America).

Community members and parentss serve as Scout Leaders, who take the Scout troops on camping and fishing trips, lead service activities, and oversee nature lessons as the boys and girls earn badges to ascent in rank. Since values are transferred to children via socialization (Maccoby, 2007), the Scouts organization provides role models who demonstrate that contact with and preservation of natural space is important in hopes that children will themselves internalize these values.

Though the Scouts provided environmental education in the community in the early 1900s, public schools still had not developed a formal curriculum that studied the environment. Environmental education at the University level, however, developed in response to the Great Depression and Dust Bowl during the 1920s and 1930s, which yielded the field of Conservation Education. Conservation Education advocated for explaining nature with rigorous scientific training rather than natural history (Cronon, 1995), however, this was a study at the University level (Good & Teller, 1969). At the public school level, environmental education ended for a time with the waning of the Nature Study Movement and at the beginning of World War I (in 1914), when the public value for nature shifted to utilitarian use for the war effort (Saylan & Blumstein, 2011). A formal science curriculum was not added to the Kindergarten to 12th grade public school system at all until the Cold War with Russia began in 1946 (Good & Teller, 1969). In an effort to keep up with the technological advances of the Russians, high schools, and later elementary schools, taught scientific concepts, but not necessarily environmental education (Good & Teller, 1969). Public

awareness of environmental issues became more commonplace as concern about environmental quality stemmed from obvious signs of environmental degradation (Archie and McCrea, 2011): flammable rivers, major oil spills, and the effects of pesticides described by Rachel Carson in *Silent Spring* (1962). The 1970s and 1980s saw a shift toward an international goal of environmental education, with specified targets of creating environmental awareness, knowledge of environmental issues, positive attitudes toward environmental behaviors, an increase in the skills necessary to make positive environmental decisions, and enhanced desire to participate in environmental decision-making (Archie and McCrea, 2011). Schools began participating in Earth Day in the 1970s as well. Classrooms planted trees, talked about ways to conserve energy, and became involved in local environmental initiatives (Earthday.org). A once-a-year activity day is not, however, a substitute for sustained environmental education.

Some child development experts had developed programs to enhance a child's cognitive processing of the environment, both natural and manmade, but these were developed overseas and were not available to public school students in the United States. Italian physician Maria Montessori pioneered a more participant-active method Notably, of education (Montessori, 1965) which sought to create citizens that actively participate in their world, and foster stewardship of the environment. Montessori, whose work was developed in the early 1900s but became more popular in the United States after 1960 (Kramer, 1976), identified several "innate tendencies" in children. These tendencies include an orientation

to and manipulation of the environment [the living and nonliving objects outside of the self, not necessarily of natural origin]," exploration, and increasing abstraction from concrete ideas and materials (Montessori, 1966). The Montessori system of education supports these supposed "innate tendencies" by allowing children the freedom and uninterrupted time to explore ideas and manipulate materials to discover and internalize knowledge for themselves (Standing, 1957). Though not necessarily an environmentally-centered approach to education, the connection between the child and his surroundings are explored, and the classroom manipulatives are often made of natural materials (Standing, 1957). The Reggio Emilia approach, having some similarities to the Montessori philosophy, seeks to develop a child through direct contact with the environment around him/her, both inside the classroom and outside its walls (Hewett, 2001). However, Reggio Emilia is unique in its emphasis on the social environment: a child's community (Caldwell, 2002). The community is seen as having a collective responsibility for the education and socialization of children (Hewett, 2001) and children's participation in this community is valued (Cadwell, 2002). This philosophy asserts the idea of a community of learners that include children and adults, with even the teacher being "inside the learning situation" rather than the facilitator of knowledge (Hewett, 2001). The community approach, which can later include the biotic community of all living things, rather than the social community exclusively comprised of human beings, is unique to the Reggio Emilia method of education. However, the Reggio Emilia approach was not part of public school methods of education in the United States.

In fact, while recommendations from *Science for All Americans* encouraged schools to create and enhance programs of environmental education (Rutherford, 1989; Archie and McCrea, 2011), some aspects of the school day prevented direct and frequent contact with the outdoors. As early as 1970, but especially common by the late 1980s, even young children were taught using teacher-directed instruction, and were expected to sit at a desk for several hours at a time (Cuban, 1984). Though an outdoor recess was still common place (Mulrine, 2000) children were expected to sit silently in class all day, raising hands to speak, but mostly to answer questions, not to ask (Cuban, 1984). A personal interaction with the environment, or with learning in general, was not achieved. Saylan and Blumstein (2011) argue that in the 1970s, increasing environmental concern prompted by Rachel Carson's (1962) *Silent Spring,* combined with a weak economy, prompted Americans under the Carter Administration to not only seek alternative resources to alleviate shortages, but to actually use less of the resources currently available. These conservation values in turn were taught in public school (Saylan & Blumstein, 2011) and Earth Day along with the community (EarthDay.org). But environmental education but ceased when the economy began to boom again during the Reagan Administration. From this point forward, public education was designed to create a utilitarian workforce to fuel an ever-growing economy (Saylan and Blumstein (2011) favoring testable knowledge over holistic education, and economic growth over environmental concerns. Even the critical thinking skills needed to make

appropriate environmental decisions were no longer taught (Saylan & Blumstein, 2011), creating citizens for whom the natural world no longer seemed relevant.

Educational policy experienced a broad bureaucratic shift under the presidency of George W. Bush, beginning with the enactment of the Elementary and Secondary Education Act, in 2001. More commonly referred to as No Child Left Behind (NCLB), this legislation changed the way Federal funding is distributed to public schools throughout the United States. Under NCLB, student achievement is measured not at the discretion of a classroom teacher, but by performance on standardized tests, with emphasis placed primarily on the instructional areas of reading and mathematics. Federal funding is withheld as penalization for schools that do not make goals of an increase in students passing the standardized tests (United States Department of Education 2007). NCLB has had the unintended effect of virtually eliminating from the school day the educational experiences geared toward a connectedness to nature. Because funding is tied to reading and math scores, school curriculum has been narrowed to only focus on those subjects (National Recreation and Park Association, 2010). Instructional time for science and social studies has decreased, field trips for outdoor learning have been cancelled (Finch, 2009), and unstructured time outdoors (recess) has been reduced or eliminated (Sutterby, 2007).

School recess, defined as unstructured time, usually outdoors (Pellegrini, 2005), has been singled out as a detraction from instructional time (“No Time for Play”, 2001). However, unstructured time has been found to be a crucial independent learning time in which children imagine themselves in roles other

than the one they actually hold in society (Vygotsky, 1967). Once regarded as fundamental part of education, unstructured time outdoors is disappearing from the school day. Through unstructured play, children learn the interconnectivity between themselves and others, comprehending and taking on multiple perspectives (Pellegrini, 2005). While some argue that structured physical education class is an acceptable substitute for recess ("No Time for Play, 2001"), theorists agree that it is not (Association of Sport and Physical Education, 2001). Additionally, children who have no unstructured time outdoors during the school day do not tend to compensate by spending more time outdoors while at home (Dale, Corbin & Dale, 2000). Thus, the ideal education described in Rousseau's *Emile* is no longer the experience of America's schoolchildren.

Contemporary theorists are calling, once again, for educational reform (No Child Left Behind Coalition, 2010, Mulrine, 2000). Claims from environmental experts (Oelschlager, 1991; Cronan, 1995; Shepard 1998) that human beings do not exist apart from nature has led educational philosophers such as Richard Louv (2005) to assert that the lack of direct contact with natural space is contributing to the academic and social decline of contemporary American children. Louv (2005) suggests that there is a connection between the lack of unstructured time spent outdoors and the increasing diagnoses of learning disabilities and attention deficit hyperactivity disorders in children, and that in order to correct the prevalence of these undesirable trends, children must once again be given opportunities for contact with nature.

While most schools have adopted the trend of decreasing instructional time spent on hands-on learning, especially science (Finch, 2009) and eliminating unstructured time outdoors (Pellegrini, 2005), some school districts have attempted a compromise. It could be possible for schools to respond to changes in educational and environmental philosophy and at the same time meet Federal demands for performance on high stakes tests by changing the way that reading and mathematics are taught. The increasing absence of time allotted to explicitly teach science has lead some schools to make strides toward the integration of nature-rich curriculum and green initiatives into other parts of the school day, making the curriculum more in line with the ideals described in Rousseau's *Emile*. Taking green initiatives in schools makes the building itself a teacher, and advocates for more holistic learning (Saylan & Blumstein, 2011). In the article, "Five Steps to a Greener School District" Gary Hines (2010), environmental resource manager for Broward County Schools, discusses green initiatives undertaken in schools in Broward County, Florida, the sixth largest school district in the United States (www.Browardschools.com). These efforts reflect the trend in many school districts to strive for more environmentally friendly practices, and also to educate students about caring for the environment. Hines identifies efforts to recycle paper and plastic, and to compost solid waste, in efforts to give students exposure to sustainable practices that can be carried over into their homes. Additionally, Hines cites examples of schools within the district integrating environmental study into their classroom curriculum, and taking students on field trips to natural spaces. Furthermore, Hines discusses

professional development that has been offered to school teachers to help enhance the curriculum by making connections to nature (Hines, 2010). Though the integration of nature into the school curriculum and green initiatives are a growing in response to the need for environmental education, the effects of this integration on students' perceptions of connectedness to nature has not yet been studied.

In fact, the components of a nature-rich curriculum and green initiatives are not applied with consistency across schools, counties, or states. At a National level, attempts to promote environmental education are concentrated into the No Child Left Inside Act, which, if signed into law, will provide incentives to schools and districts in the form of grants to implement environmental education (Salyan and Blumstein, 2011). However, the bill has not yet been voted upon in the Senate, and even if it does pass, NCLI does not mandate environmental education, it merely provides the opportunity to include it in the curriculum of American schools. Educational standards are created at a state level and vary among states and regions. The science standards in the state of California, for example, only mention environmental science in general terms and do not call for its integration into other areas of study, such as reading and math (Saylan & Blumstein, 2011). In the state of Florida, the interdependency of living things is an explicit educational benchmark (Florida Department of Education), however, even this does not guarantee that students are instructed in meaningful ways. Because the majority of Federal funding is not tied to performance on standardized tests in the area of science, and schools and districts are punished

for students failing reading and math tests, some schools “teach to the test,” disregarding all or most of the standards in other subjects (Saylan & Blumstein, 2011).

Even in schools and classrooms where environmental awareness, ecology, and natural biology are taught, the quality of environmental education is as important as the quantity. Saylan and Blumstein (2011) argue that public money should not be spent on environmental education if it does not change citizens’ behaviors in a way that promotes collective responsibility for environmental problems. Additionally, Saylan and Blumstein (2011) note that children who are environmentally aware are not necessarily committed to changing their resource consumption habits. This, according to Saylan and Blumstein (2011) is because the problems of the environment are not always made relevant to the children’s lives: they are missing a connectedness to nature.

CHAPTER 3: RESEARCH DESIGN

Applications of the Theory of Planned Behavior to Children's Connectedness to Nature

While any human behavior is complex and cannot be accurately predicted in without behavior-specific models, the intention to perform a behavior, such as exposing a child to nature, increases the likelihood of actual performance (Ajzen, 1991). Though individuals with stronger intentions are more motivated to carry out an action (Ajzen, 1991), the construct of such an intention consists of more than a desire to act. The Theory of Planned Behavior proposes that intentionality can be accurately predicted from attitudes toward the behavior, subjective norms, and perceived behavioral control (Ajzen, 1991). Thus, a behavior is more likely to be carried out if an individual has a positive attitude toward the behavior (attitudes), the society to which the individual belongs values the behavior (subjective norms), and the individual believes that the ability to act is within his control (perceived behavioral control). For example, applying the Theory of Planned Behavior to parental intentionality to expose children to nature, a parent would be more likely to actually expose a child to nature if he or she had a positive attitude toward experiences in nature, experiences in nature are valued by society, and the parent believes that providing children with nature experiences is within his or her control.

The Encouraging Children's Nature Experiences Scale (EC-NES) was created to assess the attitudes and beliefs of primary caregivers about children's nature experiences (Fraser et al., 2010) and is designed under the framework of Ajzen's Theory of Planned Behavior. Figure 1 explains the subscales of normative, behavioral, and control beliefs, and how these variables, according to Fraser et al. (2010), relate to intentionality to expose children to nature.

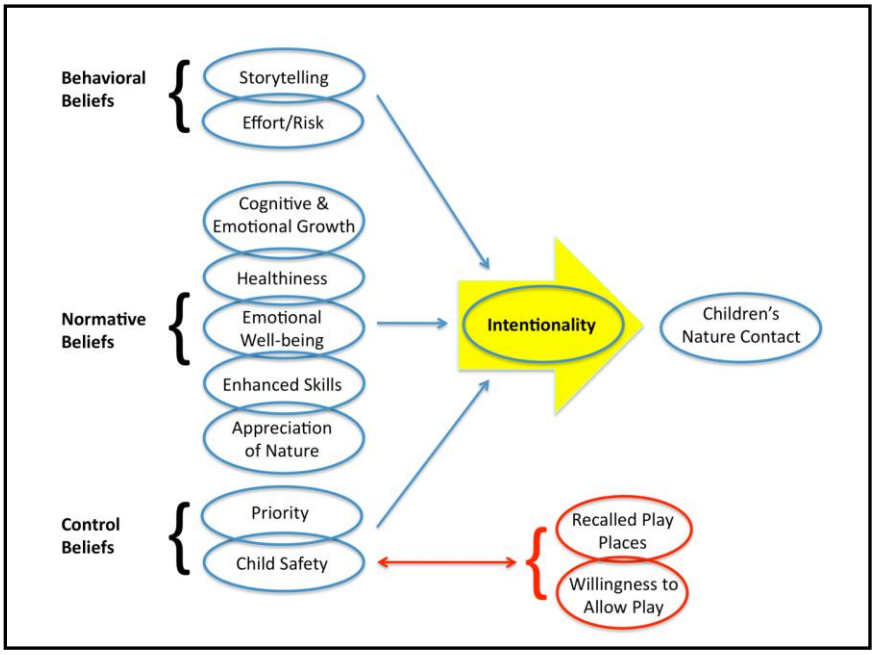

Figure 1: Subscales of behavioral, normative, and control beliefs supporting children's nature experiences, relating to intentionality to expose children to nature (Photo courtesy of Fraser et al., 2010)

The normative beliefs measured by the EC-NES correspond with Ajzen's (1991) subjective norms of society regarding the positive benefits children stand to gain from experiences in nature. Control beliefs, measured as adult priorities and need for child safety, correspond with Azjen's (1991) attitudes toward a behavior, and Behavioral Beliefs, measured by the perception that the adult's

actions will promote a desired action in the child, correspond with Azjen's (1991) perceived behavioral control. Respondents' normative, behavioral, and control beliefs regarding children's nature experiences mediated the intentionality to expose the children in their life to nature (Fraser et al., 2010). A stronger intention increases the likelihood that an action will take place (Ajzen, 1991), so Fraser et al. (2010) propose that children whose parents show a stronger intent to expose them to nature will actually have more nature contact. Whether this occurs has yet to be studied, but the EC-NES can be used as a research instrument to identify children whose parents show strong intentionality to expose them to nature, or the opposite: to identify children whose parents do not show this intentionality.

The Present Study

This study is designed to examine the roles of home and school environment as predictors of children's connectedness to nature. In order to socialize children to hold positive environmental values, child development theorists say that direct contact with nature will help build knowledge (Piaget, 1983) and socialization of values regarding nature will produce environmental attitudes (Grønhøj & Thøgersen, 2009). This study was conducted to investigate whether or not predictors from the home and school environment explain variances in children's connectedness to nature.

Connectedness to Nature. Connectedness to nature as a single factor is measured by the Connectedness to Nature Scale (CNS) by Mayer and Frantz

(2002), and determines “the extent to which and individual includes nature within his/her cognitive representation of self (Shultz, 2002). Figure 2 illustrates the proposed relationship among home and school predictors and children’s connectedness to nature (i.e., outcome). The connectedness to nature reported by each child serves as the data to measure the output in our model. Thus, we examined the relationship between the home and school predictors and the children’s scores on the CNS (See Appendix C).

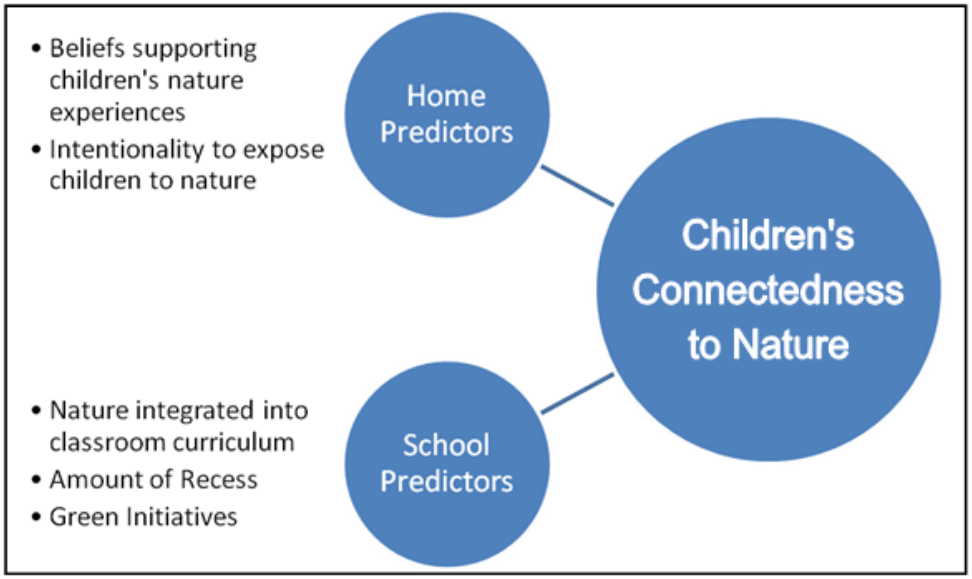

Figure 2: Proposed relationship among home and school predictors and the outcome of children’s connectedness to nature

Home Environment as Predictors. Because children are socialized to have values and behaviors similar to those of their parents (Maccoby, 2007), parents who report normative, behavioral, and control beliefs supporting children’s nature experiences, and a stronger intention to expose children to nature may have children who report a higher connectedness to nature. For this

reason the proposed home environment predictors include parental normative, behavioral, and control beliefs that support children's connectedness to nature. According to Ajzen's (1991) Theory of Planned Behavior, these beliefs would lead to the intentionality to expose children to nature. This study will investigate whether this intentionality to expose children to nature explains the relationship between parental beliefs supporting children's nature experiences and children's connectedness to nature (see Figure 3). Figure 3 illustrates that intentionality to expose children to nature mediates the relationship between parental normative, behavioral, and control beliefs and children's connectedness to nature.

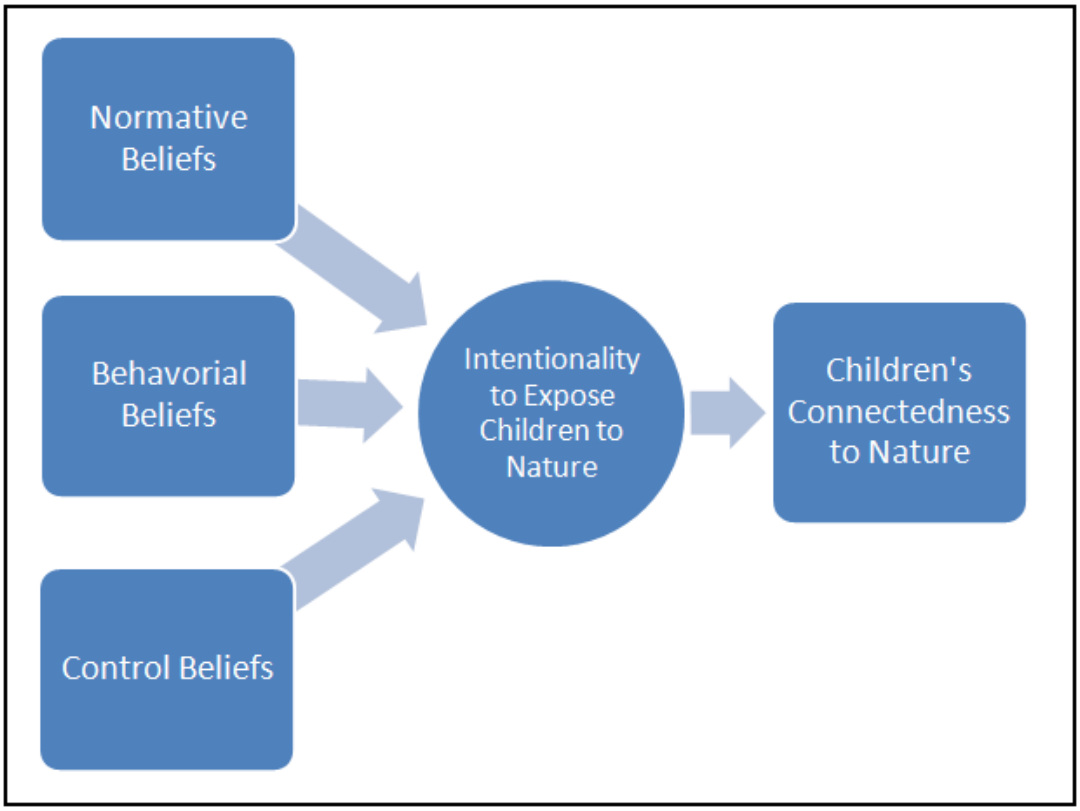

Figure 3: Relationship of a mediator to predictors of children's connectedness to nature

School Environment as Predictors. The proposed predictors associated with school environment include: integration of nature into the classroom curriculum, amount of unstructured time that the students spend outdoors, and the number of green initiatives undertaken in the classroom. Figure 4 illustrates the proposed relationship between the predictors and children's connectedness to nature.

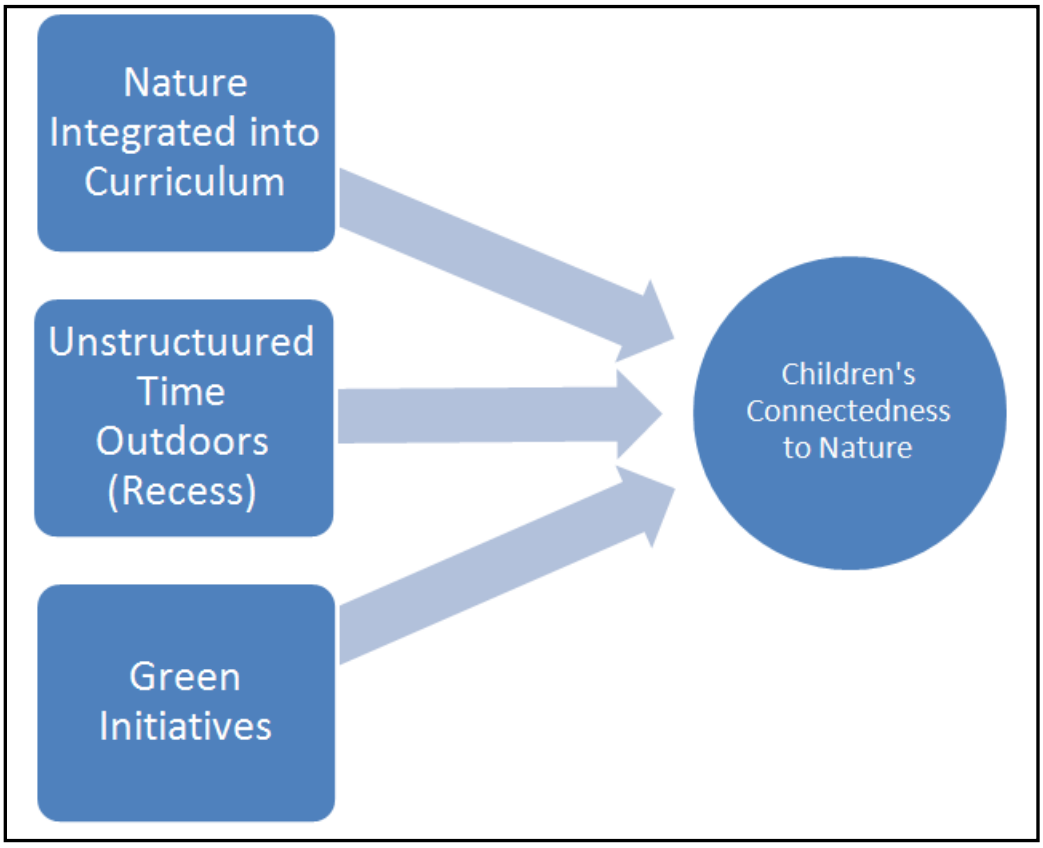

Figure 4: Relationship of school environment predictors on children's connectedness to nature

These predictors correspond with practices cited as examples of a more environmentally-centered approach to education (Hines, 2010). However, their relationship to children's connectedness to nature has not previously been examined.

Hypotheses

Previous studies have measured connectedness to nature, but have not described this variable, especially in the case of children, as being related to predictors from the home and school environment. This study aims to describe the relationship among parents' (1) normative, (2) behavioral, and (3) control beliefs, and (4) intentionality to expose children to nature, (5) the school curriculum, (6) unstructured time outdoors during the school day, and (7) green initiatives undertaken by the school as independent variables that influence children's connectedness to nature. Home predictors (normative, behavioral, and control beliefs, and intentionality to expose children to nature) were tested by the EC-NES, while school predictors (curriculum, unstructured time outdoors, and green initiatives) were tested by the Classroom Nature Experiences Survey. Children's connectedness to nature was tested using the CNS. Specifically, this study tested the following hypotheses:

Hypothesis 1a: Parents' normative, control, and behavioral beliefs supporting children's nature experiences will explain the variance in children's connectedness to nature.

Hypothesis 1b: Behavioral intentionality of parents to expose their children to nature will mediate the relationship between parents' normative, control, and behavioral beliefs and children's connectedness to nature.

Hypothesis 2: School curriculum, recess, and green initiatives will explain the variance in children's connectedness to nature.

Hypothesis 3: School environment predictors of curriculum, recess, and green initiatives will uniquely explain variances in children's connectedness to nature above and beyond parental belief variables.

CHAPTER 4: METHODS

Procedures

This research involves work with human subjects, and thus requires training in the ethical treatment of human subjects, as dictated by the Internal Review Board of the University of South Florida (Foundation Requirements in Human Subject, 2010). Following the completion of mandatory researcher training, 25 schools were identified with a random number generator (with each number corresponding to the school's position in an alphabetical list of schools in Pinellas County, Florida. The selected schools were recruited to participate in this study. Recruitment procedures involved a phone contact to the Principal or Director of the school, followed by an email explaining the nature of the study and a request for a Letter of Support to be signed and mailed or faxed back to the researcher. Of the 25 schools contacted, 2 (8%) signed a formal Letter of Support agreeing to participate. Following the receipt of the Letter of Support, a request for approval of the study was issued to the USF Internal Review Board (IRB). When approval was granted from the IRB, surveys and parental informed consent form were mailed to the participating schools for teachers, students, and parents in grades 3 to 6. Of the 19 teachers, 16 (84%) agreed to participate and completed a written informed consent form. Participating teachers sent home The EC-NES parent survey to the families of each child in his or her class, requesting that the informed consent and survey be filled out and returned.

Teachers gave the child CNS survey in class only to the children who agreed to participate with verbal assent, and whose families agreed to participate via written informed consent, yielding a total of 78 participating families and children, which constitutes 28% of eligible participants.

Participants

All participating families had children who attended private school in St. Petersburg, Florida. No participants were recruited from any of the public schools contacted, because school administrators declined to participate in the study, no data was not allowed to be collected from families in public school. Of the primary caregivers who participated, 19.7% were male and 80.3% were female. The respondents' reported household incomes were high, with 50% of participating households earning $200,000 or more annually, and a median income of between $150,000 and $199,000 annually. The majority of participants (92.2%) identified themselves as white (n=71), with 2.6% (n=2) identifying as African-American, 2.6% (n=2) identifying as Asian, and 2.6% (n=2) identifying as another ethnicity. Of the children surveyed, 34.6% were in grade 3, 20.5% were in grade 4, 17.9% were in grade 5, and 26.9% were in grade 6.

Measures

Home Predictors and Parental Intentionality to Expose Children to Nature

The predictor, beliefs supporting children's connectedness to nature, is comprised of the normative, behavioral, and control beliefs described in Ajzden's (1991) Theory of Planned Behavior. These beliefs, along with parental

intentionality to expose children to nature are measured on the EC-NES survey given to participating primary caregivers of children (See Appendix A).Teachers who agreed to participate sent home the Encouraging Children's Nature Experiences Scale (EC-NES) survey to the families of children in his or her class (See Appendix A). This survey measures normative, behavioral, and control beliefs of primary caregivers about children's nature experiences as evidence of their intentionality to expose children to nature. Respondents were asked to record the degree of their agreement or disagreement with each survey item on a scale of 1 to 7, with 1 signifying strong disagreement, and 7 signifying strong agreement. Survey items were grouped into the categories of normative, behavioral, or control beliefs, or intentionality based on the description of the categories and subcategories described in the study in which the survey instrument was first utilized (Fraser et al., 2010). Table 1 presents the subscales of normative, behavioral, and control beliefs, and intentionality to expose children to nature, along with the survey items measuring each construct, and the internal reliability analysis.

Table 1: Subscales of parental normative, behavioral, and control beliefs, and intentionality to expose children to nature, including survey items and reliability estimates of each construct.

Normative Beliefs	Survey Items
Cognitive and Emotional Growth	Question 6
Healthiness	Question 10
Emotional Wellbeing	Question 11
Enhanced Skills	Question 12
Appreciation for Nature	Question 15
Behavioral Beliefs	
Effort/Risk	Question 7
Storytelling	Question 14
Control Beliefs	
Child Safety	Question 8
Priority	Question 9
Intentionality	
Intentionality	Question 13

Normative Beliefs. Survey items on the EC-NES measuring primary caregivers' normative beliefs related to children's nature experiences asked participants to record agreement or disagreement with statements related to nature being good for children (1 = *strongly disagree*, 2 = *disagree*, 3 = *somewhat disagree*, 4 = *neither agree nor disagree*, 5 = *somewhat agree*, 6 = *agree*, 7 = *strongly agree*). Normative beliefs related to children's nature experiences includes beliefs that experiences in nature enhance cognitive and emotional growth (Question 6), healthiness (Question10), emotional wellbeing (Question 11), enhanced physical and social skills(Question 12) and an

appreciation for nature (Question 15, α = .92). The sum of the mean scores of these survey items created the variable of Normative Beliefs.

Behavioral Beliefs. Survey items on the EC-NES measuring primary caregivers' behavioral beliefs related to children's nature experiences asked participants to record agreement or disagreement with statements related to whether their actions as adults will promote a desired action in children (*1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree*). Behavioral beliefs related to children's nature experiences include making the effort to expose children to nature, despite possible risks (Question 7), and storytelling about experiences in nature (Question 14). The sum of the mean scores of these survey items created the variable of Behavioral Beliefs.

Control Beliefs. Survey items on the EC-NES measuring primary caregivers' control beliefs related to children's nature experiences asked participants to record agreement or disagreement with statements related to the priority and safety of children playing in nature (*1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree*). Control beliefs related to children's nature experiences includes beliefs that children's need to be outside, and that this need is greater than the risk of being hurt. The survey items relating to these concepts were identified and reverse coded, so that responses indicating greater control beliefs will have greater scores (See Appendix A). The sum of the mean scores of these survey items created the variable of Control Beliefs.

Intentionality. Survey items on the EC-NES measuring primary caregivers' intentionality to perform activities to influence pro-nature behaviors and attitudes in children, and the participants' likelihood to engage in activities that give children access to nature (*1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree*). The survey item relating to intentionality was identified as Question 13 of the EC-NES, and an internal reliability analysis was performed. The mean score of all of the items under Question 13 constructed the variable of Intentionality.

Classroom Curriculum, Recess and Green Initiatives

Three school environment-specific predictors of were examined as to their relationship to the outcome, children's connectedness to nature: the school-level nature integrated into the classroom curriculum, amount of unstructured time spent outdoors, and green initiatives undertaken in the classroom or school. These predictors were measured on the Classroom Nature Experiences survey given to participating classroom teachers (See Appendix B).

Nature in the Classroom Curriculum. The integration of nature into the classroom curriculum was calculated by adding a point for each report of integrating natural science in to the area of reading, writing, math, social studies or science (scoring *1 = yes, 0 = no*), yielding a score between 0 and 5 ($\alpha = 0.78$).

Recess. Teachers also reported the amount of unstructured time spent outdoors on a 7 point scale, ranging from 0 points for no unstructured time

outdoors, and 6 points for 150 or more minutes weekly of unstructured time outdoors. A point was added for each 30 minutes weekly of unstructured time reported, up to the maximum of 6 total points for more than 150 minutes, or 2.5 hours of time. A reliability analysis could not be performed on this variable because the variable was measured by only one question of the survey.

Green Initiatives. The amount of green initiatives taken in the classroom was measured adding points (scoring *1 = yes, 0 = no*) for participation in each green initiative: field trips to natural space, a classroom or school garden, an animal habitat in the classroom, a recycling and composting program, and professional development participation in the area of natural science, yielding a score between 0 and 6.

Children's Connectedness to Nature

Children whose parents agreed to participate in the study were given the Connectedness to Nature Scale (CNS) survey in class to assess their feelings of connectedness to nature (See Appendix C). Each child read a series of 14 statements written in first person, regarding the role of the individual in regards to nature. Teachers were given the option of reading the survey aloud to any child who struggled to read the survey independently. Children were asked to record the degree of their agreement or disagreement with each statement on a scale of 1 to 5, with *1* signifying strong disagreement, and *5* signifying strong agreement. Survey statements that were negatively reflective of a connection with nature were reverse coded. Item 12 was eliminated from the analysis to increase the

overall reliability of the survey. The mean of the responses was taken, yielding a child's Connectedness to Nature score.).

Statistical Analyses

The objective of this study was to investigate the relationship between parental normative beliefs, behavioral beliefs, and control beliefs, school curriculum, unstructured time outdoors, and green initiatives, as predictors in the outcome of children's connection to nature. All analyses were performed using IBM SPSS Statistics Version 19. For descriptive analyses, means and standard deviations were computed for all study variables, and the bivariate correlations between all variables in the study were computed.

To test the study hypotheses, a series of multiple regressions were used. Hypothesis 1a predicted that parents' normative, control, and behavioral beliefs supporting children's nature experiences will explain the variance in children's connectedness to nature. To test Hypothesis 1a, children's connectedness to nature was regressed on parents' normative, control, and behavioral beliefs supporting children's nature experiences.

Hypothesis 1b predicted that intentionality to expose children to nature will mediate the relationship between parents' normative, behavioral, and control beliefs supporting children's nature experiences and children's' connectedness to nature. To test Hypothesis 1b, first, children's connectedness to nature was regressed on parental normative, behavioral, and control beliefs. Next, parental intentionality to expose children to nature was regressed on parental normative,

behavioral and control beliefs. Finally, children's connectedness to nature was regressed simultaneously on parental normative, behavioral, and control beliefs supporting children's nature experiences and parental intentionality to expose children to nature.

Hypothesis 2 predicted that nature integrated into the classroom curriculum, the amount of recess given to children, and the number of green initiatives undertaken in the classroom will explain the variance in children's connectedness to nature. To test Hypothesis 2, children's connectedness to nature was regressed on school curriculum, amount of recess (unstructured time outdoors), and green initiatives in the classroom.

Hypothesis 3 predicted that school variables will explain the variance in children's connectedness to nature above and beyond factors from the home environment. To test Hypothesis 3, children's connectedness to nature, was regressed simultaneously on the predictors that were established to have a statistically significant relationship to the dependent variable: parental intentionality to expose children to nature and the amount of recess given to students in school. All relationships were said to be significant at an alpha level of .05.

CHAPTER 5: RESULTS

Demographic Information

Table 2 presents the demographic information of primary caregivers participating in this study, in comparison with demographic information from adults in Pinellas County, Florida. The categories for participant ages were different on the EC-NES from the age categories on the U.S. Census, which made them impossible to compare. The survey sample contains a disproportionately high number of participants of Caucasian ethnicity, with African American and Asian/Pacific Islander, and participants of other ethnicities being underrepresented. Survey participants also constitute disproportionately higher levels of income and education, compared to the population of Pinellas County, Florida. Additionally, the percent of female survey participants was significantly higher than the proportion of female adults in the population. This survey sample can not be said to represent the population of Pinellas County, Florida.

Table 2: Demographic information of primary caregivers participating in this study (n = 77) in comparison with demographic information from adults in Pinellas County, Florida with children under 18 (N = 743,028)

		Frequency in Participants	Percentage of Participants	Percentage in Pinellas County, FL
Ethnicity	White/Caucasian	71	92.2	74.4
	Black/African American	2	2.6	12.4
	Asian/Pacific Islander	2	2.6	4.5
	Other	2	2.6	5.6
Hispanic/Latin	No	76	98.7	84.9
	Yes	1	1.3	15.1
Age	18 or under	1	1.3	
	19 to 46	51	66.2	
	47 to 56	22	28.6	
	57 to 65	1	1.3	
	65 and over	2	2.6	20.7
	15 to 19			7.0
	20 to 24			7.1
	25 to 34			13.4
	35 to 44			14.2
	45 to 54			14.4
	55 to 59			6.0
	60 to 64			4.8
Gender	Male	15	19.7	49
	Female	61	80.3	51
Income	$25K to $34.9K	1	1.4	10.6
	$35K to $49.9K	3	4.1	14.3
	$50K to $74.9K	5	6.8	18.7
	$75K to $99.9K	8	11.0	12.3
	$100K to $149.9K	10	13.7	12.1
	$150K to $199.9K	12	16.4	4.2
Education	No High School Diploma	0	0	15.5
	High School Graduate	0	0	29.3
	Some College	3	3.9	20.3
	Undergraduate Degree	29	38.2	17.4
	Some Post Graduate	6	7.9	Not available
	Post Graduate Degree	38	50	10.1

Source: 2005-2009 American Community Survey 5-Year Estimates
www.americanfactfinder.census.gov

Survey Analyses

Appendix D presents the descriptive statistics, reliability estimates and frequencies of responses to each item on the EC-NES survey for parents, the Classroom Nature Experiences Survey for teachers, and the CNS survey for children. The reliability estimates for all of the final variables were above the generally acceptable limit of α= .70. However, the reliability estimate of Effort/Risk (α = .614), one of the sub-variables measuring Behavioral Beliefs, was lower than the allowable limit. When added with the sub-variable of Storytelling (α = .907), the overall reliability estimate of Behavioral Beliefs was within acceptable range (α = .801). Aside from this, there were no sub-variables with reliability estimates lower than the allowable limit. No reliability estimate for the variable of the amount of unstructured time outdoors (recess) was computed because only one item of the survey related to this variable.

Preliminary Analyses

Table 3 presents the means, standard deviations, and intercorrelations of all variables presented in this study. All parental beliefs supporting children's nature experiences (normative, behavioral, and control beliefs) were intercorrelated at a statistically significant level. All school variables (curriculum, green initiatives, and recess) were intercorrelated at a statistically significant level. Parental intentionality to expose children to nature was significantly

correlated with normative beliefs (r = .619, p < .01), behavioral beliefs (r = .536, p < .01), and control beliefs (r = .475, p < .01).

Table 3: Means, standard deviations, and intercorrelations for study variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Normative Beliefs	6.017	0.764							
2. Behavioral Beliefs	5.846	0.749	.641**						
3. Control Beliefs	5.819	0.634	.386**	.433**					
4. Intentionality	6.673	0.541	.619**	.536**	.475**				
5. School Curriculum	2.061	1.383	.080	.052	.146	.060			
6. Recess	3.080	1.887	.107	.088	.143	.165	.836**		
7. Green Initiatives	2.34	1.401	.080	.063	.241*	.189	.709**	.673**	
8. Children's Connectedness to Nature	3.623	0.554	.208†	.112	.136	.199†	.151	.362**	.026

Note: ** p < .01. * p < .05. † p < .10

Tests of Main Hypotheses

Hypothesis 1a predicted that parents' normative, control, and behavioral beliefs supporting children's nature experiences with nature would explain the variance in children's connectedness to nature. Table 4 summarizes the results of the analyses. Step 1 summarizes the test of Hypothesis 1a. By regressing children's connectedness to nature on parental normative, behavioral, and control beliefs, we found that normative, behavioral and control beliefs were not related to the children's connectedness to nature.

Hypothesis 1b predicted that intentionality of parents to expose their children to nature would mediate the relationship between the home environment predictors of normative, control, and behavioral beliefs and children's connectedness to nature. Because a significant relationship between the predictors and the outcome must be established as the first step in defining a mediational relationship (Judd and Kenny, 1981) we were not able to establish that parental intentionality to expose children to nature mediates the relationship between parental normative, behavioral, and control beliefs supporting children's nature experiences and the outcome, children's connectedness to nature. However, Step 2 in Table 4 shows that parental normative beliefs and control beliefs were positively associated with parental intentionality to expose children to nature, controlling for the behavioral beliefs; parents' behavioral beliefs were not associated with intentionality. As Step 3 in Table 4 shows, additionally, the relationship between parental intentionality to expose children to nature and children's connectedness to nature approached significance (b = .207, p =.082).

Table 4: Testing for intentionality to expose children to nature as a mediator using multiple regression (N= 77)

Steps in Testing for Mediation	*B*	SE *b*	B
Testing Step 1			
Outcome: Children's Connectedness to Nature			
Predictor: Normative Beliefs	.157	.109	.218
Predictor: Behavioral Beliefs	-.045	.112	-.062
Predictor: Control Beliefs	.069	.112	.079
Testing Step 2			
Outcome: Intentionality to Expose Children to Nature			
Predictor: Normative Beliefs	.293**	.078	.422
Predictor: Behavioral Beliefs	.112	.081	.160
Predictor: Control Beliefs	.205*	.081	.243
Testing Step 3			
Outcome: Children's Connectedness to Nature			
Predictor: Intentionality to Expose Children to Nature	.207†	.118	.199
Testing Step 4			
Outcome: Children's Connectedness to Nature			
Mediator: Intentionality to Expose Children to Nature	.117	.163	.113
Predictor: Normative Beliefs	.123	.119	.170
Predictor: Behavioral Beliefs	-.058	.114	-.080
Predictor: Control Beliefs	.045	.118	.051

Note: ** $p < 0.01$. * $p < 0.05$. † $p < 0.10$

Hypothesis 2 predicted that integration of nature into the school curriculum, amount of recess given to children at school, and green initiatives undertaken in the classroom would explain the variance in children's connectedness to nature. Table 5 summarizes the results of the analysis. By regressing children's connectedness to nature simultaneously on curriculum, green initiatives, and recess, we established that only recess was related to

children's connectedness to nature (b = .245, p < 0.01), such that controlling for the curriculum and green initiatives, those children in classes who spent more time in recess reported greater levels of connectedness to nature. Green initiatives were inversely related to children's connection to nature, and the association between curriculum and children's connectedness to nature approached significance. A close examination of the bivariate correlations for these variables show no significant relationship with children's connectedness to nature (See Table 2). This was likely the result of suppression (Cohen, Cohen, & Aiken, 1988). That is, although neither green initiatives nor curriculum were associated with children's connectedness to nature, because they were highly correlated with recess (r =.836, p<.001 for curriculum; r=.673, p=.002 for green initiatives) which was significantly associated with children's connectedness to nature, the overall regression model falsely spuriously identified statistically significant effects for these two variables.

Table 5: Multiple regression analysis for children's connectedness by school environment predictors

	B	SE *b*	B
Curriculum	-.113†	.062	-.356
Green Initiatives	-.110*	.053	-.302
Recess	.245**	.053	.863

Note: ** p < 0.01. * p < 0.05. † p <0.10

Hypothesis 3 predicted that school environment predictors of curriculum, recess, and green initiatives would uniquely explain the variances in children's connectedness to nature above and beyond parental intentionality to expose

children to nature. To test this hypothesis, hierarchical linear regression was used with parental intentionality as a family environment predictor (entered in Step 1) and recess as a school environment predictor (entered in Step 2). These two predictors were the only variables found to be independently related to children's connectedness to nature. Table 6 summarizes the analysis. Addition of the recess to the model with parental intentionality explained unique variances in children's connectedness to nature, above and beyond that of the parental intentionality. Furthermore, parental intentionality that approached significance in its association with children's connectedness to nature in Step 1 became no longer statistically significant in Step 2. This shows that duration of recess explain the variance in children's connectedness to nature above and beyond parental intentionality.

Table 6: Hierarchical linear regression analysis for children's connectedness to nature with parental intentionality and school recess as predictors

Variable	b	SE b	β	R^2	ΔR^2
Step 1				0.040	
Parental intentionality	0.207†	0.118	0.199		
Step 2				0.150	0.110
Parental intentionality	0.150	0.113	0.144		
Recess	0.096**	0.031	0.337		

Note: ** p <.01. * p <.05. † p <.10

CHAPTER 6: DISCUSSION

This study examined relationships among family environment factors (parental normative, behavioral, and control beliefs regarding children's nature experiences, parental intentionality to expose children to nature), school environment factors (integration of natural science into classroom curriculum, the amount of recess given at school, and the number of green initiatives in the classroom) and children's connectedness to nature of 3rd to 6th grade children. The following is a discussion of the roles of these home and school factors on children's connectedness to nature, with some explanation for possible reasons that the results were not entirely as expected.

The Roles of Parental Beliefs and Intentions in Children's Connectedness to Nature

Based on the application of the Theory of Planned Behavior (Ajzen, 1991), we predicted that parents' normative, control, and behavioral beliefs supporting children's nature experiences with nature would explain the variance in children's connectedness to nature (Hypothesis 1a). We also predicted that these associations between parental beliefs and children's connectedness to nature would be mediated by parents' intentionality (Hypothesis 1b). Our first hypothesis was only partially supported. Parental normative (b .293, $p < .01$) and control beliefs (b .205, $p < .05$) were associated with intentionality to support children's nature experiences but parental behavioral beliefs were not associated with intentionality. However, contrary to our hypothesis, parental normative,

behavioral, and control beliefs supporting children's nature experiences were not associated with children's connectedness to nature. These results suggest that children's reports of their connectedness to nature experiences were not associated with parental reports of their beliefs about the importance of nature in socializing their children. As such, parental intentionality to expose children to nature did not mediate the association between parental beliefs and children's connectedness to nature. Notwithstanding the lack of a discernable meditational role of parental intentionality, the relationship between intentionality to expose children to nature and children's reported connectedness to nature only approached statistical significance (b .207, $p < .10$).

These findings suggest that the present data provided only modest support for Ajzen's Theory of Planned Behavior. Contrary to the TPB, parents' behavioral beliefs did not explain variance in their intentionality. Perhaps parents already knew the socially desirable response, and felt compelled to report a response that did not actually reflect their true beliefs. Another explanation could be inferred from the Storytelling subsection of the Behavioral Beliefs variable. Some parents (2.6%) reported strong disagreement with the item, "I read fictional stories about nature to children" and strong disagreement (1.3%) with the item "I read fictional stories about animals to children." The surveyed families had children in grades 3 to 6, so perhaps parents were truly reporting that their child reads independently, and does not need an adult to read to him or her.

Additionally, the association between parental intention to expose children to nature and whether or not children actually felt connected to nature only

approached statistical significance. This is not surprising, given that the children's connectedness to nature was reported by children themselves rather than by their parents. Parental reports of their offspring's connectedness to nature would have produced a statistically significant relationship, due in part, to the artifact of common method variance (Doty and Glick, 1998).

A comparison between the mean value for each of the home predictors from this study and the original values reported by Fraser et al (2010) is listed below in Table 7. Participants in this study reported higher beliefs supporting children's connectedness to nature and higher intentionality to expose children to nature. Fraser et al (2010) reported that Caucasian participants and those with higher incomes tended to report higher beliefs and intentionality, and since the present sample consisted mainly of Caucasian, highly educated participants, the higher support of all beliefs and intentionality could be an effect of the sample.

Table 7: Comparisons of mean values from this study and the original study by Fraser, et al (2010)

	Mean Value From This Study	Original Mean Value (Fraser et al, 2010)
Normative Beliefs	6.017	5.636
Behavioral Beliefs	5.846	5.460
Control Beliefs	5.819	5.600
Intentionality	6.673	6.110

In general, the participants in this study reported beliefs supporting children's connectedness to nature, and intentionality to expose children to nature. This is consistent with the original findings from Fraser, et al (2010).

The Roles of School Environment in Children's Connectedness to Nature

Exposure to nature in the school environment was reported by classroom teachers, via Classroom Nature Experiences Survey. Of the school environment predictor variables (i.e., nature integrated into the classroom curriculum, unstructured time spent outdoors (recess), and green initiatives undertaken in the classroom), only the duration of recess significantly explained the variance in children's connectedness to nature ($b = .245$, $p < .01$). The amount of recess time given to students during the school day was positively related to children's connectedness to nature, such that the longer time the children spent in recess, the greater amount of connectedness to nature children reported. Furthermore, our findings have shown that the duration of recess was positively associated with children's connectedness to nature above and beyond parental intentionality to expose children to nature. This is noteworthy, since the trend in the United States has been to reduce or eliminate recess from the school day. Our research indicates that such a removal of unstructured time outdoors causes children to be less connected to nature, thus providing unstructured time out doors will promote a greater connectedness to the natural world.

It is important to note that more than half of the teachers reported integrating natural science into either no subjects at all or into just one subject;

more than half (53.8%) of the teachers reported little to no integration. Thus, given the lack of variability in the frequency of natural science integrated into the classroom curriculum, it remains unclear whether this variable has a relationship to children's connectedness to nature. Considering that science is an academic subject, the study of nature would presumably be integrated into the curriculum for one subject; however, teachers reported that this is not always the case. The likelihood of integrating science into classroom curriculum has been found to increase with teachers' professional development in science (Shepardson, et. al., 2002; Jimoyiannis, 2010). Of the teachers in our study who reported no integration of natural science to the classroom reading curriculum, 79% of them had no professional development in the area of natural science, which may explain why the integration was not taking place. Contrastingly, 70% of teachers who reported having professional development in natural science also reported integrating it into their reading curriculum.

Similarly, the validity of the green initiatives scale used in the present study is unknown. To our knowledge, there is no psychometrically reliable measure of this construct. The low variability of green initiatives in which teachers reported participation made this variable difficult to measure accurately. Although 95.4% of teachers reported using a classroom or school-wide recycling program, almost 30% of teachers reported participating in just one green initiative, the recycling program. Ideally, the green initiatives would have been utilized in conjunction with the classroom curriculum, so that the meaning behind them was discussed and understood by students.

Connectedness to Nature

The CNS scale was not the only available survey instrument to measure children's environmental attitudes. Previous attempts to adapt surveys originally intended for adults (Dunlap et al., 2000; Gardner and Stern, 2002; Milfont and Duckitt, 2004) were not successful (Larson, et al, 2011). Reliable instruments geared specifically toward children (Bunting and Cousins, 1983; Leeming et al., 1995; Musser and Malkus, 1994) but were validated against the cognitive development of a 10 to 18 year old (Larson et al, 2011). Younger children, according to the Structural-Development Theory, probably will not be able to fully understand concepts in the absence of a personal connection or establishment of empathy (Piaget, 1983), so validity of these scales for use in younger children may be compromised. Additionally, the previously mentioned environmental attitude surveys were long (Larson et al, 1999), making them inconvenient to administer. A reliable and valid scale measuring children's environmental orientations was created by Larson et al. (2011) for use in diverse groups of young children. However, the constructs of environmental orientations that Larson et al. (2011) used included two distinct constructs of "Eco-Affinity", and "Eco-Awareness." While the "Eco-Awareness" construct does seem to measure a connectedness with nature (example: "*My life would change if there were no plants and animals*"), the "Eco-Affinity" construct does not necessarily relate to a connectedness to nature. For example, one of the survey items reads, "I like to read about plants and animals." A child who does not like to read at all may disagree with this particular survey item, but still be have a high eco-affinity. The

beta error for each of the survey constructs is not discussed (Larson et al, 2011). A study measuring only the factor of connectedness to nature would eliminate the need to separate out each predictor in a multifactor survey. This is why the Connectedness to Nature Scale was more suitable for use in this study. The original study by Mayer and Frantz (2002) in which the CNS scale was introduced yielded a mean score of 3.650 with a standard deviation of .640. The mean CNS score for this study was 3.623, with a standard deviation of .554. Given that the mean CNS score for children participating in this study is so similar to that of the original, and also Mayer and Frantz (2002) found that the CNS score was not confounded by participants' cognitive ability, the CNS appears to have been a suitable choice of instrument. However, the reliability was lower for the CNS in this study (alpha = .71) than for the original (alpha = .84).

The results from the Children's Connectedness to Nature Scale survey showed that 11 of 78 children (14%) of children had mean Connectedness to Nature scores below 3.0, the point of neutrality on the scale. This shows that there are children who report lack of connectedness to nature. The children in our survey were predominantly of Caucasian ethnicity from well educated families with high socioeconomic status. These are the children who have the resources to travel to natural space (Oelschlager, 1991). The poor and people of color are disproportionately affected by pollution and other environmental problems (DiChirro, 2005) but children in urban environments, where more poor and minority citizens reside (Louv, 2005; Saylan & Blumstein, 2011) have

reported that they connected the natural world with themselves in similar ways as children living in Brazil did (Kahn, 2002). The implication of this is that, even in a more diverse sample, the reported lack of connectedness of nature may still be similar to the 14% of children who reported a disconnect with nature in this study. Connectedness to nature, as measured by the CNS, may be limited in its usability in children by the fact that children process the world in terms of themselves (Piaget, 1983), whether or not adults are transferring environmental values to them. However, the overall reliability of the CNS in this study (alpha = .71) is above the acceptable limit of .70, indicating that the CNS is measuring the same construct with enough accuracy to be considered legitimate. Furthermore, the mean and standard deviation (3.623 and .554, respectively) score in participants from this study are very similar to the original result (mean = 3.650 and S.D. = .640) from Mayer and Frantz (2002). Mayer and Frantz used the CNS on college students, much older than the 3rd to 6th graders surveyed in this study, but found that participants' cognitive ability did not explain the variances in their CNS scores (2002). The similarities between scores from the CNS scores from participants in the original Mayer and Frantz study and scores from the children in this study may indicate that the CNS is suitable for use in children.

Validating Environmental Deficit Phenomenon

Richard Louv (2005) uses the term "Nature Deficit Disorder" to explain the disconnect from nature experienced by contemporary children. A disorder, however, denotes an inherent problem with an individual. This study has established that the amount of recess during the school day (b = .245, p < 0.01)

and to a lesser extent, parental intentionality to expose children to nature contribute to children's connectedness to nature. In other words, children who are not afforded recess time outdoors may be more likely to feel disconnected to nature. To a lesser extent, our findings suggest that children whose primary caregivers do not intend to socialize their children in nature may be somewhat less likely to feel connected to nature. Our findings provide preliminary support for the notion that children's disconnect with the nature is not inherent in the child. Rather, it is a product of daily interaction with nature due to recess in school and parental socialization of children with nature. Thus, Environmental Deficit Phenomenon, rather than Disorder, may be a more accurate term.

Environmental Deficit Phenomenon (EDP), a socially imposed disconnect from nature, could lead to a lack of environmental stewardship (Chawla, 1998). However, our findings suggest that Environmental Deficit Phenomenon may be remediated, prevented by enhancing children's connectedness to nature. Specifically, this study shows that the amount of recess during the school day is positively related to children's feelings of connectedness to nature ($b = .245$, $p < 0.01$). Thus, providing recess time outdoors in schools may enhance children's feelings of connection to nature, thereby reducing the risk of Environmental Deficit Phenomenon in contemporary American youth. Further work is required to confirm this phenomenon. Particularly, without the data to show that parental beliefs and parental intentionality predict children's connectedness to nature, the role of parental socialization in children's connectedness to nature remains unclear.

However, this study illuminates other factors that may contribute to EDP. The children's grade level was also found to be associated with children's connectedness to nature (b = -.164, p = .001). In other words, as the children's grade level increased, their connectedness to nature decreased. Of the children who reported a CNS score lower than 3, which was the neutral point, 54.5% were in the 6th grade, but of the sample as a whole, only 26.9% of the students were 6th graders. Contrastingly, of the students who reported a CNS score higher than 3, the neutral point, 16% were 6th graders. Something may be changing about children's integration of nature within their representation of self at some time between 3rd and 6th grade. Identifying and studying these changes may lead to more information about Environmental Deficit Phenomenon and how to best keep children connected to nature.

Additionally, parental education level was associated with children's connectedness to nature (b = .113, p = .073). The higher reported education level of the parent, the higher the children tend to score on the CNS. In the sample as a whole, 51.9% of the parents reported having a post graduate degree. Of the children who scored lower than a 3 on the CNS score, only 18.2% had parents who reported holding a post graduate degree. Contrastingly, 56.0% of children who reported a CNS score greater than 3 had parents who reported holding a post graduate degree. In the original Fraser et al (2010) study, parents with a higher level of education were more likely to support all beliefs related to children's connectedness to nature and a greater intention to expose children to nature. In this study, the relationships between income and

beliefs or intentionality were observed. However, because there was a relationship between parents' education level and children's connectedness to nature, further exploration into the effect of parental education level and their beliefs and intentionality regarding children's nature experiences should be further evaluated.

CHAPTER 7: CONCLUSIONS

Implications on Educational Policy

In a world experiencing global climate change, scarcity of natural resources, and exponential growth, raising environmentally conscious citizens is a priority. This study did not provide support for the role of home socialization values in children's connectedness to nature. However, the amount of unstructured time outdoors during school explained children's connectedness to nature, above and beyond the parents' intentions to socialize their children with nature. Though most parents surveyed supported children's nature experiences, the majority of classrooms where these parents send their children do not regularly integrate natural science into the classroom curriculum or participate in green initiatives. Moreover, throughout the United States recess is increasingly absent from the school day (Pellegrini, 2005). In lieu of these findings, families need to advocate for more unstructured time outdoors in their children's schools. School boards do not need to wait for the public demand of children's nature experiences for students, and could begin combating Environmental Deficit Phenomenon starting with the strongest known predictor of children's connectedness to nature: unstructured time outdoors. This means that schools that have reduced or eliminated recess for students may want to rethink their decision.

Limitations

Survey Sample

There were many limitations to this study. First and foremost, access to survey participants was limited to schools who agreed to participate in the study. None of the public schools recruited for the survey agreed to participate, so the sample was limited to families and teachers from private schools, which skewed the demographic makeup of the sample. The majority of the families surveyed were Caucasian, with high socioeconomic status and high levels of education. The results original EC-NES survey (Fraser et al, 2002) showed that, while reported beliefs generally supported children's nature experiences, Caucasian and Native American parents reported stronger beliefs supporting children's nature experiences, and African American participants were uniquely prioritized child safety over experiences outdoors. Parents identifying African-American, Latino, and Asian/Pacific Islander might have reported different answers on the EC-NES in this study as well, but their contribution was limited due to the disproportionate sample. Consequently, the effect of race on children's connectedness to nature was also immeasurable.

Additionally, the data analysis was limited in its ability to predict the contribution of each predictor to children's connectedness to nature, especially in the school-level predictors, because most teachers sampled reported little or no participation in nature-rich curriculum integration or green initiatives. This, combined with the lack of any previously validated instrument for measuring any

of the school predictors from this study makes the effect of these predictors impossible to measure accurately.

Survey Instruments

Limitations of the survey instruments themselves are also numerous. The EC-NES survey and the CNS survey given to participating parents and children, respectively, were developed in earlier research. Developing original surveys for parents and children for use in this study would have been beyond the scope of this thesis project. More information from the parents regarding actual exposure of their children to nature would have given more data than beliefs and attitudes alone. Similarly, more information from the children regarding their play preferences and enjoyment of nature play would have made it possible to determine the total amount of time that the children spend actively engaged in nature experiences, as opposed to simply being offered the opportunity to play outdoors in school.

Complexity of Relationships between Predictors and Outcomes

Perhaps most importantly, the contribution of unstructured time outdoors to children's connectedness to nature needs to be further examined. This study establishes the importance of recess at school to children's connectedness to nature. Unstructured time outdoors is, by definition, a time when children explore their own interest and choose their own activities. The amount of recess time given to students at school explained almost 11% of the variance in children's connectedness to nature, but the survey instruments were limited in that did not

measure *what* the children actually do while they are outdoors. For instance, it is possible that a child who is afforded a great deal of unstructured time outdoors, for example, chooses to sit down and read a book rather than interacting with the natural space around him. Though the child is outdoors, s/he may not be engaged in nature play, and may not report as high of a connection with nature as another child who regularly observes plants and animals while outside. Additionally, given the limited sample size, we were unable to evaluate the clustering effects by classrooms. That is, there is a potential that classrooms are confounded with children's responses on connectedness to nature. That is, the students who are in Mrs. X's class may have reported higher connectedness to nature because they are in Mrs. X's class, not necessarily because Mrs. X allows a longer recess time. The relationship between amount of unstructured time outdoors and children's connectedness to nature is far more complex than could be measured by this pilot study and therefore, the relationship requires continued investigation. It is also important to note that this study assumes that exposure to nature indicates value. Where this might be true for the majority of individuals, there are some special instances not taken into account in this study. For example, a person with physical limitations may be unable to experience natural settings in the same way as most people do, but may have a high value for the environment. This study does not have a way to identify these individuals at this time.

Additionally, this study did not measure actual ecological behaviors of the children surveyed, or those of their parents. Mayer and Frantz (2002) found that

the Connectedness to Nature Scale and ecological behavior correspond positively with each other, and that the relationship is not confounded by social desirability. Without having asked the children questions regarding ecological behaviors, a correspondence between the CNS and behaviors can not be addressed in this study.

Time and Money

This study had to be completed within the timeline of completing a Master's thesis. With more time, other schools could have been recruited and sample size and diversity could have been increased. Additionally, participation would have increased if funding had been available to pay schools and families for their time. The distribution of surveys to children's families, collecting of materials and consent forms, administering of children's surveys, and completion of the teacher survey were cumbersome tasks for a classroom teacher. It is understandable that some schools and classrooms declined to participate. However, compensation for their effort may have increased their willingness to take on this extra work.

Future Research

Study Sample

Further research should include a larger, more varied, representative sample of families and schools. Our study did not capture a data sample representative of the population of children in grades 3 to 6 because most of the participants were Caucasian, wealthy, and highly educated. All of the students

were enrolled in private schools that charge tuition. Surveying families who have children in public school would provide data from a more representative sample of the population.

Future research should also identify a more diverse sample of teachers who integrate natural science into the curriculum more completely and participate in more green initiatives. It is possible that teacher professional development mediates the relationship between the predictors of curriculum and green initiatives and the outcome of children's connectedness to nature, but this needs to be further studied. Data was not sufficient to examine this relationship in the present study due to the low amount of integrated curriculum and green initiative participation.

Research Instruments

In the future it would be helpful to develop research instruments for the specific purpose of measuring children's nature contact. The EC-NES survey was developed to measure intentionality and parental beliefs to expose children to nature, with the reasoning that this increases the likelihood that children will have nature experiences. However, the survey did not measure other factors that could prevent parents from actually exposing children to nature. For example, parents may not have time to take children to natural space. In a representative sample, natural space may not be in close proximity to the families' homes, and parents may not have the financial means to take children

there. Beliefs supporting children's nature experiences were not sufficient to explain children's connectedness to nature in the present study.

The Classroom Nature Experience survey given to participating teachers could also be improved in the future. This survey was created by the Primary Investigator for the purpose of the present study. Though the Primary Investigator did not have the expertise necessary to create a reliable and valid attitudinal survey, a survey requesting information of actual practices would more likely to be valid and reliable because the survey items are direct questions (example: "*How much unstructured time does your class spend outdoors?*"). The data identified recess as the greatest measured predictor of children's connectedness to nature, but the internal validity of the survey item could not be established because there was only one item on the survey related to recess. A more reliable measure would include multiple items, perhaps not only the amount of unstructured time spent outdoors, but how many recess periods are given. Further studies are required to develop and evaluate a psychometrically sound scale of school socialization practices of children with nature. An especially comprehensive scale would include ecological momentary assessment (EMA), which asks participants to record their behaviors close in time to the experience, with data taken several times throughout the study (Moskowitz and Young, 2006). Using EMA would allow for a more accurate representation of classroom practices than a one-time survey.

The CNS survey given to the children had many benefits, primarily, its simplicity and ease of use. However, a more detailed survey instrument could

gain more data from the participating children. The instrument could be expanded to include items relating to children's play preferences. Additionally, it would be helpful to know the gender of each child, so that comparisons could be made among boys and girls. Because grade level was related to children's connectedness to nature ($b = -.164$, $p = .01$), the same children could be given the CNS in 3rd and in 6th grade to compare the individual participants' scores across a period of 3 years. Paired with other information about changes in the children's home, school, and social lives, this data could be used to identify what, if any, changes through the years contribute to the decline in connectedness to nature.

Location

Both participating schools were located in St. Petersburg, Florida. Future research could survey a sample of parents, teachers, and children from another area of the United States to determine what, if any differences exist between sets of data.

Treatments

This study did not apply a treatment to remediate the children's reported disconnect from nature. Future research could identify children who reported little or no connection with nature, increase the amount of unstructured time that children spend outdoors, and measure the children's connectedness to nature again after a specified amount of time.

Conclusion

This study examined whether parental normative, behavioral, and control beliefs supporting children's nature experiences explained the variance in children's self reported connectedness to nature, and whether the intention to expose children to nature mediated this relationship. While normative and behavioral beliefs supporting children's nature experiences was established to be related to parental intention to expose children to nature, normative, behavioral, and control beliefs were not related to children's connectedness to nature. Additionally, this study examined whether nature integrated into the school curriculum, the amount of unstructured time outdoors (recess) given to children during the school day, and green initiatives undertaken in the classroom explained the variance in children's connectedness to nature. The amount of recess given to children, in the form of unstructured time outdoors, was found to explain the variance in children's connectedness to nature, above and beyond the parents' intentionality to socialize children with nature.

Because environmental health has been found to be related to human health and wellbeing (Morales, et al., 1995; Colborn et al., 1996; Knobeloch et al., 2000; Criss, 2004; Mindell et al., 2005; Geelen et al., 2009) it is imperative that today's generation of children grow up to hold more environmentally centered attitudes and concern for nature. Doing so will improve their environmental stewardship (EPA Environmental Stewardship Committee, 2005) and prepare them to address the fate of the world, and in turn, their own fate as well. The adults of the future internalize their values through socialization while

they are children (Brim, 1966). Socialization occurs at home and at school (Whitbeck & Gecas, 1988; John, 1999; Maccoby, 2007). Therefore, the home and school factors related to children's connectedness to nature are important in shaping the adults whose attitudes will drive future environmental policy. This study serves as a pilot study and illustrates the need for further investigation of the home and school practices related to children's connectedness to nature, especially parental intentionality to expose children to nature, and the amount of recess, in the form of unstructured time outdoors, given to children during the school day.

WORKS CITED

Welcome to Broward County. (n.d.). Welcome to Broward County. Retrieved November 2, 2011, from http://www.broward.org

2011 Legislative Platform. (n.d.). *NRPA - National Recreation and Park Association*. Retrieved June 1, 2011, from http://www.nrpa.org/Content.aspx?id=620

A/RES/42/187. Report of the World Commission on Environment and Development. (n.d.). *Welcome to the United Nations: It's Your World*. Retrieved November 1, 2011, from http://www.un.org/documents/ga/res/42/a42r187.htm

About EPA | About EPA | US EPA. (n.d.). *US Environmental Protection Agency*. Retrieved November 1, 2011, from http://www.epa.gov/aboutepa/

Archie, M., & McCrea, E. (1998). Environmental education in the United States: Definition and direction. *Environmental education in the United States: past, present, and future.* (pp. 1 - 8). Rock Spring: North American Association For Environmental Education.

Azjen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179 - 211.

Badash, L. (1995). *Scientists and the development of nuclear weapons: from fission to the Limited Test Ban Treaty, 1939 - 1963* (1. publ. ed.). New York: Humanities Press.

Belief (Stanford Encyclopedia of Philosophy/Winter 2010 Edition). (n.d.). *Stanford Encyclopedia of Philosophy*. Retrieved May 1, 2011, from http://plato.stanford.edu/archives/win2010/entries/belief

Boyd, W. (1911). *The educational theory of Jean Jacques Rousseau*. New York: Longmans, Green.

Brim, O. G. (1966). Socialiation Through the Life Cycle. *Socialization after childhood; two essays* (pp. 1 - 49). Hoboken, NJ: J. Wiley.

Cadwell, L. B. (2003). *Bringing learning to life: the Reggio approach to early childhood education*. New York: Teachers College Press.

Carson, R. (1962). *Silent spring*: Houghton Mifflin.

Chawla, L. (1998). Significant Life Experiences Revisited: A Review of Research on Sources of Environmental Sensitivity. *The Journal of Environmental Education*, *29*(3), 11 - 21.

Colborn, T., Dumanoski, D., & Myers, J. P. (1997). *Our stolen future: are we threatening our fertility, intelligence, and survival? : a scientific detective story* (With a new epilogue by the authors ed.). New York: Plume.

Cornstalk, A. (1911). *Handbook of Nature-Study*. Ithaca, NY: Cornell University Press.

Criss, R., & Davidson, M. (2004). Fertilizers, Water Quality, and Human Health. *Environmental Health and Perspective*, *112*, a536- a536.

Cronon, W. (1995). *Uncommon ground: toward reinventing nature*. New York: W.W. Norton & Co..

Cronon, W. (2003). *Changes in the land: Indians, colonists, and the ecology of New England*. New York: Hill And Wang.

Cuban, L. (1993). *How teachers taught: constancy and change in American classrooms, 1890-1990* (2nd ed.). New York: Teachers College Press.

Cunningham, A., & Jardine, N. (1990). *Romanticism and the sciences*. Ithaca, New York: Cambridge University Press.

Dale, D., Corbin, C., & K.S., D. (2000). Restricting opportunities to be active during school time: do children compensate by increasing physical activity levels after school? . *Research Quarterly for Exercise and Sport*, *77*(3), 240 - 248.

DiChiro, G. (1995). Nature as community: the convergence of environmental and social justice. *Uncommon ground: toward reinventing nature* (pp. 298 - 320). New York: W.W. Norton & Co..

Doty, D., & Glick, W. (1998). Common method bias: does common method variance really bias results?. *Organizational Research Methods*, *1*(4), 374 - 406.

Dunlap, R., Liere, K. V., Mertig, A., & Jones, R. (2000). Measuring endoresment of the New Ecological Paradigm: a revisited NEP scale. *Journal of Social Issues*, *56*, 425 - 442.

Environmental Stewardship Staff Committee. (2005). *Everyday choices: opportunities for environmental stewardship*. Washington, D.C.: EPA Innovation Action Council.

Environmental education. (1980). Paris: UNESCO ;.

Finch, K. (2009). *A Parent's Guide to Nature Play*. Omaha, Nebraska: Green Hearts Institute for Nature in Childhood.

Foundation Requirements in Human Subject Protections - Division of Research Integrity & Compliance - University of South Florida. (n.d.). *Office of Research and Innovation - University of South Florida*. Retrieved November 1, 2011, from http://www.research.usf.edu/cs/irb_courses_foundation.htm

Frader, L. L. (2006). *The industrial revolution: a history in documents*. London: Oxford University Press.

Francis, R. (1997). *Transcendental utopias: individual and community at Brook Farm, Fruitlands, and Walden*. Ithaca: Cornell University Press.

Fraser, J., Heimlich, J., & Yocco, V. (2010). *American beliefs associated with increasing children's opportunities for experiences in nature*. Edgewater, MD: Institute for Learning Innovation.

Gardner, G. T., & Stern, P. C. (2002). *Environmental problems and human behavior* (2nd ed. ed.). Needham Heights: Allyn And Bacon.

Geelen, M., Huijbregts, H., Hollander, A. D., Ragas, H., Jarrsveld, D. V., & Zwart, D. D. (2009). Confronting environmental pressure, environmental quality and human health impact indicators of priority air emissions. *Atmospheric Environment*, *43*, 1613 - 1621.

Good, H. G., & Teller, J. D. (1969). *A history of Western education* (3d ed.). New York: Macmillan.

Gura, P. F. (2007). *American transcendentalism: a history*. New York: Hill And Wang.

Harris, R., & Paxman, J. (2002). *A higher form of killing: the secret history of chemical and biological warfare*. New York: Random House Trade Paperbacks.

Hewett, V. (2001). Examining the Reggio Emilia approach to early childhood education. *Early Childhood Education Journal*, *29*, 95 - 100.

Hines, G. (2010, March). A Parent's Guide to Nature Play. *The Education Digest*, *75*, 43 - 46.

Holmes, R. (2008). *The age of wonder: how the romantic generation discovered*

the beauty and terror of science. New York: Pantheon Books.

John, D. (1999). Consumer socialization of children: a retrospective look at twenty-five years of research. *Journal of Consumer Research*, *26*, 183 - 213.

Judd, C., & Kenny, D. (1981). Process analysis: estimating mediation in treatment evaluations. *Evaluation Review*, *5*, 602 - 619.

Kaestle, C. F., & Foner, E. (1983). *Pillars of the republic: common schools and American society, 1780-1860*. New York: Hill And Wang.

Knobeloch, L., Salna, B., Hogan, A., Postle, J., & Anderson, H. (2000). Blue babies and nitrate-contaminated well water. *Environmental Health Perspective*, *108*, 675 - 678.

Kramer, R. (1976). *Maria Montessori: a biography*. Barcelona: Putnam.

Larson, L., Green, G., & Castleberry, S. (2009). Construction and validation of an instrument to measure environmental orientations in a diverse group of children. *Environment and Behavior*, *43*(1), 72 - 89.

Leeming, F., Dwyer, W., & Bracken, B. A. (1995). Children's environmental attitude and knowledge scale: construction and validation. *Journal of Environmental Education*, *26*, 22 - 31.

Loukaitou-Sideris, A., & Sideris, A. (2010). What brings children to the park: Analysis and measurement of the variables affecting children's use of parks. *JOURNAL OF AMERICAN PLANNING ASSOCIATION*, *76*(1), 89 - 107.

Louv, R. (2005). *Last child in the woods: saving our children from nature-deficit disorder*. Chapel Hill, North Carolina: ALGONQUIN BOOKS OF CHAPEL HILL.

Maccoby, E. (2007). Historical overview of socialization research and theory. *Handbook of socialization: theory and research. J. E. Grusec, & P. D. Hastings (Eds.),* (pp. 13 - 41). New York: Guilford Press.

Mayer, S., & Frantz, C. (2002). The connectedness to nature scale: a measure of individualsâ€™ feeling in community with nature. *Journal of Environmental Psychology*, *24*, 503 - 515.

Meine, C. (2010). *Aldo Leopold: his life and work*. Madison: University of Wisconsin Press.

Merchant, C. (1995). Reinventing Eden: Westurn culture as a recovery narrative. *Uncommon ground: rethinking the human place in nature, W. Cronon (Ed.)* (pp. 69 - 90). New York: W.W. Norton & Co..

Milfont, T., & Duckitt, J. (2004). The structure of environmental attitudes: a firsthand second-order confirmatory factor analysis. *Journal of Environmental Psychology*, *24*, 289 - 303.

Miller, C. (2004). *Gifford Pinchot and the making of modern environmentalism*. Washington: Island Press/Shearwater Books.

Mindell, J., & Barrowcliffe, R. (2005). Linking environmental effects to health impacts: a computer modelling approach for air pollution. *Journal of Epidemiology and Community Health*, *59*(12), 1092 - 1098.

Montessori, M. (1965). *Dr. Montessori's own handbook*. New York: Schocken Books.

Montessori, M. M. (1966). *The human tendencies and Montessori education,* ([Rev. ed.). Amsterdam: Association Montessori Internationale.

Morales-Suarez-, M., Llopis-Gonzalez, A., & Perez, M. T. (1995). Impact of nitrates in drinking water on cancer mortality in Valencia, Spain. *European Journal of Epidemiology*, *11*(1), 15 - 21.

Moskowitz, D., & Young, S. (2006). Ecological momentary assessment: what it is and why it is a method of the future in clinical psychopharmacology. *Journal of Pyschiatry and Neurosciences*, *31*(1), 13 - 20.

Mulrine, A. (2000). What's your favorite class?. *U.S. News and World Report*, *128*(17), 50.

Musser, L., & Malkus, A. (1994). The children's attitudes toward the environment scale.. *Journal of Environmental Education*, *25*, 22 - 26.

Myers, G. (1997). *Significant life experiences and choice of major among undergraduate minorities and nonminority students majoring in environmental studies and other disciplines*. Vancouver, British Columbia: North American Association of Environmental Education.

Myerson, J. (1987). *The Brook Farm Book: A Collection of First-Hand Accounts of the Community*. New York: Garland.

NWRS History | Chronology | 1800's. (n.d.). *U.S. Fish and Wildlife Service Home*. Retrieved November 1, 2011, from http://www.fws.gov/refuges/history/chron/chron_1800s_fs.html

Association of Sport and Physical Education. (2001, July). Recess in elementary schools. A position paper from the National Association for Sport and Physical Education . *Council for Physical Education and Children*, *1*. Retrieved May 23, 2011, from http://www.aahperd.org/naspe/pdf-files/pos-papers/ current-res.pdf.

No time for play. (2001, June 16). *The Economist*, *1*, 35. Retrieved May 28, 2001, from http://www.economist.com/node/656096

Novotny, P. (2000). *Where we live, work, and play: the environmental justice movement and the struggle for a new environmentalism*. Connecticut: Praeger.

O'Leary, R., Fiorino, D. J., & Durant, R. (2004). Environmental Conflict Resolution. *Environmental governance reconsidered: challenges, choices, and opportunities* (pp. 322 - 354). Michigan: MIT Press.

Oelschlaeger, M. (1991). *The idea of wilderness: from prehistory to the age of ecology*. New Haven: Yale University Press.

Palmer, J. A. (1993). Development of concern for the environment and formative experiences of educators. *The Journal of Environmental Education*, *24*(3), 26 - 30.

Pellegrini, A. D. (2005). *Recess: its role in education and development*. Hillsdale: L. Erlbaum Associates.

Peterson, N., & Hungerford, H. (1981). Developmental variables affecting environmental sensitivity in professional environmental educators. *Current issues in environmental education and environmental studies* , *7*, 111 - 113.

Poirier, R. (1987). *The renewal of literature: Emersonian reflections*. New York: Random House.

Roosevelt, T., & Nunzio, M. R. (1994). *Theodore Roosevelt: an American mind : a selection from his writings*. London: Penguin Books.

Rousseau, J. (1979). *Emile: or, On education*. New York: Basic Books.

Runte, A. (1997). *National parks: the American experience* (3rd ed.). Lincoln and London: University of Nebraska Press.

Rutherford, F. J. (1989). *Science for all Americans: summary*. Washington: American Association for the Advancement of Science.

Schultz, P. W. (2002). Inclusion with nature:The psychology of human-nature relations. *Psychology of sustainable development, P Schmuck & P. Schultz (Eds.)* (pp. 62 - 78). Dordrecht: Kluwer Academic.

Schwenk, M. (1998). *The Third Annual Annenberg Public Policy Center's Conference on Children and Television: A Summary*. Philadelphia, PA: Annenberg Public Policy Center of the University of Pennsylvania.

Shapin, S. (1996). *The scientific revolution*. Chicago: University Of Chicago Press.

Shepard, P., & Shepard, F. R. (1998). *Coming home to the Pleistocene*. Washington, DC: Island Press.

Standing, M. (19571958). *Maria Montessori; her life and work.*. London: Hollis & Carter.

Stearns, P. N. (2007). *The industrial revolution in world history*. Oxford: Westview Press.

Steingraber, S. (2011). *Raising Elijah: protecting our children in an age of environmental crisis*. New York and Washington D.C.: Da Capo Press.

Tanner, T. (1980). Significant life experiences. *The Journal of Environmental Education*, *11*(4), 20 - 24.

Teale, E. (., & Muir, J. (1954). *The wilderness world of John Muir*. Boston: Houghton Mifflin.

Thoreau, H. D., & Fender, S. (1997). *Walden*. Toronto: Oxford Univ. Press.

Tuan, Y. (1974). *Topophilia: a study of environmental perception, attitudes, and values*. Ithaca, N.Y.: Prentice-Hall.

Vygotsky, L. (1967). Play and its role in the mental development of the child. *Soviet Psychology*, *12*, 62 - 76.

Wilson, J. (1999). *The earth shall weep: a history of Native America*. New York: Atlantic Monthly Press.

Wraight, C. (2008). *Rousseau's 'The Social Contract' a Reader's Guide.*. London: Continuum International Pub.

subject. (n.d.). A Blueprint for Reform: The Reauthorization of the Elementary and Secondary Education Act-- Pg 1. *U.S. Department of Education*. Retrieved November 1, 2011, from http://www2.ed.gov/policy/elsec/leg/blueprint/publication.html

(2010). value . In *The American Heritage Stedman's Medical Dictionary* (Vol. 1, p. 1). New York: Houghton Mifflin. Retrieved May 11, 2011, from http://dictionary.reference.com/browse/value

APPENDICES

Appendix A: The Encouraging Children's Nature Experiences Scale (EC-NES)

Understanding Environmental Deficit Phenomenon:
Influences Affecting Children's Perceptions of Connectedness to Nature
Parent Survey Taken from the **Encouraging Children's Nature Experiences Scale [EC-NES]**
Fraser, Heimlich &Yocco (2010) © Institute for Learning Innovation (2010)

1) Please select the category that includes the year you were born:
__1993 – 2009
__1977 – 1992
__1965 – 1976
__1955 – 1964
__1946 – 1954
__1937 – 1945
__Born 1936 or earlier

2) In which state/province is your home _____?

3) Which television network do you rely on as your primary source for TV news? (Select one)
__ABC
__CBS
__CW
__FOX
__NBC
__PBS
__Cable news stations (e.g. CNN, MSNBC, etc.)
__Other, please specify _____

4) Have you watched at least one television show about nature from beginning to end in the past two years?
__Yes
__No

5) Have you visited a national, state, or regional nature park in the past two years?
__Yes
__No

Appendix A (Continued): The Encouraging Children's Nature Experiences Scale

6) **For the following statements, please rate how strongly you agree or disagree with each one.** If you strongly disagree with the statement, you'd circle a 1. If you strongly agree with the statement, you'd circle a 7. If you are somewhere in between you would circle a 3, 4, or 5.

	Strongly Disagree						Strongly Agree
All children learn from nature whenever they are outdoors	1	2	3	4	5	6	7
Being in nature helps children learn how things work	1	2	3	4	5	6	7
Being in a nature setting helps a child develop emotionally	1	2	3	4	5	6	7
Free play outdoors helps children learn self control	1	2	3	4	5	6	7
Children develop good memory skills by being in nature	1	2	3	4	5	6	7
Children develop their thinking ability by being in nature	1	2	3	4	5	6	7
Playing outdoors helps children learn to solve problems	1	2	3	4	5	6	7
Children learn how to learn by themselves when they play in nature	1	2	3	4	5	6	7

7) **For the following statements, please rate how strongly you agree or disagree with each one.** If you strongly disagree with the statement, you'd circle a 1. If you strongly agree with the statement, you'd circle a 7. If you are somewhere in between you would circle a 3, 4, or 5.

	Strongly Disagree						Strongly Agree
The costs of a child being hurt outdoors exceed the benefits	1	2	3	4	5	6	7
It is difficult to get children to play outdoors	1	2	3	4	5	6	7
If day care providers don't take kids outside, why should I?	1	2	3	4	5	6	7
Schools don't care about kids being outside, so why should I?	1	2	3	4	5	6	7
Children don't get a lot of benefit from being in nature	1	2	3	4	5	6	7
Being outside can expose a child to bad germs and disease	1	2	3	4	5	6	7

Appendix A (Continued): The Encouraging Children's Nature Experiences Scale

8) **For the following statements, please rate how strongly you agree or disagree with each one.**

If you strongly disagree with the statement, you'd circle a 1. If you strongly agree with the statement, you'd circle a 7. If you are somewhere in between you would circle a 3, 4, or 5.

	Strongly Disagree						Strongly Agree
I don't feel comfortable in nature	1	2	3	4	5	6	7
Playgrounds are safer for children than natural areas	1	2	3	4	5	6	7
It is a challenge to find a safe place to take children to play in nature	1	2	3	4	5	6	7
It is a challenge to find a safe place to take children to play outdoors	1	2	3	4	5	6	7
Children need to be supervised at all times when they play outdoors	1	2	3	4	5	6	7
The costs of a child being hurt outdoors exceed the benefits	1	2	3	4	5	6	7
I am concerned about a child getting hurt when they play outdoors	1	2	3	4	5	6	7
I am concerned about a child getting hurt when they play in nature	1	2	3	4	5	6	7
Bad people can take advantage of children when they play in nature	1	2	3	4	5	6	7

9) **For the following statements, please rate how strongly you agree or disagree with each one.**

If you strongly disagree with the statement, you'd circle a 1. If you strongly agree with the statement, you'd circle a 7. If you are somewhere in between you would circle a 3, 4, or 5.

	Strongly Disagree						Strongly Agree
Children don't really need to be outdoors	1	2	3	4	5	6	7
Children don't really need to be in nature	1	2	3	4	5	6	7
There is nothing to learn from playing outside that can't be taught in school	1	2	3	4	5	6	7
The effort to have children in nature is not worth the benefits	1	2	3	4	5	6	7

Appendix A (Continued): The Encouraging Children's Nature Experiences Scale

10) For the following statements, please rate how strongly you agree or disagree with each one.

If you strongly disagree with the statement, you'd circle a 1. If you strongly agree with the statement, you'd circle a 7. If you are somewhere in between you would circle a 3, 4, or 5.

	Strongly Disagree						Strongly Agree
Free-play in a natural area helps a child become more creative	1	2	3	4	5	6	7
Child's play in a natural area is important in helping a child develop	1	2	3	4	5	6	7
Children are healthier when they play in nature	1	2	3	4	5	6	7
Playing in nature is important for a child's physical health	1	2	3	4	5	6	7
Free-play in natural settings encourages vigorous activity for children	1	2	3	4	5	6	7
Free-play in nature is important for a child's physical well-being	1	2	3	4	5	6	7
Vigorous activity in natural settings is good for children	1	2	3	4	5	6	7
Physical fitness is an important benefit of children playing in nature	1	2	3	4	5	6	7
Playing in nature has a positive impact on a child's mental health	1	2	3	4	5	6	7
Seeing trees and plants has a positive impact on a child's mental health	1	2	3	4	5	6	7

Appendix A (Continued): The Encouraging Children's Nature Experiences Scale

11) **For the following statements, please rate how strongly you agree or disagree with each one.**

If you strongly disagree with the statement, you'd circle a 1. If you strongly agree with the statement, you'd circle a 7. If you are somewhere in between you would circle a 3, 4, or 5.

	Strongly Disagree						Strongly Agree
Children build confidence in themselves when they are allowed to play in nature	1	2	3	4	5	6	7
Children build their self-esteem when they are allowed to play by themselves in nature	1	2	3	4	5	6	7
Free-play in nature helps a child become more independent	1	2	3	4	5	6	7
Free-play in natural areas gives a child a greater sense of what they can control	1	2	3	4	5	6	7
Children improve their ability to concentrate when they can play in nature	1	2	3	4	5	6	7
Children would be less obese if they played in nature more often	1	2	3	4	5	6	7
Playing in a natural area contributes to a sense of belonging	1	2	3	4	5	6	7
Playing in natural areas helps connect children to their community	1	2	3	4	5	6	7
Playing in natural areas helps children build an awareness of their own abilities	1	2	3	4	5	6	7

12) **For the following statements, please rate how strongly you agree or disagree with each one.**

If you strongly disagree with the statement, you'd circle a 1. If you strongly agree with the statement, you'd circle a 7. If you are somewhere in between you would circle a 3, 4, or 5.

	Strongly Disagree						Strongly Agree
Playing in natural areas helps children develop better coordination	1	2	3	4	5	6	7
The skills a child gains from playing in a natura l area are unique	1	2	3	4	5	6	7
Playing in nature helps children develop physical strength	1	2	3	4	5	6	7
Free-play in natural settings is important for children learning to play with others	1	2	3	4	5	6	7
Children learn about how society works when they play with other children innatural areas	1	2	3	4	5	6	7
Cooperation is an important ability learned by children when they play together In Nature	1	2	3	4	5	6	7

Appendix A (Continued): The Encouraging Children's Nature Experiences Scale

13) **For the following statements, please rate how strongly you agree or disagree with each one.**

If you strongly disagree with the statement, you'd circle a 1. If you strongly agree with the statement, you'd circle a 7. If you are somewhere in between you would circle a 3, 4, or 5.

	Strongly Disagree						Strongly Agree
I will make sure the children in my life have opportunities to play outdoors	1	2	3	4	5	6	7
I will take children to nature places where they can play	1	2	3	4	5	6	7
I will try to help children learn to be good members of society	1	2	3	4	5	6	7
I will make sure the children in my life respect private property	1	2	3	4	5	6	7
I will make sure the children in my life learn to take care of nature	1	2	3	4	5	6	7
I will advocate for protecting the natural areas in our community	1	2	3	4	5	6	7

14) **For the following statements, please rate how strongly you agree or disagree with each one.**

If you strongly disagree with the statement, you'd circle a 1. If you strongly agree with the statement, you'd circle a 7. If you are somewhere in between you would circle a 3, 4, or 5.

	Strongly Disagree						Strongly Agree
I tell stories about my personal experiences with nature	1	2	3	4	5	6	7
I tell stories about nature to build family bonds	1	2	3	4	5	6	7
I share stories about nature with children	1	2	3	4	5	6	7
I think it is important for children to hear stories about nature	1	2	3	4	5	6	7
I read fictional stories about nature to children	1	2	3	4	5	6	7
I read fictional stories about animals to children	1	2	3	4	5	6	7

Appendix A (Continued): The Encouraging Children's Nature Experiences Scale

15) **For the following statements, please rate how strongly you agree or disagree with each one.**

If you strongly disagree with the statement, you'd circle a 1. If you strongly agree with the statement, you'd circle a 7. If you are somewhere in between you would circle a 3, 4, or 5.

	Strongly Disagree						Strongly Agree
By being outdoors, children learn to appreciate what nature provides	1	2	3	4	5	6	7
Nature helps children to learn about their role in the "circle of life"	1	2	3	4	5	6	7
By being outdoors, children learn about how nature works	1	2	3	4	5	6	7
Nature experiences help children learn to care about wild animals	1	2	3	4	5	6	7
Being in nature helps children develop their own values	1	2	3	4	5	6	7
Children learn about their world better by being outdoors	1	2	3	4	5	6	7
Children learn to care for nature when they play outdoors	1	2	3	4	5	6	7

16) How far from your home is the closest nature place that you think is appropriate for children's play? (Select One)

__Just outside our door
__5 minute walk
__15 minute walk
__15 minutes by car
__30 minutes by car
__30 minutes by bus (don't have a car)
__1 hour (any type of transportation)
__More than 90 minutes to get to nature from where I live

17) Please provide a brief description of the nature place that best fits the place you described in the previous question:

Appendix A (Continued): The Encouraging Children's Nature Experiences Scale

18) When you were a child, which of these places were you allowed to play unsupervised? (Choose all that apply)

	Yes	No
At home or my friends home indoors	___	___
Indoor activity area	___	___
School playground	___	___
Indoor after school club	___	___
In the streets near my home	___	___
Garden	___	___
School playing fields	___	___
Outdoor adventure playground	___	___
Woods	___	___
Shrubland/fields/farmland	___	___
Riverside/creekside/pond	___	___
Mountains/grassy hills/other wild spaces	___	___

19) In which of these places would you allow your child aged 7-11 to play unsupervised? (Choose all that apply)

	Yes	No
At home or my friends home indoors	___	___
Indoor activity area	___	___
School playground	___	___
Indoor after school club	___	___
In the streets near my home	___	___
Garden	___	___
School playing fields	___	___
Outdoor adventure playground	___	___
Woods	___	___
Shrubland/fields/farmland	___	___
Riverside/creekside/pond	___	___
Mountains/grassy hills/other wild spaces	___	___

Appendix A (Continued): The Encouraging Children's Nature Experiences Scale

Please tell us some more about yourself:

20) Are you Spanish/Hispanic/Latino?

___No, not Spanish/Hispanic/Latino
___Yes, Mexican, Mexican American, Chicano
___Yes, Puerto Rican
___Yes, Cuban
___Yes, Other Spanish/Hispanic/Latino
___Prefer not to answer

21) Which of the following best describes your family heritage? (select all that apply)

___White/Caucasian
___Black/African American
___American Indian/First Nations
___Asian/Pacific Islander
___Other
___Prefer not to answer

22) What is your highest level of academic achievement?

___Some high school
___High school diploma/GED
___Some college
___Undergraduate degree
___Some post-graduate studies
___Post-graduate degree

23) Are you now, or have you been a parent/guardian of children?

Yes No

24) Do you have a child under 17 who lives in your household?

Yes No

25) Which of the following best represents your household income last year before taxes?

___Less than $25,000
___$25,000-$34,999
___$35,000-$49,999
___$50,000-$74,999
___$75,000-$99,999
___$100,000-149,000
___$150,000-199,000
___$200,000 or more

26) Are you?

___Male
___Female
___Prefer not to answer

Identification Code:

Appendix B: Classroom Nature Experiences Survey

Understanding Environmental Deficit Phenomenon: Influences Affecting Children's Perceptions of Connectedness to Nature

Teacher Survey of Curriculum and Green Initiatives Within School Environments

1. Do you regularly incorporate natural science into your classroom curriculum:

   - For Reading? ____Yes ____No

     If Yes, please provide an example:

   - For Writing? ____Yes ____No

     If Yes, please provide an example:

   - For Math? ____Yes ____No

     If Yes, please provide an example:

   - For Science? ____Yes ____No

     If Yes, please provide an example:

   - For Social Studies? ____Yes ____No

     If Yes, please provide an example:

Appendix B (Continued): Classroom Nature Experiences Survey

2. How much unstructured time does your class spend outdoors each week?

3. Have you taken or plan to take any field trips to a natural space this school year?

   _____Yes _____No

4. Does your class have a classroom or school garden?

   _____Yes _____No

5. Do you keep an animal habitat in your classroom?

   _____Yes _____No

6. Does your class participate in a recycling program?

   _____Yes _____No

7. Does your class participate in a composting program?

   _____Yes _____No

8. Have you attended any professional development to enhance the integration of natural science into your classroom activities?

   _____Yes _____No

Identification Code:

Appendix C: Connectedness to Nature Scale

Please answer each of these questions in terms of the way you generally feel. Using the following scale, in the space provided next to each question simply state what you are feeling as hnestly as you can.

1	2	3	4	5
Strongly disagree		Neutral		Strongly agree

____1. I often feel a sense of oneness with the natural world around me.

____2. I think of the natural world as a community to which I belong.

____3. I recognize and appreciate the intelligence of other living organisms.

____4. I often feel disconnected from nature.

____5. When I think of my life, I imagine myself to be part of a larger cycle of living things.

____6. I often feel a close relationship with animals and plants.

____7. I feel as though I belong to the Earth as equally as it belongs to me.

____8. I have a deep understanding of how my actions affect the natural world.

____9. I often feel part of the web of life.

____10. I feel that all living things of Earth, human, and nonhuman, share a common 'life force'.

____11. Like a tree can be part of a forest, I feel like a part inside the bigger natural world.

____12. When I think of my place on Earth, I consider myself to be on the top of a pyramid that exists in nature.

____13. I often feel like I am only a small part of the natural world around me, and that I am no more important than the grass on the ground or the birds in the trees.

____14. My personal welfare is separate from the welfare of the natural world.

Appendix D: Item Analysis for Survey Items

Normative Beliefs (Overall Reliability α =.975)

		M	SD	Strongly Dis-agree	Dis-agree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
Cognitive and Emotional Growth (Question 6) α=.935	All children learn from nature whenever they are outdoors	5.831	1.281	0 (0.0%)	2 (2.6%)	2 (2.6%)	8 (10.4%)	14 (18.2)	20 (26.0%)	31 (40.3%)
	Being in nature helps children learn how things work	5.870	1.281	1 (1.3%)	0 (0.0%)	3 (3.9%)	8 (10.4%)	11 (14.3%)	23 (29.9%)	31 (40.3%)
	Being in a nature setting helps a child develop emotionally	5.818	1.315	0 (0.0%)	2 (2.6%)	2 (2.6%)	9 (11.7%)	15 (19.5%)	16 (20.8%)	33 (42.9)
	Free play outdoors helps children learn self control	5.868	1.181	0 (0.0%)	1 (1.3%)	3 (3.9%)	3 (3.9%)	21 (27.6%)	18 (23.7%)	30 (39.5%)
	Children develop good memory skills by being in nature	5.182	1.345	0 (0.0%)	3 (3.9%)	6 (7.8%)	12 (15.6%)	24 (31.2%)	17 (22.1%)	15 (19.5%)
	Children Develop their thinking ability by being in nature	5.512	1.135	0 (0.0%)	3 (3.7%)	1 (1.2%)	7 (8.5)	25 (30.5)	32 (39.0)	1 (17.1%)
	Playing outdoors helps children learn t solve problems	5.793	1.141	0 (0.0%	2 (2.4%)	1 (1.2%)	6 (7.3%)	19 (23.2%)	29 (35.4%)	25 (30.5%)
	Children learn how to learn by themselves when they play in nature	5.800	1.280	1 (1.4%)	0 (0.0%)	2 (2.9%)	7 (10.0%)	17 (24.3%)	15 (21.4%)	28 (40.0%)

Appendix D (Cont'd): Item Analysis for Survey Items

		M	SD	Strongly Dis-agree	Dis-agree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
Healthiness (Question 10) α = .943	Children Develop their thinking ability by being in nature	5.512	1.135	0 (0.0%)	3 (3.7%)	1 (1.2%)	7 (8.5)	25 (30.5)	32 (39.0)	1 (17.1%)
	Playing outdoors helps children learn to solve problems	5.793	1.141	0 (0.0%	2 (2.4%)	1 (1.2%)	6 (7.3%)	19 (23.2%)	29 (35.4%)	25 (30.5%)
	Children learn how to learn by themselves when they play in nature	5.800	1.280	1 (1.4%)	0 (0.0%)	2 (2.9%)	7 (10.0%)	17 (24.3%)	15 (21.4%)	28 (40.0%)
	Free-play in a natural area helps a child become more creative	6.325	.924	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (6.5%)	9 (11.7%)	19 (24.7%)	44 (57.1%)
	Child's play in a natural area is important in helping a child develop	6.312	.950	0 (0.0%)	0 (0.0%)	1 (1.3%)	4 (5.2%)	8 (10.4)	21 (27.3%)	43 (55.8%)
	Children are healthier when they play in nature	6.364	.916	0 (0.0%)	0 0.0%)	0 (0.0%)	5 (6.5%)	8 (10.4%)	18 (23.4%)	46 (59.7%)
	Playing in nature is important for a child's physical health	6.312	.977	0 (0.0%)	1 (1.3%)	0 (0.0%)	2 (2.6%)	12 (15.6%)	18 (23.4%)	44 (57.1%)
	Free-play in natural settings encourages vigorous activity for children	6.221	.968	0 (0.0%)	0 (0.0%)	1 (1.3%)	3 (3.9%)	14 (18.2%)	19 (24.7%)	40 (51.9%)
	Free-play in nature is important for a child's physical well-being	6.286	.886	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (3.9%)	13 (16.9%)	20 (26.0%)	41 (53.2%)
	Vigorous activity in natural settings is good for children	6.636	.626	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	6 (7.8%)	16 (20.8%)	55 (71.4%)
	Physical fitness is an important benefit of children playing in nature	6.618	.692	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.3%)	6 (7.9%)	14 (18.4%)	55 (72.4%)
	Playing in nature has a positive impact on a child's mental health	6.520	.718	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.3%)	7 (9.1%)	20 (26.0%)	49 (63.6%)
	Seeing trees and plants has a positive impact on a child's mental health	6.364	.902	0 (0.0%)	0 (0.0%)	1 (1.3%)	2 (2.6%)	10 (13.0%)	19 (24.7%)	45 (58.4%)

Appendix D (Cont'd): Item Analysis for Survey Items

		M	SD	Strongly Dis-agree	Dis-agree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
Emotional Wellbeing (Question 11) α =.959	Children build confidence in themselves when they are allowed to play in nature	5.974	1.131	0 (0.0%)	0 (0.0%)	2 (2.6%)	8 (10.5%)	13 (17.1%)	20 (26.3%)	33 (43.4%)
	Children build their self-esteem when they are allowed to play by themselves in nature	5.805	1.113	0 (0.0%)	0 (0.0%)	1 (1.3%)	10 (13.0%)	20(26.0%)	18(23.4%)	28(36.4%)
	Free-play in nature helps a child become more independent	6.078	1.085	0 (0.0%)	0 (0.0%)	1 (1.3%)	8 (10.4%)	8 (10.4%)	26 (33.8%)	34 (44.2%)
	Free-play in natural areas gives a child a greater sense of what they can control	5.816	1.230	0 (0.0%)	1 (1.3%)	1 (1.3%)	13 (17.1%)	10 (13.2%)	22 (28.9%)	29 (38.2%)
	Children improve their ability to concentrate when they can play in nature	5.662	1.353	0(0.0%)	2(2.6%)	2 (2.6%)	14(18.2%)	13 (16.9%)	17 (22.1%)	29 (37.7%)
	Children would be less obese if they played in nature more often	6.143	1.097	0 (0.0%)	1 (1.3%)	0 (0.0%)	7 (9.1%)	10 (13.0%)	20 (26.0%)	39 (50.6%)
	Playing in a natural area contributes to a sense of belonging	5.766	1.347	0 (0.0%)	3 (3.9%)	0 (0.0%)	13 (16.9%)	11 (14.3%)	19 (24.7%)	31 (40.3%)
	Playing in natural areas helps connect children to their community	5.948	1.134	0 (0.0%)	1 (1.3%)	0 (0.0%)	9 (11.7%)	14 (18.2%)	21 (27.3%)	32 (41.6%)
	Playing in natural areas helps children build an awareness of their own abilities	6.098	1.013	0 (0.0%)	0 (0.0%)	1 (1.2%)	6 (2.0%)	14 (17.1%)	24 (29.3%)	37 45.1%)

Appendix D (Cont'd): Item Analysis for Survey Items

		M	SD	Strongly Dis-agree	Dis-agree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
Enhanced Skills (Question 12) α = .933	Playing in natural areas helps children develop better coordination	5.870	1.092	0 (0.0%)	1 (1.3%)	0 (0.0%)	7 (9.1%)	20 (26.0%)	21 (27.3%)	28 (36.4%)
	The skills a child gains from playing in a natural area are unique	6.052	.985	0 (0.0%)	0 (0.0%)	0 (0.0%)	8 (10.4%)	11 (14.3%)	27 (35.1%)	31 (40.3%)
	Playing in nature helps children develop physical strength	5.948	1.062	0 (0.0%)	1 (1.3%)	0 (0.0%)	7 (9.1%)	14 (18.2%)	27 (35.1%)	28 (36.4%)
	Free-play in natural settings is important for children learning to play with others	5.857	1.097	0 (0.0%)	1 (1.3%)	1 (1.3%)	7 (9.1%)	15 (19.5%)	28 (36.4%)	25 (32.5%)
	Children learn about how society works when they play with other children in natural areas	5.494	1.273	0 (0.0%)	2 (2.6%)	3 (3.9%)	10 (13.0%)	23 (29.9%)	18 (23.4%)	21 (27.3%)
	Cooperation is an important ability learned by children when they play together in nature	5.792	1.139	0 (0.0%)	0 (0.0%)	1 (1.3%)	11 (14.3%)	20 (26.0%)	16 (20.8%)	29 (37.7%)

		M	SD	Strongly Dis-agree	Dis-agree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
Appreciation for Nature (Question 15) α = .921	By being outdoors, children learn to appreciate what nature provides	6.610	.710	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (2.6%)	4 (5.2%)	16 (20.8%)	55 (71.4%)
	Nature helps children to learn about their role in the "circle of life"	6.390	.905	0 (0.0%)	0 (0.0%)	2 (2.6%)	1 (1.3%)	7 (9.1%)	22 (28.6%)	45 (58.4%)
	By being outdoors, children learn about how nature works	6.507	.788	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (3.9%)	5 (6.5%)	19 (24.7%)	50 (64.9%)
	Nature experiences help children learn to care about wild animals	6.338	.926	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (6.5%)	9 (11.7%)	18 (23.4%)	45 (58.4%)
	Being in nature helps children develop their own values	5.818	1.189	0 (0.0%)	1 (1.3%)	3 (3.9%)	4 (5.2%)	22 (28.6)	18 (23.4)	29 (37.7%)
	Children learn about their world better by being outdoors	6.117	1.051	0 (0%)	1 (1.3%)	0 (0%)	4 (5.2%)	16 (20.8%)	19 (24.7%)	37 (48.1%)
	Children learn to care for nature when they play outdoors	6.286	0.985	0 (0%)	1 (1.3%)	0 (0%)	2 (2.6%)	13 (16.9%)	18 (23.4%)	43 (55.8%)

Appendix D (Cont'd): Item Analysis for Survey Items

Behavioral Beliefs (Overall Reliability α = .801)

		M	SD	Strongly Dis-agree	Dis-agree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
Effort/Risk (Question 7) α = .614	The costs of a child being hurt outdoors exceed the benefits	2.026	1.646	43 (55.8%)	19 (24.7%)	3 (3.9%)	2 (2.6%)	5 (6.5%)	2 (2.6%)	3 (3.9%)
	It is difficult to get children to play outdoors	2.922	1.738	22 (28.6%)	16 (20.8%)	11 (14.3%)	11 (14.3%)	9 (11.7%)	7 (9.1%)	1 (1.3%)
	If day care providers don't take kids outside, why should I	1.703	1.164	43 (67.2%)	8 (12.5%)	3 (4.7%)	9 (14.1%)	1 (1.6%)	0 (0%)	0 (0%)
	Schools don't care about kids being outside, so why should I	1.710	1.208	44 (63.8%)	13 (18.8)	3 (4.3%)	8 (11.6%)	0 (0%)	0 (0%)	1 (1.4%)
	Children don't get a lot of benefit from being in nature	1.233	.742	66 (85.7%)	8 (10.4%)	1 (1.3%)	1 (1.3%)	0 (0%)	1 (1.3%)	0 (0%)
	Being outside can expose a child to bad germs and disease	1.714	1.179	49 (63.6%)	12 (15.6%)	9 (11.7%)	5 (6.5%)	1 (1.3%)	0 (0%)	1 (1.3%)

		M	SD	Strongly Dis-agree	Dis-agree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
Effort/Risk (Question 7) α = .614	The costs of a child being hurt outdoors exceed the benefits	2.026	1.646	43 (55.8%)	19 (24.7%)	3 (3.9%)	2 (2.6%)	5 (6.5%)	2 (2.6%)	3 (3.9%)
	It is difficult to get children to play outdoors	2.922	1.738	22 (28.6%)	16 (20.8%)	11 (14.3%)	11 (14.3%)	9 (11.7%)	7 (9.1%)	1 (1.3%)
	If day care providers don't take kids outside, why should I	1.703	1.164	43 (67.2%)	8 (12.5%)	3 (4.7%)	9 (14.1%)	1 (1.6%)	0 (0%)	0 (0%)
	Schools don't care about kids being outside, so why should I	1.710	1.208	44 (63.8%)	13 (18.8)	3 (4.3%)	8 (11.6%)	0 (0%)	0 (0%)	1 (1.4%)
	Children don't get a lot of benefit from being in nature	1.233	.742	66 (85.7%)	8 (10.4%)	1 (1.3%)	1 (1.3%)	0 (0%)	1 (1.3%)	0 (0%)
	Being outside can expose a child to bad germs and disease	1.714	1.179	49 (63.6%)	12 (15.6%)	9 (11.7%)	5 (6.5%)	1 (1.3%)	0 (0%)	1 (1.3%)

Appendix D (Cont'd): Item Analysis for Survey Items

Control Beliefs (Overall Reliability α = .759)

		M	SD	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
Child Safety (Question 8) α = .751	I don't feel comfortable in nature	1.766	1.213	45 (58.4%)	17 (22.1%)	9 (11.7%)	3 (3.9%)	1 (1.3%)	1 (1.3%)	1 (1.3%)
	Playgrounds are safer for children than natural areas	2.697	1.296	18 (23.7%)	19 (25.0%)	12 (15.8%)	22 (28.9%)	5 (6.6%)	0 (0%)	0 (0%)
	It is a challenge to find a safe place to take children to play in nature	2.584	1.601	27 (35.1%)	15 (19.5%)	16 (20.8%)	6 (7.8%)	9 (11.7%)	3 (3.9%)	1 (1.3%)
	It is a challenge to find a safe place to take children to play outdoors	2.286	1.563	33 (42.9%)	19 (24.7%)	10 (13.0%)	6 (7.8%)	4 (5.2%)	4 (5.2%)	1 (1.3%)
	Children need to be supervised at all times when they play outdoors	3.842	1.862	11 (14.5%)	8 (10.5%)	12 (15.8%)	22 (28.9%)	6 (7.9%)	8 (10.5%)	9 (11.8%)
	The costs of a child being hurt outdoors exceed the benefits	1.680	1.243	47 (62.7%)	18 (24.0%)	5 (6.7%)	1 (1.3%)	1 (1.3%)	2 (2.7%)	1 (1.3%)
	I am concerned about a child getting hurt when they play outdoors	2.610	1.406	20 (26.0%)	24 (31.2%)	10 (13.0%)	13 (16.9%)	9 (11.7%)	1 (1.3%)	0 (0%)
	I am concerned about a child getting hurt when they play in nature	2.507	1.354	20 (26.0%)	28 (36.4%)	8 (10.4%)	13 (16.9%)	7 (9.1%)	1 (1.3%)	0 (0%)
	Bad people can take advantage of children when they play in nature	3.441	1.509	9 (11.7%)	13 (16.9%)	15 (19.5%)	24 (31.2%)	10 (13.0%)	3 (3.9%)	3 (3.9%)

Appendix D (Cont'd): Item Analysis for Survey Items

		M	SD	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
Priority (Question 9) α =.902	Children don't really need to be outdoors	1.143	0.479	69 (89.6%)	6 (7.8%)	1 (1.3%)	1 (1.3%)	0 (0%)	0 (0%)	0 (0%)
	Children don't really need to be in nature	1.156	0.5165	69 (89.6%)	5 (6.5%)	2 (2.6%)	1 (1.3%)	0 (0%)	0 (0%)	0 (0%)
	There is nothing to learn from playing outside that can't be taught in school	1.221	0.5988	65 (84.4%)	9 (11.7%)	1 (1.3%)	2 (2.6%)	0 (0%)	0 (0%)	0 (0%)
	The effort to have children in nature is not worth the benefits	1.263	0.806	65 (85.5%)	7 (9.2%)	1 (1.3%)	2 (2.6%)	0 (0%)	1 (1.3%)	0 (0%)

Intentionality (Overall Reliability α = .915)

		M	SD	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
Intentionality (Question 13) α = .915	I will make sure the children in my life have opportunities to play outdoors	6.662	0.661	0 (0%)	0 (0%)	0 (0%)	1 (1.3%)	5 (6.5%)	13 (16.9%)	58 (75.3%)
	I will take children to nature places where they can play	6.546	0.770	0 (0%)	0 (0%)	0 (0%)	1 (1.3%)	10 (13.0%)	12 (15.6%)	54 (70.1%)
	I will try to help children learn to be good members of society	6.792	0.522	0 (0%)	0 (0%)	0 (0%)	1 (1.3%)	1 (1.3%)	11 (14.3%)	64 (83.1%)
	I will make sure the children in my life respect private property	6.753	0.588	0 (0%)	0 (0%)	0 (0%)	1 (1.3%)	3 (3.9%)	10 (13.0%)	63 (81.8%)
	I will make sure the children in my life learn to take care of nature	6.753	0.566	0 (0%)	0 (0%)	0 (0%)	1 (1.3%)	2 (2.6%)	12 (15.6%)	62 (80.5%)
	I will advocate for protecting the natural areas in our community	6.610	0.691	0 (0%)	0 (0%)	0 (0%)	1 (1.3%)	6 (7.8%)	15 (19.5%)	55 (71.4%)

Appendix D (Cont'd): Item Analysis for Survey Items

Integrating Nature into the Classroom Curriculum and Green Initiatives

		%No	%Yes
Integrates Nature into the Classroom Curriculum α = .776	Reading	64	36
	Writing	82	18
	Math	77.4	22.6
	Science	62.8	37.2
	Social Studies	47.5	52.5
Green Initiatives α = .773	Recycles	5	95
	Composts	100	0
	Animal Habitat in the Classroom	82.4	17.6
	Garden	63.2	36.8
	Field Trips to Natural Space	47.7	52.3
	Professional Development in Natural Science for Teachers	62.8	37.2

Unstructured Time Outdoors

	Frequency	Percent
0 minutes	12	15.4
30 to 59 minutes	8	10.3
60 to 89 minutes	15	19.2
90 minutes to 119 minutes	21	26.9
120 minutes to 149 minutes	5	6.4
150 minutes or more	17	21.8

Appendix D (Cont'd): Item Analysis for Survey Items

Children's Connectedness to Nature (Overall reliability α = .71)

	M	SD	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I often feel a sense of oneness with the natural world around me.	3.269	1.224	10 (12.8%)	8 (10.3%)	23 (29.5%)	25 (32.1%)	12 (15.4%)
I think of the natural world as a community to which I belong.	3.821	1.041	1 (1.3%)	7 (9.0%)	23 (29.5%)	21 (26.9%)	26 (33.3%)
I recognize and appreciate the intelligence of other living organisms.	4.026	1.105	1 (1.3%)	9 (11.5%)	13 (16.7%)	19 (24.4%)	36 (46.2%)
I often feel disconnected from nature.	1.987	1.134	36 (46.2%)	19 (24.4%)	13 (16.7%)	8 (10.3%)	2 (2.6%)
When I think of my life, I imagine myself to be part of a larger cycle of living things.	3.397	1.177	6 (7.7%)	9 (11.5%)	28 (35.9%)	18 (23.1%)	17 (21.8%)
I often feel a close relationship with animals and plants.	3.949	1.056	2 (2.6%)	5 (6.4%)	18 (23.1%)	23 (29.5%)	30 (38.5%)
I feel as though I belong to the Earth as equally as it belongs to me.	3.782	1.077	2 (2.6%)	7 (9.0%)	22 (28.2%)	22 (28.2%)	25 (32.1%)
I have a deep understanding of how my actions affect the natural world.	4.000	1.019	1 (1.3%)	6 (7.7%)	16 (20.5%)	24 (30.8%)	31 (39.7%)
I often feel part of the web of life.	3.474	1.267	6 (7.7%)	13 (16.7%)	18 (23.1%)	20 (25.6%)	21 (26.9%)
I feel that all living things of Earth, human, and nonhuman, share a common 'life force'.	3.680	1.179	2 (2.6%)	13 (16.7%)	19 (24.4%)	18 (23.1%)	26 (33.3%)
Like a tree can be part of a forest, I feel like a part inside the bigger natural world.	3.500	1.114	3 (3.8%)	12 (15.4%)	23 (29.5%)	23 (29.5%)	17 (21.8%)
When I think of my place on Earth, I consider myself to be on the top of a pyramid that exists in nature.	2.846	1.207	14 (17.9%)	13 (16.7%)	30 (38.5%)	13 (16.7%)	8 (10.3%)
I often feel like I am only a small part of the natural world around me, and that I am no more important than the grass on the ground or the birds in the trees.	2.936	1.462	17 (21.8%)	15 (19.2%)	21 (26.9%)	6 (7.7%)	19 (24.4%)
14. My personal welfare is separate from the welfare of the natural world.	2.744	1.189	13 (16.7%)	19 (24.4%)	30 (38.5%)	7 (9.0%)	9 (11.5%)