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Using a Mixed-Methods Approach to Understand Urban Children's Nature Conceptions, Ecological Worldviews and Environmental Perceptions and Preferences Before and After Attending an Environmental Education Program

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USING A MIXED-METHODS APPROACH TO UNDERSTAND URBAN CHILDREN'S NATURE CONCEPTIONS, ECOLOGICAL WORLDVIEWS AND ENVIRONMENTAL PERCEPTIONS AND PREFERENCES BEFORE AND AFTER ATTENDING AN ENVIRONMENTAL EDUCATION PROGRAM

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ABSTRACT

USING A MIXED-METHODS APPROACH TO UNDERSTAND URBAN CHILDREN'S NATURE CONCEPTIONS, ECOLOGICAL WORLDVIEWS AND ENVIRONMENTAL PERCEPTIONS AND PREFERENCES BEFORE AND AFTER ATTENDING AN ENVIRONMENTAL EDUCATION PROGRAM

by Alejandra Maria Bozzolasco

The main objective of this dissertation is to utilize multiple instruments to measure urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences, and to determine whether they are impacted by an environmental education (EE) intervention. This information is critical today in light of growing urbanization that is considered a contributor to *nature deficit disorder* (NDD) in which children, particularly urban children, are growing up distanced from the natural world, thereby impacting children's development, public health, and the environment. Urban children from northern New Jersey who attended the New Jersey School of Conservation's (NJSOC) EE program participated in this study, as did three Americorps teachers, and one NJSOC program administrator. Six instruments were utilized to conduct the research, including the New Ecological Paradigm Scale for Children, photo-elicitation, the Draw Nature test, and three questionnaires. The study utilized qualitative and quantitative methods of data analysis. The findings demonstrate that: (1) urban children espouse strong pro-ecological worldviews; (2) urban children positively perceive both *natural* and *urban* environments that are structured and appear safe; (3) urban children prefer urban environments that are not dilapidated; (4) urban children have an object view of nature

and conceive of it as a series of living and non-living things that exhibit limited interactions with one another, and feature little to no human interference; (5) the NJSOC EE program had minimal impacts on participants' nature conceptions, ecological worldviews, and environmental perceptions and preferences, although it did differentially impact female participants; and (6) the program was perceived positively by participants, Americorps teachers, and a program administrator. These findings are of interest to environmental educators and managers who will increasingly interact with urban stakeholders whether through the delivery of EE programs or through the implementation of environmental management plans.

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Chapter 1. Introduction to the Dissertation

Introduction

This dissertation explores the nature conceptions, ecological worldviews, and environmental perceptions and preferences of urban children from a city in northern NJ who participated in the New Jersey School of Conservation's 3-day 2-night outdoor environmental education program. This study population was chosen because the students belong to the urban school district that most frequently participates in the NJSOC's field trips, and whose directors agreed to participate in the research. This dissertation's subject matter was chosen because understanding the nature conceptions, ecological worldviews, and environmental perceptions and preferences of urban children is critical in this era of multiple environmental crises and growing urbanization, factors that many attribute to a distancing of children from nature. Establishing a baseline understanding of urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences provides critical information to environmental educators and managers who are creating solutions to environmental problems. Although the EE literature includes research that explores the nature conceptions, ecological worldviews, and environmental perceptions and preferences of adults, there is a dearth of information on the nature conceptions, ecological worldviews, and environmental perceptions and preferences of children in general, and urban children in particular (Rickinson, 2001). This dissertation addresses this gap in the research by taking a child-focused, multiple and mixed-methods pre-posttest approach to assess the nature conceptions, ecological worldviews, and environmental perceptions and preferences of a

group of urban children who attended the NJSOC. This dissertation takes into account children's gender and ethnicity to determine if they are factors in nature conceptions, ecological worldviews, and environmental perceptions and preferences. Additionally, this dissertation utilizes a pre-and posttest approach in order to assess the effects of the NJSOC program to determine if it impacted children's nature conceptions, ecological worldviews, and environmental perceptions and preferences. This dissertation contributes to the EE literature by providing insight into urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences. The insights gleaned from this dissertation can assist environmental educators and managers in understanding what children from urban areas conceive of as nature, and whether their ecological worldviews, and environmental perceptions and preferences suggest a distancing from nature as recent literature has widely promulgated.

Background

The publication of Richard Louv's book Last Child in the Woods, drew widespread attention to children's alienation from the natural world. This distancing from nature that Louv dubbed *nature deficit disorder* has become a central issue in environmental education, protection, and management, and public health because it impacts children's physical and developmental health and potentially affects the future of the environment (Faber Taylor, Kuo, & Sullivan, 2001, 2002; Faber Taylor & Kuo, 2006; Frumkin, 2005; Frumkin & Louv, 2007; Maller, Townsend, Pryor, Brown, & St. Leger, 2005; Spencer & Woolley, 2000; Stone & Hanna, 2003). According to the research, being alienated from nature inhibits children's ability to cultivate care and concern for the

natural world, which in turn, impacts their personal health and development (Frumkin & Louv, 2007; Louv, 2008; Malone & Tranter, 2003). Children experiencing NDD may demonstrate a decline in their respect for natural surroundings, have potentially shorter life expectancies, exhibit increases in attention and mood disorders, depression, and childhood obesity, and may experience a decrease in their performance in school (Faber Taylor et al., 2001; Faber Taylor & Kuo, 2006; Frumkin & Louv, 2007; Kellert, 2002; Louv, 2008; Maller et al., 2005; Sallis & Glanz, 2006; Skouteris et al., 2014; Spencer & Woolley, 2000; Stone & Hanna, 2003). NDD is of particular concern in this era of multiple environmental crises fueled largely by increased urbanization. As such, addressing the factors that contribute to NDD is critical to the future of the environment and the healthy development of today's children.

Today's children are spending less time engaging with the natural world due to several factors including: parental fears, restricted or limited access to nature, and increased screen time (Hofferth, 2009; Louv, 2008; Sallis & Glanz, 2006; Skouteris et al., 2014; Sorin, Brooks, & Haring, 2012; Spencer & Woolley, 2000). Children are increasingly participating in structured activities such as sports, and spending a greater amount of time in front of television, computer, and phone screens which is creating a distancing effect from the natural world, and cultivating a more insular childhood experience (Hofferth, 2009; Louv, 2008). Additionally, parents are raising their children in a culture of "stranger danger" and fear of abduction that encourages parents to limit children's home ranges, and promotes a sense of fear of so-called natural or wild areas (Aaron & Witt, 2011; Frumkin & Louv, 2007; Kellert, 2005; Louv, 2008; Maller et al.,

2005; Matthews, 1986; Sorin et al., 2012; Spencer & Woolley, 2000; Spilsbury, 2005; Stone & Hanna, 2003). Not surprisingly, nature is increasingly taking a backseat in the childhood experience. This is becoming the new reality and scholars are interested in understanding its effects on children and the environment. As NDD grows, there has been a renewed interest in understanding children's nature conceptions, ecological worldviews, and environmental perceptions and preferences because they can indicate, to environmental educators and managers, that there is indeed a distancing from nature. This information can then guide the development of strategies to create greater connection between children and the natural world.

Environmental education is a potential solution to NDD. EE programs that focus on connecting children to nature, and teach them to advocate and care for the natural environment can improve the chances that children will develop a knowledge of, and love for nature that may result in a healthy future for the environment, while improving children's personal, health, and developmental outcomes (Athman & Monroe 2001; Boeve-de Pauw, Donche, & Van Petegem 2011; Chawla & Cushing, 2007; Collado, Staats, & Corraliza, 2013; Erdogan, 2011; Larson, Castleberry, & Green, 2010; Warren, 2005). Studies have shown that adults attribute their environmental advocacy with childhood play in and interaction with nature and the natural world at an early age (Chawla, 2006; Kellert, 2002; Wells & Lekies, 2006; White, 2004). As such, EE programs that are scoped to provide children with greater access to nature, while addressing their unique educational and social needs are positioned to play a central role in ameliorating NDD, and creating an environmentally-educated populace.

Alienation from nature can affect children of all backgrounds, including those living in rural, suburban, and urban communities. However, the impact is most likely to be felt by urban children who, due to their proximity from nature or natural areas, are less likely to directly interact with nature on a day-to-day basis. This is problematic, because daily contact with nature is critical to developing environmental awareness, knowledge, and concern (Aaron & Witt, 2011; Bixler, Carlisle, & Hammit, 1994; Bruyere, Wesson, & Teel, 2012; Pyle, 2011; Simmons, 1994). As such, EE programs by giving children, especially those from urban areas, the opportunity to directly interact with nature could potentially provide the exposure needed to create connectivity where it is lacking (Bruyere et al., 2012). Specifically, outdoor EE programs that take urban children out of their daily routine, and allow them to spend a few days and nights living in natural environments, can create an interest in, and awareness and knowledge of, nature and the environment that may inspire them to become environmental stewards in the future (Chawla & Cushing, 2007; Collado et al., 2013; Erdogan, 2011; Larson et al., 2010). Furthermore, EE as a process can teach children from urban areas to understand the value of the environment and its associated resources (Filho, 1997), thereby providing an impetus to protect the environment by participating in the environmental management and decision-making process as adults. Additionally, outdoor EE can link children's futures to the health and integrity of the environment, creating a sense of camaraderie, determination, and drive to affect environmental change. As such, outdoor EE can help urban children to establish a relationship with nature that may inspire future actions to protect the environment.

EE programs geared toward connecting urban children to nature, must take into account that lack of exposure to nature may have led to the development of nature conceptions and ecological worldviews that are negative, incorrect, or misinformed (Aaron & Witt, 2011; Bixler et al., 1994; Bruyere et al., 2012; Warren, 2005). This will require specialized knowledge and programming. Although the EE literature includes assessments of people's nature conceptions, ecological worldviews, and environmental perceptions and preferences, the majority of studies have largely focused on adult populations. Of the studies that have explored children's nature conceptions, ecological worldviews, and environmental perceptions and preferences the majority have focused on rural or suburban children, or have utilized survey instruments designed for adults, which can be difficult for children to understand or tedious for them to complete (Einarsdottir, Dockett, & Perry, 2009; Manoli, Johnson, & Dunlap, 2007; Horstman, Aldiss, Richardson, & Gibson, 2008). As a result, little is known about urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences, and even less is known across gender or ethnicity. This is problematic, because the research largely excludes this important segment of the population, whose numbers and influence are on the rise. This dissertation, by focusing specifically on urban children and their nature conceptions, ecological worldviews, and environmental perceptions and preferences aims, in part, to address this research gap.

Dissertation Goals, Objectives, and Research Questions

If Louv's findings are correct, that today's children are experiencing NDD, their nature conceptions, ecological worldviews, and environmental perceptions and

preferences could reveal a distancing effect. As such, this dissertation utilizes an existing EE program to understand and identify the nature conceptions, ecological worldviews, and environmental perceptions and preferences of urban children who, as a result of where they live, tend to have fewer opportunities to directly interact with nature. This dissertation seeks to determine whether urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences vary across gender and ethnicity, and whether they are impacted by attending an established outdoor environmental education program. In doing so, the dissertation aims to inform the broader EE community on urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences in order to address gaps in the research that include: (1) limited studies that focus on the nature conceptions, ecological worldviews, and environmental perceptions and preferences of urban children; (2) limited studies on urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences across gender and ethnicity, (3) and limited studies using child-specific, multiple and mixed-method approaches to understand and identify children's nature conceptions, ecological worldviews, and environmental perceptions and preferences.

Three research questions guided this dissertation's approach. These research questions are:

> *Research Question 1*: What are urban children's pre-existing nature conceptions, ecological worldviews, and environmental perceptions and preferences?

Research Question 2: Do urban children's pre-existing nature conceptions, ecological worldviews, and environmental perceptions and preferences vary across gender and ethnicity?

Research Question 3: Do urban children's nature conceptions, ecological worldviews, and environmental perceptions, and preferences change after attending an outdoor EE program?

The first dissertation goal was to utilize child-focused, multiple, and mixed-method approaches to identify and understand urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences. Utilizing instruments that are specifically designed for children can improve results, because they take into consideration children's developmental stages, reading and writing skills, and shorter attention spans. The instruments used in this dissertation include: the New Ecological Paradigm Scale for Children, photo-elicitation techniques, the Draw Nature test, and closed- and open-ended questionnaires. Using multiple and diverse instruments allows for quantitative and qualitative analyses that can yield more nuanced results, and improve study outcomes. However, using a mixed-method approach that produces both quantitative and qualitative data can introduce bias into the research. As such, the great care was taken to allow the data to speak for itself, so that no preconceived notions were introduced by the researcher.

The second dissertation goal was to determine if urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences vary across gender and/or ethnicity. These variables were taken into consideration because

they may impact how children conceive of nature and perceive the environment. It is possible that an individual's gender can influence if and how they interact with nature. For example, males may be allowed to wander into the woods or to travel farther away from home; whereas females may not. Similarly, ethnicity may also be a factor in children's nature conceptions, ecological worldviews, and environmental perceptions and preferences. It is possible that children of different ethnic backgrounds may have different relationships with nature due to prevailing cultural mores. The surveys used in this dissertation included a section for children to indicate their gender and ethnicity, so that quantitative analyses could be conducted to detect the effects of these variables on the children's nature conceptions, ecological worldviews, and environmental perceptions and preferences.

The third dissertation goal was to establish urban children's baseline nature conceptions, ecological worldviews, and environmental perceptions and preferences to determine if the EE program had any detectable effects. Children from a city who attended the outdoor EE program, and who agreed to participate in the research, completed one of the instruments upon arrival, during orientation. This allowed the children to share their pre-existing nature conceptions, ecological worldviews, or environmental perceptions and preferences. Upon completion of the program, during summation, the children completed posttests in order to detect any post-program changes. Chapters 2, 3, 4, and 5 explain the instruments that were used to conduct the dissertation, and detail the methodologies implemented to fulfill the dissertations's goals.

Dissertation Methods and Structure of the Dissertation

In this dissertation, multiple measures are used to understand the nature conceptions, ecological worldviews, and environmental perceptions and preferences of a population of children from an urban area. Central to the dissertation is determining the effects of an EE program on urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences. Understanding whether a short-term EE intervention impacts urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences is relevant to understanding whether spending less time in nature is creating a distancing effect from nature. Additionally, it provides critical information about the ability of EE programs to effectuate change in populations that may require special interventions. Although it is a widespread belief that EE programs can provide the exposure necessary to connect urban children to nature, empirical studies are needed to qualify and quantify its effects. As such, this dissertation assesses the New Jersey School of Conservation's outdoor EE program in order to understand if and how the program impacted this group of urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences.

New Jersey School of Conservation

The New Jersey School of Conservation is located on a 240-acre campus within Stokes State Forest in rural Branchville, NJ and serves as the environmental field campus of Montclair State University. It "is the oldest and largest university-operated environmental field center in the nation" (http://www.montclair.edu/provost/faculty-handbook/academic-policies/other-programs/njsoc/). Originally established as a Civilian

Conservation Corps camp in the 1930's, it became the New Jersey State School of Conservation in 1949, and has been administered by Montclair State University since 1972 (Smith-Sebasto & Semrau, 2004). The NJSOC's mission is to "gather knowledge of Earth systems through research and to communicate this knowledge through education" (http://www.montclair.edu/csam/school-of-conservation/). The school's goal is to "contribute to the resolution of environmental problems by cultivating environmentally responsible behaviors that will encourage scientists, teachers, students, and citizens to promote sustainable practices in their communities" (http://www.montclair.edu/csam/school-of-conservation/). As such, NJSOC programs aim to improve students' environmental knowledge; to foster increased awareness of and appreciation for the interconnectedness between humans and the environment; and to help students develop their self-esteem and critical thinking, cultivate team work, and develop the collaborative and cooperative skills necessary to participate in solving environmental problems (http://www.montclair.edu/provost/faculty-handbook/academic-policies/other-programs/njsoc/).

Environmental education programs at the NJSOC are taught by full-time faculty, graduate students, AmeriCorps teachers and/or teachers from visiting schools who have been trained by the NJSOC's faculty (Schierloh, 1982; Smith-Sebasto & Semrau, 2004). NJSOC field programs include classes and field experiences that consist of lessons in the natural and social sciences, the humanities, and outdoor pursuits. Participants take classes from all four of the curricular areas as part of the NJSOC experience, so they are exposed to the multiple disciplines that comprise environmental studies (Schierloh, 1982). Classes

offered during a typical campus visit are Fish, Bear, and/or Water Ecology, Conservation Photography, Orienteering, Climbing Wall, Pioneer Life, and Night Hikes (to name a few). Visiting schools and NJSOC program administrators select classes for participating groups; thereby crafting unique experiences that are in alignment with the sending institution's own mission and goals. Consequently, the NJSOC offers a wide variety of outdoor nature experiences.

NJSOC programming emphasizes direct contact with nature in order to impart knowledge of, and create connections to the natural world, so that participants leave with the feeling that nature is cool, fun, and important, and recognize that positive environmental change begins with them (R. Fitzgerald, personal communication, November, 2015). Direct contact with nature is facilitated by allowing participants to spend the majority of their time outdoors immersed in natural surroundings where they can experience diverse habitats. NJSOC faculty teach children about the species that reside in local ecosystems, address and allay children's fears, and encourage respect for wildlife, one another, their teachers, and the NJSOC's rules and regulations. In order to promote group cohesion and cooperation, participants engage in Action Socialization Exercises (ASEs) that challenge them to team-build, utilize problem-solving skills, and create a sense of empowered camaraderie. For the duration of their stay, participants reduce their waste-stream, actively recycle, and cooperate to solve personal and group challenges, and complete a myriad of environmental lessons and natural encounters.

Historically, the NJSOC has been beset by financial challenges that have threatened its closure on several occasions (Schierloh, 1982). In order to ensure continued

funding, on May 18, 1981, then Governor Brendan T. Byrne signed into law a bill that protected the NJSOC in perpetuity (Schierloh, 1982). Protected status secured state funding, that according to a program administrator, amounted to $100,000 annually (R. Fitzgerald, personal communication, March 14, 2013). Today, the state provides funding in the amount of $1 million annually, yet the NJSOC's yearly budget approximates $2 million (R. Fitzgerald, personal communication, November, 2015). As such, securing outside funding to support programming is a necessity, particularly in light of today's educational climate of standardized testing and budget-cuts, which have caused many sending schools to opt out of outdoor environmental education programs when choosing how to allocate limited time and financial resources. Currently, in order to fully fund programming, the NJSOC charges user fees, and additional funding for the 5,000 visiting students and teachers is provided by individual school districts, parents, parent-teacher organizations, and additional outside fundraising on the part of sending institutions. The Board of Education provides a small percentage of funding for most participants to attend the NJSOC, although, in the past, it had provided the majority of funding for sending institutions. However, despite budgetary constraints and funding challenges, the NJSOC continues to thrive. Program administrators believe this is because the NJSOC is such a unique experience that allows participants, particularly children, from all socio-economic backgrounds to gain a deeper connection to nature. Although anecdotal, parents have told administrators that they value the experience the program provides their children, teachers have reported positive changes in their students after program attendance, and the participants have given positive feedback about their experience - including having

been influenced to pursue environmental interests as a direct result of their time at the NJSOC (R. Fitzgerald, personal communication, March 14, 2013).

Instruments used in this dissertation

In this dissertation, the New Ecological Paradigm Scale for Children, photo-elicitation techniques, and the Draw Nature test were utilized to determine children's pre- and post-program nature conceptions, ecological worldviews, or environmental perceptions and preferences, and to identify any pre-posttest changes across gender and ethnicity. In addition, three questionnaires were created to understand how the NJSOC's outdoor EE program is perceived by program participants, Americorps teachers, and to gain insight about the program from an NJSOC administrator. The children's survey consisted of five true-false questions and was used to allow the children to directly voice their opinions about the program. The Americorps teacher volunteers' survey consisted of six open-ended questions that were designed to allow the teachers to share their insights and thoughts about the NJSOC program experience from their perspective as educators. The NJSOC administrator's survey consisted of five open-ended questions that were designed to allow the administrator to share his insight on the program's efficacy, strengths and weaknesses, future directions, reach, and impact.

Limitations and Scope of the Dissertation

Like most empirical research, this dissertation has limitations that the researcher acknowledges. It was not possible to randomly select individuals for the study due to the small number of urban participants, and the structure of the program. NJSOC programs are highly-structured, so time is of the essence, limiting the amount of time that the

researcher could spend interacting with the children or selecting children for participation. In light of this limitation, all urban children in attendance who agreed to participate were included in the dissertation. Additionally, due to privacy concerns from the Board of Education, strict limitations were set on what questions could be asked, and how much face-to-face contact the researcher was granted with the children, so conducting interviews was not possible. It is recognized that had the researcher been able to interview the children, deeper and more probing questions could have been asked that would have clarified the children's responses to closed-ended questions or to their written commentary. Finally, due to accessibility and time constraints, the researcher was unable to secure another population for comparison. However, although sampling rural or suburban children would have added greater nuance to the dissertation; this dissertation focuses on the nature conceptions, ecological worldviews, and environmental perceptions and preferences of urban children in particular due to an underrepresentation of this group in the research, making this dissertation an important contribution to EE literature.

The scope of this dissertation is limited to the nature conceptions, ecological worldviews, and environmental perceptions and preferences of a group of urban children from northern NJ, so care should be taken in generalizing these results to other urban children. Further research with urban children from different locations would improve generalizability.

Summary

Taken in its totality, this dissertation contributes to the EE literature by shedding light on urban children's nature conceptions, ecological worldviews, and environmental

perceptions and preferences, and whether attending a short-term overnight EE program can have an influence. Furthermore, this dissertation provides insight on the use of alternative research method approaches such as photo-elicitation and drawing as tools to understand children's nature conceptions, and environmental perceptions, and preferences. This information is critical to the EE community and those interested in ameliorating NDD. Understanding urban children's unique nature conceptions, ecological worldviews, and environmental perceptions and preferences, what effects a short-term outdoor EE program can have on said conceptions, worldviews, perceptions and preferences, and different ways to capture and assess changes using diverse instruments can assist in developing population-appropriate EE programs. This can improve the likelihood that EE programs will provide the experiential and learning experiences necessary to create greater connectivity between urban children and the natural world, if it is indeed lacking. The chapters that follow detail the multiple approaches that were utilized to identify and understand urban children's nature conceptions, ecological worldviews, environmental preferences and perceptions, the impacts of the NJSOC EE program, and the results of using diverse instruments to complete this dissertation.

Chapter 2. Using the New Ecological Paradigm Scale for Children to Assess the Ecological Worldviews of Urban Children Before and After Attending the New Jersey School of Conservation's Outdoor Environmental Education Program

Introduction

Issues such as, climate change, pollution, and environmental degradation resulting from natural resource extraction and habitat fragmentation indicate an increased need for action from an environmentally-aware and educated populace. Yet, recent studies have shown that growing urbanization, combined with the proliferation of hand-held devices and their opportunities for distraction, are creating generations of children who rarely interact with the natural world (Louv, 2008; Pyle, 2011) and, as a result, may be less likely to espouse positive ecological worldviews. This is problematic, because children require ample opportunities to directly interact with nature in order to develop pro-ecological worldviews (Kellert, 2002). However, many urban areas lack extant "green" spaces for children to interact with nature that are both accessible and safe. Political, budgetary, and space constraints make it difficult to retrofit highly urbanized environments, particularly in neighborhoods with large minority or low-income populations, which might be due to the fact that the people often lack the power to influence the decision-making process. Environmental education programs today are often implemented as stand-ins for local nature in order to increase the likelihood that urban children will become eco-conscious individuals. Despite their widespread use, little is known about the effects of environmental education on urban children's ecological worldviews (Manoli, Johnson, & Dunlap, 2007; Smith-Sebasto & Semrau, 2004). This

study contributes to the environmental education literature by addressing the research gap, and improving the current state of knowledge regarding children's ecological worldviews, and the effects that environmental education programs have on shaping these worldviews.

Literature Review

Environmental Education

Environmental education with its goal of "developing a world population that is aware of, and concerned about, the total environment and its associated problems, and which has the knowledge, attitudes, skills, motivation and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones" (UNESCO-UNEP, 1976 as cited in Athman & Monroe, 2001) has been making children more environmentally aware and knowledgeable, while connecting them to nature. Residential environmental education programs are immersive experiences that allow children to interact with the natural world via educational programming that helps them develop the skills necessary to solve real world problems, and to improve their cognitive and observational skills (Athman & Monroe, 2001; Boeve-de Pauw, Donche, & Van Petegem, 2011; Erdogan, 2011; Smith-Sebasto & Semrau, 2004; Smith-Sebasto & Cavern, 2006). Children reflectively interact with the natural world, and actively participate in answering complex environmental problems via classroom and field exercises (Athman & Monroe, 2001; Blythe & Harre, 2012; Boeve-de Pauw et al., 2011; Chawla & Cushing, 2007; Erdogan, 2011). This approach not only teaches children about nature and the environment, it familiarizes them with environmental processes, and

empowers them to play a role in environmental advocacy and protection, thereby giving them the knowledge and agency to become involved in environmental protection. Outdoor and residential environmental education programs have become more widespread as a result of growing urbanization, and growing recognition of the importance of childhood experiences in nature to childhood development and lifelong environmental concern (Larson, Castleberry, & Green, 2010; Rickinson, 2001). Specifically, residential environmental education programs are used to bring urban children into direct contact with the natural world in the hopes that the novel experiences encountered during these programs will instill environmental values in participants (Athman & Monroe 2001; Boeve-de Pauw et al., 2011; Collado, Staats, & Corraliza, 2013; Erdogan, 2011; Warren, 2005). Steeped in the traditions of the Nature Study Movement and Progressive and Outdoor education, residential environmental education programs emphasize Deweyan "learning by doing" principles (Athman & Monroe, 2001; Warren, 2005) in which participants learn about nature and the environment through direct experience with native materials and life situations that are best learned outdoors (Athman & Monroe, 2001; Erdogan, 2011; Warren, 2005). This provides children, particularly those who do not have regular access to nature locally, where they live, to directly interact with nature and experience the necessary connections to instill positive ecological worldviews.

The New Ecological Paradigm Scale

Today's environmental education programs were borne of the environmental movement of the 1970's that helped raise awareness of human impacts on the

environment, and helped to drive research into adult environmental attitudes and worldviews (Dunlap, Van Liere, Mertig, & Jones, 2000; Dunlap, 2008; Dunlap & Van Liere, 2008; Manoli et al., 2007). As environmental awareness grew, scholars such as Pirages and Ehrlich noted that a new worldview was replacing the American dominant social paradigm (DSP) of commitment to abundance, continual progress, individualism, property rights, and laissez faire economics (Amburgey & Thoman, 2012; Boeve-de Pauw et al., 2011; Dunlap et al., 2000; Dunlap, 2008; Dunlap & Van Liere, 2008; Evans et al., 2013; Manoli et al., 2007). The new environmental paradigm (NEP), as it came to be known, consists of the beliefs that humanity has the ability to upset the balance of nature, that there are limits to growth, and that human beings do not have the right to rule over the rest of nature (Amburgey & Thoman, 2012; Boeve-de Pauw et al., 2011; Dunlap et al., 2000; Dunlap, 2008; Dunlap & Van Liere, 2008). In 1978, Dunlap and Van Liere, responding to societal paradigm shifts, developed the New Environmental Paradigm Scale - a set of 12 Likert-type items that measure the attitudinal facets of this emerging worldview (Dunlap et al., 2000; Dunlap, 2008). The scale tapped into peoples' "primitive beliefs about humanity's relationship with the environment" (Dunlap, 2008) in order to measure individuals' environmental worldviews. The scale was structured so that the higher the NEP score, the more an individual espoused ecocentric worldviews (Dunlap et al., 2000; Dunlap, 2008) and the lower the NEP score, the more they espoused anthropocentric worldviews.

The creation of the NEP scale provided researchers with a reliable and internally consistent instrument with which to measure changing adult ecological beliefs (Boeve-de

Pauw et al., 2011). However, as use of the scale increased, concerns about its dimensionality, item directionality, and language arose (Dunlap, 2008). Scholars found that the scale could have anywhere from one to five dimensions depending on the research study or population in question (Dunlap, 2008; Erdogan 2009; Rideout, Hushen, McGinty, Perkins, & Tate, 2005), pro-NEP items were overrepresented, and some of the language was outdated (Dunlap, 2008). In response to critics, Dunlap and Van Liere reexamined, updated, and renamed the scale in 2000. The New Ecological Paradigm Scale reflected updated language, content, and an ecological approach to understanding the environment (Dunlap et al., 2000; Dunlap, 2008). The scale was expanded to include 15 Likert-type items that comprise 5 facets of a pro-ecological worldview including the original scale's three facets: "Balance to Nature," "Limits to Growth." and "Anti-anthropocentrism," with the addition of "Human Exemptionalism," and "Ecocrisis" (Dunlap et al., 2000; Dunlap, 2008). As a result of the updates, it is recommended that researchers determine scale dimensionality on a case-by-case basis as informed by their study data (Dunlap et al., 2000; Dunlap, 2008).

Despite the widespread use of both versions of the NEP scale, researchers continue to develop and utilize study-specific scales, which impacts generalizability and limits understanding of all the factors involved in adult ecological worldviews (Bogner & Wiseman, 2004; Boeve-de Pauw et al., 2011; Hawcroft & Milfont, 2010; Johnson & Manoli, 2011; Manoli et al., 2007). For example, scholars often utilize the Ecology Scale (Maloney & Ward, 1973; Maloney, Ward, & Braucht, 1975) and the Environmental Concern Scale (Weigel & Weigel, 1978) both of which measure similar expressions of

concern by inquiring about specific environmental issues (Hawcroft & Milfont, 2010). However, the environmental issues they reference are dated, which impacts the scales' ability to detect changes in modern environmental attitudes (Hawcroft & Milfont, 2010). The NEP scale avoids this problem by tapping into general beliefs regarding the relationship between humans and the environment as opposed to emphasizing specific environmental issues (Hawcroft & Milfont, 2010). Although the NEP scale has its limitations; its long history, careful revisions, and reputation make it the most widely used and accepted measure of ecological worldview to date, making it the current standard for measuring adult environmental attitudes and/or worldviews (Dunlap et al., 2000; Harraway, Broughton-Ansin, Deaker, Jowett, & Shephard, 2012; Hawcroft & Milfont, 2010; Manoli et al., 2007).

The New Ecological Paradigm Scale for Children

The majority of studies on ecological attitudes or worldviews have been conducted on adult populations, or on children using instruments designed for adults, leading to an underrepresentation of children in the literature and affecting study accuracy (Boeve-de Pauw et al., 2011; Evans et al., 2013; Manoli et al., 2007; Van Petegem & Blieck, 2006). This has occurred largely due to a lack of a scale for children in particular, and to simplify acquisition of participants, since most studies occur on college campuses and college students are a readily accessible population to study. Leeming, Dwyer, and Bracken (1995) first called attention to this gap in the study of ecological attitudes and worldviews, and expressed a need for scales to be specifically designed for children in order to improve understanding of children's ecological

worldviews. They asserted that understanding children's ecological worldviews is critical for environmental protection because "early attitudes and knowledge shape the later thinking of adolescents and adults" (Leeming et al., 1995). Prompted by this research, Manoli et al., (2007) conducted a three-year study in which they revised, tested, and validated the NEP scale for use with children between the ages of 10-12. Hundreds of children from diverse ethnic and socioeconomic backgrounds from the states of Pennsylvania, Louisiana, and Arizona participated in the study. They used a pre- and posttest design to evaluate the effects of an earth education program the children attended. Based on the children's responses and feedback, the 15-item scale was revised down to a 10-item scale that measures "three interrelated dimensions of the New Ecological Paradigm: "Rights to Nature," "Eco-crisis," and "Human Exemptionalism" and "a unidimensional measure providing one overall score on the anthropocentric to ecocentric continuum" (Manoli et al., 2007). Therefore, NEP Scale for Children (NEP Children) scores can be reported as either three separate scores or as a single measure with one overall score (Manoli et al., 2007). The NEP Scale for Children was used successfully to evaluate the earth education program the children attended and was deemed useful for evaluating the effects of other environmental education programs (Manoli et al., 2007). The NEP Children is one of the few scales that assesses children's ecological worldviews. Although it is increasing in use, more studies are needed to determine if it taps into attitudinal and worldview changes across diverse populations of children (Manoli et al., 2007). As is the case with research on adult worldviews, there is a need for a standard scale in order to improve understanding and study comparability. This

has been difficult to achieve because scholars continue to use different scales to conduct their research.

Rationale

The rationale for this study is that to date, few studies have specifically focused on the effects of EE programs on the ecological worldviews of urban children of different genders and from diverse ethnic backgrounds, (Boeve-de Pauw et al., 2011; Larson et al., 2010). Although recent studies have shown that residential programs can engender pro-ecological worldviews, these studies have primarily focused on suburban or White children (Evans et al., 2013; Lee, 2008; Smith-Sebasto & Cavern, 2006). Yet, understanding the ecological worldviews of diverse groups of children is critical as population trends indicate increasing urbanization, and the demographic predominance of ethnic minorities, especially in urban areas (Johnson, Bowker, Bergstrom, & Cordell, 2004; Lee 2008; Warren, 2005; Wilhelm & Schneider, 2005).

In this study, children's gender and ethnicity are taken into account to determine if they are factors in children's ecological worldviews. Previous studies on adults have shown that gender may be a factor in ecological beliefs, with women espousing stronger pro-ecological views than men (Dunlap et al., 2000; Corraliza, Collado, & Bethelmy, 2013). In working with children, other researchers have considered gender a potential factor in ecological worldviews, although gender differences have yet to be found (Corraliza et al., 2013; Evans et al., 2007; Manoli et al., 2007). Historically, urban and ethnic minorities were perceived as less concerned with environmental problems (Lee, 2008; McMillan, Hoban, Clifford, & Brant, 1997; Milton & Cleveland, 1995; Stern,

Powell, & Ardoin, 2011). However, studies have shown that minorities are just as concerned about the environment as their White counterparts (Johnson et al., 2004; Kahn & Friedman, 1998; Larson et al., 2010). However, many scholars suggest that ethnic differences lie not in the extent of environmental concerns, but in the environmental issues of concern. For example, urban ethnic minorities tend to care more about local environmental or social justice issues than White environmentalists who focus on environmental conservation (Lee, 2008; McMillan et al., 1997; Evans et al., 2013; Kahn & Friedman, 1998; Milton & Cleveland, 1995; Stern et al., 2011; Stranix, 1975).

The rationale for using the NEP Children, instead of the NEP scale typically used for adults, is that this version of the scale was specifically adapted to be used with the age demographic being researched and to allow for comparison with similar studies across cultures and population. This version of the scale has not been widely used (Hawcroft & Milfont, 2010), however, it is one of the few well-developed instruments shown to be effective in determining the effects of environmental education interventions on children's ecological worldviews (Boeve-de Pauw et al., 2011; Johnson & Manoli, 2011; Manoli et al., 2007). The NEP Children scale is psychometrically-sound and includes language that children comprehend, which is critical when using scales to assess pro-ecological worldviews and behavior in children (Collado et al., 2013; Johnson & Manoli, 2011; Milton & Cleveland, 1995; Stern et al., 2011).

Research Objectives and Goals

The research objectives of this study are to (1) determine the ecological worldviews of a group of urban children; (2) to determine if gender and ethnicity are

variables in children's ecological worldviews; (3) to determine if children's ecological worldviews varied before and after attending an environmental field program; and (4) to determine the effects of an environmental field program on the ecological worldviews of a group of urban children. The overall research goal is to provide insight into the ecological worldviews of urban children before and after they attend an environmental field program, and to determine the impact of environmental education on urban children's worldviews. Additionally, another research goal is to contribute to the diversity of EE research that is inclusive of underrepresented populations such as children, urbanites, and low-income and minority populations.

Materials and Methods

Study Participants

This study was conducted during the 2012-2013 academic year. The participants consisted of 142 5-7th grade students from seven schools within a large urban school district in New Jersey who were attending the NJSOC's 3-day 2-night environmental education program. The children were predominantly Hispanic (43%) and African American (39%), with a smaller percentage of Asians (15%) and Whites (3%). The respondents were relatively evenly split by gender – 52% were female and 48% were male. The children attended schools where the majority of pupils are eligible for free or reduced school lunch. Six of the seven schools in this study ranked in the bottom 20% of New Jersey schools, whereas the 7th school ranked in the top 45%. Students participating in the NJSOC program were part of a broader Board of Education initiative created to

foster improved cultural and environmental awareness among urban children through sharing in the same meaningful field-trip experiences.

Due to the nature of the program, randomly selecting students for the study was not possible, so intact school groups that were scheduled to participate in the 3-day 2-night residential program were studied. This school district was selected because it is one of the few urban districts that regularly attend NJSOC programs. Students were enrolled in the program by their parents. This may have led to selection-bias because it is likely that only those parents with an interest in environmental issues allowed their children to participate, and only those teachers who were willing to participate in the residential program, or who themselves have increased environmental awareness were likely to recommend students for participation.

Procedure

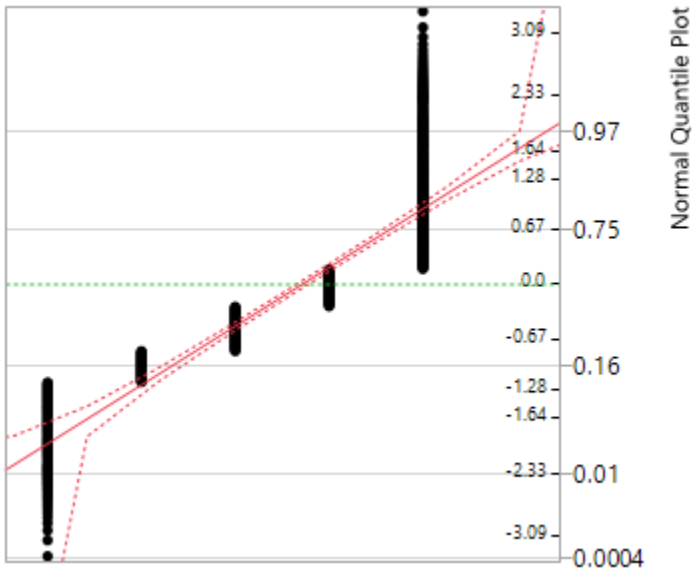
In order to determine the effects of the residential environmental education program on the children's ecological worldviews, the 10-question NEP Children scale was administered using a pre-posttest design. Pretests were administered during arrival orientation sessions, and posttests were administered prior to departure during program summation. Test administration took approximately 15 minutes per session. In addition to completing the NEP Scale for Children, participants were asked to provide answers to questions that included first name and last initial, gender, ethnicity, and school name. Each NEP Children statement was read aloud twice, and children were given sufficient time to respond. Children had the opportunity to ask for clarification if they did not understand a statement, however, no clarification was necessary. In order to ensure

continuity, the principal researcher administered all of the surveys. Children were reminded that participation in the research was strictly voluntary, and that they did not have to participate in the study to attend the environmental education program. This research underwent review by Montclair State University's Internal Review Board and met all research and ethical standards.

Statistical Analyses

A normal quantile plot, or QQ plot of the data was generated using JMP software to test the data for normal distribution. As demonstrated by Graph 1, the data is not normally distributed; however, this is to be expected because the NEP Children scale is a Likert-based scale and therefore generates ordinal data. Despite the lack of normal distribution, parametric statistics were utilized to analyze the data for several reasons. Despite debates, parametric statistics are regularly utilized in studies using Likert scales (deWinter & Dodou, 2010; Murray, 2013; Norman, 2010). In educational research, in particular, Likert-type scales are typical and studies have shown that using parametric statistics to analyze ordinal data produce robust findings, that give the correct answer even when assumptions of normal distribution are violated (de Winter & Dodou; Murray, 2013; Norman, 2010). Researchers have asserted that it is indeed appropriate to utilize parametric statistics when analyzing data generated using Likert scales, findings that are supported by empirical literature that dates back approximately 80 years (Murray, 2013; Norman, 2010). Furthermore, reporting findings using parametric statistics is common in studies using the NEP Children scale, therefore, in order to allow for comparability of the findings, this study utilizes the approaches taken by other researchers who have utilized

the scale to gain deeper insight on children's ecological worldviews (Corraliza, Collado, & Bethelmy, 2013; Manoli et al., 2007; Wu, 2012).



Graph 1: QQ plot of the NEP data.

The NEP Children scale was treated as a unidimensional measure of ecological worldviews with one overall score, and as a measure of three separate interrelated dimensions of ecological worldviews with three individual scores. Therefore, mean NEP Children scores and NEP Children mean factor scores were calculated to compare pre- and post-program ecological worldviews and worldviews by gender and ethnicity. Negatively worded items 3, 6, 7, & 9 were reverse scored so that *strongly agree* = 1 and *strongly disagree* = 5. Two-tailed matched-pairs t-tests and one-way ANOVA were conducted (with the alpha level set to .05) in order to compare the respondents' pre- and post-program mean NEP Children and mean factor scores, and to detect any differences in mean scores by gender, ethnicity, and school. NEP Children items and factors listed in Table 1.

Factors
Rights of Nature (RON) Item 1: Plants and animals have as much right as people to live. Item 4: People must still obey the laws of nature. Item 7: People are supposed to rule over the rest of nature.
Eco-Crisis (ECO) Item 2: There are too many (or almost too many) people on earth. Item 5: When people mess with nature it has bad results. Item 8: People are treating nature badly. Item 10: If things don't change, we will have a big disaster in the environment soon.
Human Exemptionalism (HE) Item 3: People are clever enough to keep from ruining the earth. Item 6: Nature is strong enough to handle the bad effects of our modern lifestyle. Item 9: People will someday know enough about how nature works to be able to control it.

Table 1: NEP Children Items grouped by factors.

Results

Mean NEP Children Scores: General Pre- and Post-Program Assessment

NEP Children Items	Pre-test Means *(Std. Dev.)*	Post-test Means *(Std. Dev.)*
1. RON	4.56 *(0.79)*	4.72 *(0.69)*
2. ECO	2.80 *(1.44)*	2.86 *(1.32)*
3. HE	2.96 *(1.42)*	2.47 *(1.20)*
4. RON	4.62 *(0.87)*	4.71 *(0.60)*
5. ECO	4.33 *(1.00)*	4.23 *(.97)*
6. HE	3.11 *(1.27)*	3.15 *(1.30)*
7. RON	4.68 *(0.71)*	4.46 *(0.96)*
8. ECO	3.68 *(1.16)*	3.87 *(1.11)*
9. HE	2.36 *(1.14)*	2.49 *(1.26)*
10. ECO	4.25 *(1.14)*	4.14 *(1.13)*
Summed Means:	3.74 *(0.87)*	3.71 *(0.89)*

Table 2: Pre and Posttest Mean scores and Standard Deviations for NEP Children "RON" = Rights of Nature Factor Items, "HE" = Human Exemptionalism Factor Items, "ECO" = Eco-Crisis Factor Items.

There was a non-significant decrease in the respondents' pre-program (M = 3.74, SD = .87) and post-program (M = 3.71, SD = .89) mean NEP Children scores; t (9) = -.38, p = .72.

Pre- and Post-Program Assessment by Gender

NEP Children Items	Pre-test Means *(Std. Dev.)*		Post-test Means *(Std. Dev.)*	
	Female	**Male**	**Female**	**Male**
1. RON	4.63 *(0.77)*	4.66 *(0.78)*	4.61 *(0.83)*	4.62 *(0.75)*
2. ECO	2.64 *(1.44)*	2.95 *(1.41)*	2.56 *(1.33)*	2.97 *(1.43)*
3. HE	2.83 *(1.35)*	2.76 *(1.33)*	2.75 *(1.32)*	2.55 *(1.40)*
4. RON	4.69 *(0.83)*	4.60 *(0.79)*	4.69 *(0.77)*	4.69 *(0.71)*
5. ECO	4.38 *(1.00)*	4.19 *(1.10)*	4.30 *(0.99)*	4.24 *(1.0)*
6. HE	3.20 *(1.21)*	3.07 *(1.28)*	3.23 *(1.4)*	3.09 *(1.30)*
7. RON	4.58 *(0.79)*	4.74 *(0.66)*	4.44 *(1.00)*	4.45 *(0.92)*
8. ECO	3.97 *(0.99)*	3.67 *(1.30)*	3.86 *(1.10)*	3.76 *(1.16)*
9. HE	2.53 *(1.20)*	2.43 *(1.20)*	2.39 *(1.22)*	2.69 *(1.34)*
10. ECO	4.27 *(1.13)*	4.14 *(1.16)*	4.20 *(1.20)*	4.00 *(1.23)*
Summed Means:	3.77 *(.88)*	3.72 *(.86)*	3.70 *(.89)*	3.71 *(.82)*

Table 3: Mean scores and Standard Deviations for NEP for Children by Gender. "RON" = Rights of Nature Factor Items, "HE" = Human Exemptionalism Factor Items, "ECO" = Eco-Crisis Factor Items.

No statistically significant differences were found between male and female respondent's pre-program scores; (t (9) = -.92, p = .38) or male and female respondents' post-program scores; (t (9) = .05, p = .96). There was a statistically significant decrease in females' mean NEP Children scores from a pre-program 3.77 (SD = .88) to a post-program 3.70 (SD = .89); t (9) = -3.84, p = .004; however, there was no statistically

significant difference in male respondents' mean NEP Children scores, which decreased from a pre-program 3.72 (SD = .86) to a post-program 3.71 (SD = .82); t (9) = -.29, p = .78.

Pre- and Post-Program Assessment by Ethnicity

NEP Children Items	**Pre-test Means *(Std. Dev.)***				**Post-test Means *(Std. Dev.)***			
	AF	AS	H	W	AF	AS	H	W
1. RON	4.57 *(0.97)*	4.72 *(0.46)*	4.64 *(0.68)*	5.00 *(0)*	4.72 *(0.58)*	4.44 *(1.10)*	4.57 *(0.84)*	4.75 *(0.5)*
2. ECO	2.55 *(1.40)*	3.22 *(1.26)*	2.94 *(1.49)*	1.50 *(0.58)*	2.64 *(1.44)*	2.94 *(1.16)*	2.91 *(1.40)*	1.25 *(0.5)*
3. HE	2.81 *(1.47)*	2.72 *(1.23)*	2.89 *(1.27)*	1.75 *(0.96)*	2.66 *(1.40)*	3.10 *(1.55)*	2.51 *(1.20)*	2.75 *(2.07)*
4. RON	4.55 *(1.02)*	5.00 *(0)*	4.64 *(0.71)*	4.25 *(0.96)*	4.77 *(0.60)*	4.88 *(0.32)*	4.57 *(0.91)*	4.50 *(1.00)*
5. ECO	4.23 *(1.22)*	4.28 *(1.13)*	4.38 *(0.86)*	3.75 *(0.96)*	4.32 *(0.96)*	4.40 *(1.04)*	4.19 *(0.94)*	4.00 *(2.00)*
6. HE	3.28 *(1.19)*	3.33 *(1.46)*	2.98 *(1.22)*	2.75 *(1.26)*	3.21 *(1.35)*	3.5 *(1.47)*	3.04 *(1.32)*	2.75 *(1.71)*
7. RON	4.66 *(0.67)*	4.39 *(1.04)*	4.74 *(0.68)*	4.75 *(0.50)*	4.38 *(1.17)*	4.28 *(0.89)*	4.53 *(0.80)*	4.75 *(0.50)*
8. ECO	4.00 *(0.93)*	3.56 *(1.39)*	3.75 *(1.25)*	4.00 *(1.15)*	3.98 *(1.03)*	3.44 *(1.25)*	3.79 *(1.17)*	3.75 *(0.96)*
9. HE	2.38 *(1.11)*	2.11 *(1.02)*	2.62 *(1.29)*	3.50 *(0.58)*	2.47 *(1.28)*	2.33 *(1.28)*	2.57 *(1.28)*	3.75 *(0.96)*
10. ECO	4.40 (0.98)	4.33 (1.08)	4.06 (1.23)	3.25 (1.71)	4.11 (1.29)	4.33 (1.08)	4.02 (1.22)	4.25 (0.96)

Table 4: Mean pre-and post-test scores and Standard Deviations for NEP for Children by Ethnicity. AF = African American, AS = Asian, H = Hispanic, W = White.
"RON" = Rights of Nature Factor Items, "HE" = Human Exemptionalism Factor Items, "ECO" = Eco-Crisis Factor Items.

There were no statistically significant differences between the groups' pre-program (F (3, 36) = .17, p = .91) and post-program (F (3, 36) = .01, p = 1.00) NEP Children scores.

Mean Factor NEP Children: General Pre- and Post-Program Assessment

NEP Children Factors	**Pre-program Means *(Std. Dev.)***	**Post-program Means *(Std. Dev.)***
Rights of Nature	4.62 *(.06)*	4.63 *(.15)*
Eco-Crises	3.77 *(.71)*	3.78 *(.63)*
Human Exemptionalism	2.81 *(.40)*	2.70 *(.39)*

Table 6: Pre-and Posttest Mean Factor Scores and Standard Deviations for NEP Children Factors.

There was no statistically significant difference in the respondents' Rights of Nature (RON) pre-program (M = 4.62, SD = .06) and post-program (M = 4.63, SD = .15) mean NEP Children factor scores; t (2) = .09, p = .94; Eco-Crises (ECO) pre-program (M = 3.77, SD = .71) and post-program (M = 3.78, SD = .63) mean NEP Children factor scores; t (3) = .14, p = .90; or Human Exemptionalism (HE) pre-program (M = 2.81, SD = .40) and post-program (M = 2.70, SD = .39) mean NEP Children factor scores; t (2) = -.55, p = .64.

Pre- and Post-Program Assessment by Gender

NEP Children Factors	Gender	Pre-test Means *(Std. Dev.)*	Post-test Means *(Std. Dev.)*
RON	**Male**	4.67 *(.07)*	*4.59 (.12)*
	Female	4.63 *(.05)*	4.58 *(.13)*
ECO	**Male**	3.74 *(.57)*	3.74 *(.55)*
	Female	3.82 *(.80)*	3.73 *(.80)*
HE	**Male**	2.75 *(.32)*	2.78 *(.28)*
	Female	2.85 *(.34)*	2.79 *(.42)*

Table 7: Pre and Posttest Mean Factor Scores and Standard Deviations for NEP Children Factors by Gender.

There were no statistically significant differences between male and female respondents' pre-program RON scores (t (2) = -.46, p = .69), ECO scores (t (3) = -.58, p= .60), or HE scores (t (2) = -1.27, p = .33) or their post-program RON scores (t (2) = 2, p = .18, ECO scores (t (3) = .09, p = .93), or HE scores (t (2) = .08, p = .94. There were no statistically significant differences between female respondent's pre- and post-program RON scores; t (2) = -1.22, p = .35. However, there was a statistically significant difference between female respondents' pre- and post-program ECO scores; t (3) = -9.81, p = .001*. Finally, there was no statistically significant difference between female respondents' pre- and post-program HE scores; t (2) = -1.27, p = .33.

Finally, there was no statistically significant difference between male respondents' pre- and post-program RON scores; t (2) = -72, p=.55; ECO scores; t (3) = .10, p = .93; or HE scores; t (2) = -.08, p = .94.

Pre- and Post-Program Assessment by Ethnicity

Factor	Ethnicity	Pre-test Means *(Std. Dev.)*	Post-test Means *(Std. Dev.)*
RON	**African American**	4.60 *(.06)*	4.62 *(.21)*
	Asian	4.70 *(.31)*	4.53 *(.31)*
	Hispanic	4.67 *(.06)*	4.56 *(.02)*
	White	4.67 *(.38)*	4.67 *(.14)*
ECO	**African American**	3.80 *(.84)*	3.76 *(.76)*
	Asian	3.85 *(.62)*	3.99 *(.54)*
	Hispanic	3.69 *(.67)*	3.73 *(.57)*
	White	3.13 *(1.13)*	4.42 *(1.39)*
HE	**African American**	2.82 *(.45)*	2.78 *(.38)*
	Asian	2.72 *(.61)*	2.98 *(.59)*
	Hispanic	2.77 *(.19)*	2.71 *(.29)*
	White	2.67 *(.88)*	3.08 *(.58)*

Table 8: Pre-and Posttest Mean Factor Scores and Standard Deviations for NEP Children Factors by Ethnicity.

There were no statistically significant differences between the groups' RON pre-program ($F (3, 8) = .11$, $p = .95$) and post-program ($F (3, 8) = .28$, $p = .84$) mean scores; ECO pre-program ($F (3, 12) = .73$, $p = .55$) and post-program mean scores ($F (3, 12) = .24$, $p = .87$); or HE pre-program ($F (3, 8) = .04$, $p = .99$) and post-program ($F (3, 8) = .39$, $p = .76$) mean scores.

Discussion

Mean NEP Children Scores

Environmental education programs are used to educate youth about the myriad of environmental crises facing society and the environment, and to give them an opportunity to learn about and directly experience nature while immersed in its environs. It is a wide-held belief that urban children, due to their proximity from nature, tend to exhibit less affective connection to nature and espouse presumably weaker ecological worldviews.

However, the group of urban children in this study exhibit strong pro-ecological worldviews both in pre- and post-program tests. In many cases their pre-program mean NEP Children scores were higher than the post-program mean scores. This suggests that despite living in highly urbanized environments, these children have developed pro-ecological worldviews in which they value the natural world as more than a resource, acknowledge humanity's place in the natural world, and believe that there is a balance to nature that can be upset by human activities.

Although this group of urban children espoused strong pro-ecological worldviews, this does not suggest that that all urban children share ecocentric beliefs. This study compared the ecological worldviews of a group of urban children from the same city and same school district, therefore, it was not possible to determine how their ecological worldviews compared to their peers from other urban, rural, or suburban areas. However, when this study group's mean NEP Children scores were compared to those of other researchers who have used this scale to assess ecological worldviews, the participants in this study hold similar worldviews. The mean NEP Children scores of this study population range from 3.53 (SD = 1.22) to 3.95 (SD = .97). These scores are similar to those of respondents from previous studies by Manoli et al. (2007), Wu (2012), and Corraliza et al. (2013). Manoli et al. (2007), report average pre-test mean scores of 3.58 (SD = .47) and average post-test mean scores of 3.74 (SD = .74). Wu (2012), reports a mean scale score of 3.94 (no SD given) and Corraliza et al. (2013), report a mean score of 3.82 (SD = .57). This study's findings, and those of other scholars, suggest a trend of ecocentric worldviews in children of this age range (Corraliza et al., 2013; Kahn, 1999;

Kellert, 2005; Larson et al., 2010) that may cut across culture, place of residence, and ethnicity, and calls into question the notion that urban children, particularly ethnic minorities, have weaker ecological worldviews than their White counterparts. Not surprisingly, when this study groups' pre- and post-program ecological worldviews were compared across gender and ethnicity these variables were not mediating factors of the strength or direction of ecological worldviews.

In using the NEP Children scale to assess the impact of the NJSOC environmental education program this study shows that the program did not change participants' ecological worldviews, although it did differentially impact female participants. When pre- and post-program scores were compared by gender and ethnicity the only statistically significant difference that was observed was a decrease in female participant's post-program mean NEP Children scores. These findings suggest that the NJSOC program may have caused a weakening of female students' ecological worldviews. Unfortunately, due to access limitations, it was not possible to follow-up with the children regarding their worldviews or experiences while in attendance at the NJSOC, so any suggestions of correlation are merely speculative. It is possible that there is a lack of fit between the female participants and the NJSOC program (owing to socialization effects). Some activities may be less enjoyable to female students. For example, classes such as fish and stream ecology require students to handle live specimens which may not be appealing to female participants due, for example, to prevailing culture-specific gender-based notions of disgust. Understanding why the program has differential gender effects is critical if females' pro-ecological worldviews

are to be encouraged and sustained. Studies have shown that although women have greater pro-ecological worldviews (Boeve-de Pauw et al., 2011) and interest in environmental issues than their male counterparts, they tend to score lower on environmental knowledge (Larson et al., 2010; McMillan et al., 1997). It is possible that this is a product of the way in which environmental education programs are structured and delivered, causing a loss of interest. Nevertheless, any differential impacts warrant further investigation to determine if programming changes are necessary.

It is important to point out, that although not statistically significant, decreases in mean NEP Children scores were experienced by males, and Hispanic and Asian respondents. It is difficult to explain why scores dropped, but this study's findings are similar to those of Smith-Sebasto & Semrau (2004), who used the CATES to evaluate the effects of the NJSOC's 4-day 3-night program on the environmental attitudes of students from suburban central NJ, who found that the program was ineffective in changing the participant's overall environmental attitudes. Lower post-program NEP Children scores could be attributed to a host of situational factors including boredom, distraction, fatigue, or inclement weather. Larson et al. (2010), found that in order for environmental education programs to effectively reach children they must offer mixed activities and they must be fun. The NJSOC program features physical activities and includes opportunities for play and reflection, however it is highly structured and rule-intensive which could limit opportunities for fun; therefore, it is possible that children's worldviews could have been impacted. Although the children appeared engaged while completing the measure, they were distracted by their surroundings and anxious to get on

with activities. This was apparent during post-program sessions when the children were tired and ready to go home. Furthermore, the students attended the NJSOC immersion during rainy and chilly weather. As Smith-Sebasto and Cavern (2006), suggest, spending 7+ hours a day in the outdoors during inclement weather may affect students' attitudes towards the environment and the environmental education program. Additionally, Bixler and Carlisle (1994), found that urban students were fearful of weather conditions while on trails in wilderness areas; therefore, it is possible that NEP Children scores could have been negatively impacted by extended periods of inclement weather. Another possible interpretation of the negligible pre- and posttest differences, not to mention deterioration, of NEP Children scores could be students' prior exposure to what is broadly understood as the ecological worldview (including knowledge, beliefs and intentionality). It is possible that there is a plateauing effect of environmental exposure on the students' environmental worldviews and that it is reached at fairly modest levels of exposure (in or outside of classroom). Further research can shed more light on this aspect, and if true, innovative environmental programs and new modalities of delivery would be needed to overcome the plateauing effect.

NEP Factor Scores

In addition to the unidimensional version of the NEP Children scale, the three-dimensional factor model of the scale that constitutes the facets of ecological worldviews as conceptualized by Manoli et al. (2007), was used. This approach was taken for three reasons, (1) to determine if the environmental education program had an impact on particular NEP Children factors (2) to understand, if across factors, worldviews varied by

gender or ethnicity, and (3) to test if the three-dimensional version of the scale detects changes in children's ecological worldviews. This study's participants' NEP Children mean factor scores were compared to those of Manoli et al. (2007), demonstrating that study participants' RON and ECO scores were similar to (and in many cases higher than) those of Manoli et al. (2007), who reported mean pre-test RON scores of 4.22 (SD = .70) and ECO scores of 3.58 (SD = .63) with mean post-test RON scores of 4.40 (SD = .65) and ECO scores of 3.72 (SD = .67). This study groups' RON scores ranged from a low of 4.40 (SD = .39) to a high of 4.91 (SD = .11), and their ECO scores ranged from a low of 3.13 (1.13) to a high of 4.42 (1.30). This suggests that the students in this study strongly espouse the beliefs represented by these factors, which include that nature has an existence value, that humans are a part of nature, and that human actions can have detrimental (and potentially irreversible) ecological impacts. However, when compared to Manoli et al. (2007), who reported pre-test HE scores of 2.93 (SD = .74) and post-test HE scores of 3.12 (SD = .74), this study population holds slightly more anthropocentric worldviews, with HE scores ranging from a low of 2.48 (SD = .43) to a high of 3.12 (SD = .29). This suggests that these students more strongly believe in nature's ability to handle the negative effects of human actions and the ability of human ingenuity and technology to keep from ruining the earth.

Participants' pre-and post-program factor scores were compared to gauge the effects of the NJSOC program on the participants' ecological worldviews. The comparisons show a statistically significant decrease in female's post-program ECO factor scores. This gives an indication as to the specific facet of ecological worldviews

that the program may have affected. Although it is not possible to attribute causality to the program alone, it is possible the immersive experience changed female students' perceptions of the scope of the current environmental crises or that some aspect of the students' experience generated a negative feedback which affected their ECO factor scores. As part of the environmental education program, the children learn about a myriad of environmental problems and a host of possible solutions and actions that can be taken to ameliorate problems. Therefore, it is possible that by highlighting solutions to current environmental problems, and teaching the children that they can act to help avert future crises, respondents subsequently thought that the crises are not as dire as they once perceived.

Using the three-dimensional factor model of the scale enabled changes in ecological worldviews to be detected that the unidimensional version of the scale did not allow. Calculating an overall NEP Children score makes it difficult to tease out which facet of ecological worldviews are impacted by environmental education programs. For example, the unidimensional model suggested that female respondents' post-program scores decreased significantly, but it did not give insight into what particular facet of ecological worldviews were affected. As such, it was found that the three-dimensional model provided a more informative, nuanced, and concise way to assess both changes in ecological worldviews and the effects of an environmental education program.

Conclusions

The findings of this study suggest that urban children espouse pro-ecological worldviews as measured by the New Ecological Paradigm Scale for Children. This runs

counter to the widespread belief that urban children due to their proximity from nature, are less likely to espouse pro-ecological worldviews. Additionally, this study demonstrates that children's gender, or ethnicity do not appear to be significant factors that impact ecological worldviews, which suggests that there may be a trend in pro-ecological worldviews in children of this age range, or that other factors that were not considered in this study play a role in shaping ecological worldviews. Furthermore, this study demonstrates that the NEP Children scale can be utilized to assess the effects of EE interventions on the ecological worldviews of urban children between the ages of 10-12. Both the unidimensional and three-dimensional models of the scale are useful to assess the ecological worldviews of urban children and the impacts of an EE intervention, although the three-dimensional model provides a more complete understanding of what facets of ecological worldviews are more strongly or weakly held, and are impacted by an intervention. As a result, this study demonstrates that both models of the scale can be used to test whether EE programs are meeting their goal of promoting changes in ecological worldviews, and gauging whether there are differential impacts on participants from diverse genders and ethnicities. Finally, the findings demonstrate that the NJSOC program did not change ecological worldviews, but may have differentially impacted female respondents'.

Study Limitations

This study's limitations include a lack of probability sampling, a small sample size of White participants, and an inability to follow-up with participants due to time and access limitations. The lack of control group limits the generalizability of this study. As

such, it should be understood that the findings of this study are representative of the ecological worldviews of one group of urban children who attended the NJSOC. In future studies, control groups or comparison groups should be utilized in order to improve generalizability across populations. Due to access and time limitations, this study utilized a pre-post-test design with no follow-up. As a result, there was no opportunity to question participants about changes to their ecological worldviews or to understand what aspects of the NJSOC's programs could have impacted their responses. In future studies, it is recommended that, whenever possible, longitudinal studies are conducted to determine the long-term effects of EE interventions on children's ecological worldviews.

Chapter 3. Evaluating Urban Children's Environmental Perceptions and Preferences using Photo-Elicitation Techniques in Conjunction with an Outdoor Environmental Education Experience

Introduction

Today a majority of children live and grow up in urban environments where they are spending less time in nature. Although this is a trend across all socioeconomic groups, urban minority and low-income children are disproportionately impacted as a result of their greater numbers within urban areas, and lack of resources with which to connect with nature (Aaron & Witt, 2011; Frumkin, 2005; Kahn & Friedman, 1995; Lee, 2008; Rideout, 2000; Strife & Downey, 2009). Several studies have shown that low-income and minority urban neighborhoods lack sufficient and safe parks, greenways, sports fields, and trail systems (Frumkin, 2005; Lindsey et al., 2001; Sallis et al., 1996; Strife & Downey, 2009; Wolch et al., 2002). As a result, urban children are spending a greater proportion of their time indoors and in front of television or computer screens where their knowledge of, and interactions with nature are indirect and mediated by third parties (Aaron & Witt, 2011; Hofferth, 2001, 2009; Keliher, 1997; Kellert, 2005; Payne, 2014; Pergams & Zaradic, 2006; Sorin et al., 2012). This is having psychological, physical and social impacts, and is likely affecting urban children's environmental perceptions and preferences (Aaron & Witt, 2011; Burgess & Mayer-Smith, 2011; Kellert, 2005; Maller, Townsend, Pryor, Brown, & St Leger, 2005; Pyle, 2002).

In order to address the growing urban child-nature disconnect, many urban public school systems have incorporated environmental education programs into the curriculum

to connect urban children to nature while teaching them about the natural world and the environment (Chankook & Fortner, 2006; Copley, n.d.; Taproot, 2015). Teaching children about nature and the environment is believed to facilitate learning and caring behaviors and impact children's environmental awareness and perceptions (Burgess & Mayer-Smith, 2011; Chawla, 1998, 2007; & Emmons, 1997). However, most EE programs are developed for average children with average experience in nature, which is likely not the case for most urban children (Warren, 2005). Additionally, for EE interventions to be impactful they must be informed by the target audience's previous experience, perspectives, and preferences (Wilhelm & Schneider, 2005). Yet, little is known about urban children's environmental perceptions and preferences, previous environmental experience, or the impact of environmental education interventions on their perceptions and preferences (Emmons, 1997; Rickinson, 2001; Simmons, 1994). This research contributes to the EE literature by addressing the research gap, thereby improving the state of knowledge on urban children's environmental perceptions and preferences, and the effects that environmental education programs can have in shaping these perceptions and preferences.

Literature Review

Landscape and Environmental Assessment

The birth of the environmental protection movement and subsequent passage of environmental regulations in the late 1960's and early 1970's drove environmental perception and preference research (Taylor, Zube, & Sell, 1987). Researchers were interested in assisting environmental managers and policy makers in incorporating newly

protected environmental amenities and values into the decision-making and regulatory process (Taylor et al., 1987). As such, there was a need for landscape assessment methods that could stand up to scrutiny and provide a metric that could be incorporated in economic or technical measures (Taylor et al., 1987). Additionally, as environmental paradigms shifted, there was a growing need for improved understanding of people's changing perceptions of, and preferences for, different environments in order to assist in environmental protection, land management, and development (Taylor et al., 1987; James Hutton Institute, 2011b). As studies proliferated, researchers developed landscape assessment techniques based on diverse disciplinary approaches, which led to disagreement on the best way to assess landscapes and landscape values that continues to this day (Taylor et al., 1987). However, Taylor et al.'s (1987), *model of landscape perception* provides a theoretical foundation for researchers to develop and conduct landscape studies. The *model of landscape perception* is based on the assumption that humans and landscapes exist in a process of mutual interaction wherein one affects the other (Taylor et al., 1987). Based on this model, Taylor et al. (1987), identified four research paradigms: the expert, psychophysical, cognitive, and experiential. This study combines three of these paradigms: (1) the psychophysical, (2) the cognitive, and (3) the experiential which are discussed in the following paragraphs.

The psychophysical paradigm is based on experimental psychology and assumes that a stimuli-response relationship exists between the landscape and its observers (Luckmann, Lagemann, & Menzel, 2013; Taylor et al., 1987). The landscape or its elements provide the stimuli that cause observers to respond (Taylor et al., 1987). As

such, in this research paradigm a landscape's value is related to its stimulus property (Taylor et al., 1987). Stimulus properties are external to observers, who passively perceive the stimulus without conscious thought (Luckmann et al., 2013; Taylor et al., 1987). For example, Gibson's *theory of affordances* states that an observer will perceive what is offered by an environment (its affordances) in terms of possible behavioral responses (Nye & Silverman, 2012; Taylor et al., 1987). Affordances are what a given environment offers an individual animal for good or ill and implies a complementarity between the animal and the environment (Gibson, 1979). Affordances, are thus, relative to the animal. Different environments will afford different behavioral responses to different animals, and will provide different encounters between animals and the environment (Gibson, 1979). Environmental value is, therefore, linked to an environment's affordances (Taylor et al., 1987). The psychophysical approach is typically used to assess the landscape perceptions and preferences of the general public and special interest groups in order to inform experts on the public's design and aesthetic preferences, and to determine if there are significant differences in the landscape perceptions and preferences of diverse groups (Taylor et al., 1987). The outcomes of human-landscape interactions are statistically verifiable measurements of the public's perceptions of landscape or environmental quality that can be used or manipulated in environmental design or management (Taylor et al., 1987).

The cognitive paradigm is also utilized to assess the general public's landscape and environmental perceptions and preferences; however, its central premise is that humans are a meaning-making species that do not merely respond to the environment, but

actively choose elements of the environment that they perceive are valuable (Luckmann et al., 2013; Taylor et al., 1987). Human observers' past experiences, future expectations, and sociocultural backgrounds act in concert with information received from landscapes to create meaning and value (Luckmann et al., 2013). As such, the cognitive approach focuses on why people value certain landscapes (Luckmann et al., 2013; Taylor et al., 1987). Diverse approaches to determine why landscape meaning arises exist, however, this approach places an emphasis on verbal evaluations of landscapes using surveys, questionnaires, adjective checklists, or semantic differentials (Taylor et al., 1987).

The cognitive paradigm includes many research approaches including the psychobiological perspective of Wohlwill and colleagues, and the evolutionary-based perspectives of Kaplan and Kaplan, and Appleton (Taylor et al., 1987). According to Wohlwill and colleagues, who developed the *arousal approach* in which there is an optimal level of stimulus that humans can receive from an environment before it becomes too stressful or boring, humans adapt from past experiences and use those experiences to inform their landscape perceptions and preferences (Taylor et al., 1987). Humans generally prefer environments with less uncertainty or conflict that consist of intermediate levels of stimulation (Taylor et al., 1987). Kaplan and Kaplan's *information processing theory* suggests that humans prefer landscapes that resemble those that permitted primitive man to gather and organize information in order to ensure survival (Home, Bauer, & Hunziker, 2010; Taylor et al., 1987). The Kaplans' theory suggests that landscape perceptions are an expression of humans' goals of making sense of and remaining visually involved in an environment (Taylor et al., 1987). As such, humans are

likely to prefer environments that afford coherence, legibility, complexity, and mystery. Like the Kaplans', Appleton developed the *prospect-refuge theory* in which he theorized that humans experience and assess landscapes in ways that hearken back to human evolutionary heritage (Luckmann et al., 2013; Taylor et al., 1987). As such, humans will prefer environments that are more likely to ensure survival by providing prospect and panoramic views in order to help identify potential threats, and provide refuge where one can hide and be protected from danger (Appleton, 1975; Home et al., 2010; Luckmann et al., 2013). Essentially, humans prefer landscapes where there are places "to see without being seen" (Appleton, 1975).

The experiential paradigm, unlike the psychophysical and cognitive approaches, focuses on the interactions between humans and the landscape (Taylor et al., 1987). Humans actively participate in landscapes and evaluate them through individual filters including their personal intentions, needs, knowledge, abilities, and culture (Taylor et al., 1987). This suggests that groups and individuals from diverse backgrounds are likely to have very different environmental perceptions and preferences. Additionally, humans are said to ascribe meaning to landscapes based on the contexts and situations in which landscapes are experienced (Taylor et al., 1987). For example, a child could perceive a forest negatively if while they were hiking on the trails, the child fell, broke his/her ankle and had to be taken to the hospital. However, this same child could perceive the forest positively if while hiking on the trails, the child encountered a beautiful vista and participated in a picnic. As such, landscapes are perceived not solely in terms of their affordances or aesthetic value, but for a myriad of reasons including their setting, habitat,

system, richness, history, or place (Taylor et al., 1987). Researchers who utilize the experiential approach apply phenomenological techniques such as eliciting participant's descriptions of personal experiences in landscapes in order to understand the human-landscape interaction (Taylor et al., 1987). The landscape experience is considered a subjective process, which necessitates that the participants and their landscape interactions speak for themselves, so the researcher must take care not to project their own perceptions and preferences onto respondents' comments (Taylor et al., 1987).

Environmental Perceptions and Preferences

Despite a lack of agreement on the best methodological approach to utilize when conducting landscape assessments to assess environmental perceptions and preferences, researchers generally agree that there are consistent cross-cultural landscape preferences amongst adults (Hartig & Staats, 2005; Home et al., 2010; James Hutton Institute, 2011a; Kaplan & Talbot, 1988) that include:

- a preference for "natural" landscapes in which human manipulation is less obvious (although management of the environment is not excluded) (Balling & Falk, 1982; Hartig & Staats, 2005; Home et al., 2010; Luckmann et al., 2013)
- a preference for landscapes featuring water (Aaron & Witt, 2011; Balling & Falk, 1982; Luckmann et al., 2013)
- a preference for soft landscape features such as water or vegetation over hard landscape features such as stones or rocks (Aaron & Witt, 2011; Luckmann et al., 2013)

- a preference for environments with visual openness and depth (savanna-type settings) (Aaron & Witt, 2011; Balling & Falk, 1982)
- a preference for environments that provide hiding spaces and vantage points (Aaron & Witt, 2011; Appleton, 1975; Balling & Falk, 1982; Luckmann et al., 2013).

Additionally, cross-cultural studies have shown that adults, youth, and children prefer park-like settings with short grass, no tangled underbrush, and clusters of scattered mature trees, preferences that are believed to be related to humans' evolutionary history on the savanna (Balling & Falk, 1982; Home et al, 2010; Hartig & Staats, 2005; Kaplan & Talbot, 1988; Kaplan & Kaplan, 1989). Ulrich's five variables that affect the informational properties of environments and that influence preferences appear to hold true in that people generally prefer natural landscapes with a good degree of complexity, a clear focal point, even ground textures, good depth, and a sense of mystery that promises further information if explored (Balling & Falk, 1982). Limited studies with children have shown that they are less likely to spend time in unmanicured or weedy environments because they perceive them to be messy, abandoned, or unsafe (Home et al., 2010; Luckmann et al., 2013). Both adults and children appear to prefer environments with which they are familiar, supporting the *familiarity hypothesis* first proposed by Hammit in 1979, who found high correlations between people's preferences and familiar settings (Balling & Falk, 1982; Herzog, Herbert, Kaplan, & Crooks, 2000).

Of the few landscape studies conducted with heterogeneous populations of children or youth, researchers report different patterns in landscape perception and

preference (Aaron & Witt, 2011; Luckmann et al., 2013). According to Luckmann et al. (2013), teens exhibit an appreciation for some urban infrastructure, adolescents who live near or in rural or natural areas have a greater interest in natural environments, and children and youth have a preference for developed urban parks, and will choose engineered gardens over so-called "wild" gardens. Additionally, cross-cultural studies have shown that children's developmental stages influence their environmental perceptions and preferences depending on their psychosocial or personal needs (Kellert, 2005; Luckmann et al., 2013). Young children rely on the natural world as a source of materials for play with which they can develop their motor and cognitive skills (Kellert, 2005). As such, nature provides a source of reliable information and a host of inspirational experiences that challenge children to learn, grow, and develop personal and social skills (Kellert, 2005; Pyle, 2002). Adolescents, on the other hand, are more likely to go into nature to reflect in solitude, or to engage and socialize with their peers (Luckmann et al., 2013). As such, they tend to prefer natural environments with affordances that include built elements where they can congregate (Luckmann, et al., 2013). This suggests that environmental perceptions and preferences shift over time as humans develop, mature, and accumulate new environmental experiences (Kellert, 2005; Luckmann et al., 2013).

Several socio-demographic factors can influence individuals' and group's landscape and environmental perceptions and preferences, including previous experience of landscapes, a person's gender, and ethnicity (James Hutton Institute, 2011b). Generally, socialization, socio-cultural background, immigrant status, and family

influence are factors that impact environmental perceptions and preferences (Alerby, 2000; James Hutton Institute, 2011b; Spencer & Woolley, 2000). For example, Ribeiro de Souza Silva and Biondi (2013), conducted a study to determine the landscape preferences of tourists visiting the botanical gardens of the city of Curitiba, Parana State, Brazil and found that women prefer postcards featuring landscapes with many shades of green and blue, and that men prefer landscapes featuring darker colors, including reds and oranges. This suggests gender-based differences in landscape preferences that could be present and detected in childhood; however, the origins of gender differences in landscape preferences requires further investigation in order to determine why preferences vary. Kaplan and Talbot (1988), in their study of Black and White Americans' preferences for natural areas in urban surroundings found consistent and "substantial ethnic preference differences". Their study demonstrates that that Blacks prefer outdoor settings that include built components and provide a sense of openness and visibility; whereas they do not prefer densely vegetated or enclosed environments (Kaplan & Talbot, 1988). Additionally, they found that Blacks consider neatness and order important factors in preferred environments (Kaplan & Talbot, 1988). By contrast, White Americans were more likely to prefer environments featuring dense vegetation containing unmanicured weedy areas that provided a sense of enclosure (Kaplan & Talbot, 1988). This suggests ethnicity-based differences in landscape preferences that requires further investigation.

With greater numbers of children growing up indoors and in urban environments, their experiences are likely to impact their environmental perceptions and preferences

(Luckmann et. al., 2013). As such, studies that assess urban children's environmental perceptions and preferences can provide insight into urban children's baseline environmental perceptions and preferences, and how they compare to those of rural and suburban children, or those who have greater access to natural environments. Additionally, it will be possible to track the effects of environmental interventions on preference and perceptual changes that can help to determine if targeted exposure to nature through environmental education programs can effectively change pre-existing environmental perceptions and preferences. This information could inform and impact the way environmental education programs are structured and delivered to urban children and to students of diverse genders and ethnic backgrounds.

Photo-elicitation

Photo-elicitation techniques have been used in anthropology and the social sciences in response to post-modern and culturalist shifts in the research that call for the use of techniques that can more effectively explore emotions and social values (Bignante, 2010; Harper, 2002; Le Dantec & Shehan Poole, 2008). The technique was first used by photographer and researcher, John Collier in 1957 in order to improve understanding of mental health in changing Canadian communities (Harper, 2002; Hatten, Forin, & Adams, 2013). Photo-elicitation techniques typically include the use of images in interviews, so that informants can comment on the images before them (Bignante, 2010; Tinkler, 2014) that provide researchers with greater insight into participants' perceptions and preferences. Images can be selected either by researchers or the informants themselves (Bignante, 2010; Harper 2002). Photo-elicitation has increased in use and

popularity because it improves the quality of interviews, helps overcome fatigue and repetition associated with conventional or textual interviews, and triggers latent memories that both stimulate and release comments about informants' lives, values, and perceptions (Bignante, 2010; Harper, 2002; Tinkler, 2014). Additionally, the technique is fueled by the idea that two people can view the same images, yet see completely different things, yielding insight into social and personal meanings and values (Bignante, 2010; Harper, 2002; Hatten et al., 2013; Tinkler, 2014). Furthermore, informants tend to prefer viewing images to conventional interviews, which can improve involvement, participation, and enjoyableness (Bignante, 2010). Not surprisingly, photo-elicitation techniques have been used successfully to elicit responses from children (Le Dantec & Shehan Poole, 2008). From the researcher's perspective, photo-elicitation is somewhat collaborative in that both the researcher and the informant participate in discussing or interpreting the different meanings of given images, which can improve general excitement for the research at hand (Bignante, 2010; Harper, 2002).

Rationale

The rationale for this study is that although several studies have utilized questionnaires and images to assess populations' environmental perceptions and preferences, few studies utilize photo-elicitation techniques to assess urban children's environmental perceptions before and after attending an EE program (Rickinson, 2001). Photo-elicitation techniques, despite their rich history, are underutilized in EE research and could prove to be a more effective and enjoyable means with which to engage research participants, particularly children. Incorporating children's voices in the research

by utilizing diverse research approaches can broaden understanding of children's environmental perceptions and preferences, while providing useful information about EE research approaches and the efficacy of EE interventions to create more environmentally-concerned and literate urban populations. Furthermore, exploring urban children's environmental perceptions and preferences creates a more inclusive EE research literature, because despite the growth in numbers of children being raised in urban environments, their voices remain relatively absent in the literature. Creating diversity in EE research is relevant now more than ever, as environmental education has gained international recognition due to global environmental and social crises, as rifts between children and nature continue to grow, and as there is a pressing need to create the conditions to ensure an environmentally-aware populace that will advocate for the environment in the future (Athman & Monroe, 2001; Rickinson, 2001).

Typically, schools in urban areas utilize informal EE programs that consist of immersive outdoor education field trips in which children go into nature to gain first-hand experience of the natural world under novel circumstances that challenge them personally, socially, and academically (Orion & Hofstein, 1994; Taproot, 2015). As such, outdoor immersions permit children from urban areas to spend time in natural environments they would otherwise be unlikely to encounter in their day-to-day lives. Furthermore, outdoor EE programs are valued by educators, parents, and those interested in environmental protection and childhood development, because they allow children in the early and middle years to meaningfully engage with nature (Chawla, 1998). Providing access to nature is crucial, as studies have shown that direct interaction with "nature" in

the early and middle years can foster life-long relationships with nature, and encourage environmental attitudes and values that stay with individuals well into adulthood (Arnold, Cohen, & Warner, 2009; Chawla, 1998, 1999, 2006; Kellert & Derr, 1998; Kellert, 2005; Simmons, 1994; Strife & Downey, 2011). For example, longitudinal studies with environmentalists have borne out that similar outdoor experiences were pivotal in driving their environmental activism and advocacy (Kellert & Derr, 1998; Chawla 1998, 1999, 2006). Despite the importance of childhood experiences in nature, there is a dearth of research demonstrating the effects of EE programs on urban children's environmental perceptions and preferences. As such, this study will contribute to the EE research by bridging this research gap and giving voice to urban children who, heretofore, remain silent.

Research Objectives and Goals

The research objectives of this study are to use photo-elicitation techniques to: (1) determine the baseline environmental perceptions and preferences of a diverse group of urban children from northern New Jersey, (2) determine if gender or ethnicity are factors in urban children's environmental perceptions and preferences, and (3) determine the effects of an immersive outdoor EE program on urban children's environmental perceptions and preferences. The overall research goal is to provide insight into the environmental perceptions and preferences of a group of urban children before and after they attend an environmental field program, and to determine the impact of environmental education on urban children's environmental perceptions and preferences. Additionally, another research goal is to contribute to the diversity of EE research by

utilizing alternative assessment techniques such as photo-elicitation that is inclusive of underrepresented populations such as children, urbanites, and low-income and minority populations.

Materials and Methods

Study Participants

This study was conducted during the 2012-2013 academic year. Participants consisted of 105 5-7th grade students from seven schools within a large urban school district in New Jersey who attended the New Jersey School of Conservation. A slight majority of the participants were female (56%). The children were predominantly Hispanic (42%) and African American (38%), with a smaller percentage of Asians (16%), and Whites (4%). Participating children attended schools in which the majority of pupils are eligible for free or reduced school lunches. Students participating in the environmental education program were part of a greater Board of Education initiative created to foster improved cultural relationships and environmental awareness among urban children through shared field-trip experiences.

Due to the nature of the environmental education program, it was not possible to randomly select students, so intact school groups scheduled to participate in the 3-day 2-night residential program were included in this study. This school district was selected because it is one of the few urban districts that regularly attend the NJSOC.

Procedure

Photo-elicitation was used to assess urban children's environmental perceptions and preferences before and after they attended an outdoor environmental education

program. The internet was used to search for *natural* and *urban* images that represented environments that the children were likely to have encountered in their daily lives, and that they were likely to experience while attending the outdoor education program. *Natural* and *urban* images were selected and juxtaposed to determine the children's baseline environmental perceptions and preferences and to compare them to post-program perceptions and preferences in order to identify changes that could be associated with the outdoor environmental education program. The lead researcher and dissertation advisor selected the images in order to present the children with contrasting, yet diverse scenes that typified so-called *natural* vs. *urban* or *domesticated* environments. The scenes include a natural stream juxtaposed to an urban waterfront, a house in the woods juxtaposed to urban houses, and wild animals juxtaposed to domesticated animals.

Pre-tests were administered during program orientation and posttests during program summation. A Power Point presentation of the landscapes was created and projected using a projector and white screen. Each landscape appeared individually and then side-by-side for comparison. For example, the natural stream appeared on the white screen for a minute, followed by the urban waterfront which also appeared on the screen for a minute. The next slide consisted of a side-by-side comparison of the images. The children were asked to rank each individual image as *good* or *bad*, *pleasant* or *unpleasant*, and *safe* or *unsafe*. This approach was drawn from the semantic differential technique which measures people's affective reactions to a stimulus in terms of bipolar rating scales using contrasting adjectives (Heise, 1970), and is considered a simple way to obtain data on emotional responses to different situations and in different cultural

contexts (Dalton, Maute, Oshida, Hikichi, & Izumi, 2008). The adjectives chosen in this study were selected for their evaluative perspective, which is one of the measures used in semantic differential scales that typically account for evaluation, potency, and action (EPA) (Heise, 1970). Adjectives were selected that were evaluative, because of an interest in determining how the children evaluated the scenes they were viewing. The approach of using one dimension of the EPA is common in research using the semantic differential technique (Dalton et al., 2008). Next, the children were asked: "What other words would you use to describe the scenes?" Finally, the children were prompted to circle the image they preferred. This process was repeated for all 3 image pairs. The children were given approximately 2 minutes to rate each image and image pair, to describe the images in their own words, and to make their preference selections.

This methodological approach was chosen due to time constraints. Providing the children with closed-ended options streamlined the process, standardized selections, and improved the chances of producing valid and reliable data that could be objectively compared and analyzed. By using the closed-ended adjectives of *good* or *bad*, *pleasant* or *unpleasant*, and *safe* or *unsafe* it was possible to tap into the children's perceptions regarding the environments' quality, enjoyableness or aesthetics, and safety. Asking the children to describe the images in their own words gave insight into their perceptions and preferences in lieu of conducting formal interviews. Directly asking the children to circle their preferred environment made it possible to determine if there were any changes to their environmental preferences in posttests or within and across the groups of interest.

Images

Natural stream

Urban waterfront

House in the Woods

Urban Houses

Wild Animals

Domesticated Animals

Data Analyses

Wilcoxon signed-rank tests, a non-parametric equivalent to matched pairs t-tests, were used to test for differences between the children's pre- and posttest environmental perceptions and preferences, and for differences across and within gender and ethnic groups. Due to low response rates, qualitative data generated by the written response portion of this study was assessed for the entire group as a whole and did not account for gender or ethnicity. A content analysis was conducted in which the children's responses were read and re-read, and themes were allowed to emerge from the data. After repeated analysis, four over-arching themes arose. The children described the images based on aesthetics, affective reactions, image descriptions, and environmental or ecological relationships.

Results

Quantitative Analysis: Pre- and Post-Program Environmental Perceptions

Natural Stream. The majority of respondents perceived the natural stream as good, pleasant, and unsafe both in pre- and posttests as depicted in Figure 1. Wilcoxon signed-rank tests show that there was no statistically significant difference in the respondents' pre- and posttest perceptions of this environment's goodness or pleasantness (Z- and p-values can be found in Appendix C). However, there was a statistically significant difference in the respondents' pre- and posttest perceptions of this environment's safety ($Z = 49.5$, $p = .01$), with significantly fewer respondents perceiving this environment as unsafe after completing the environmental education program.

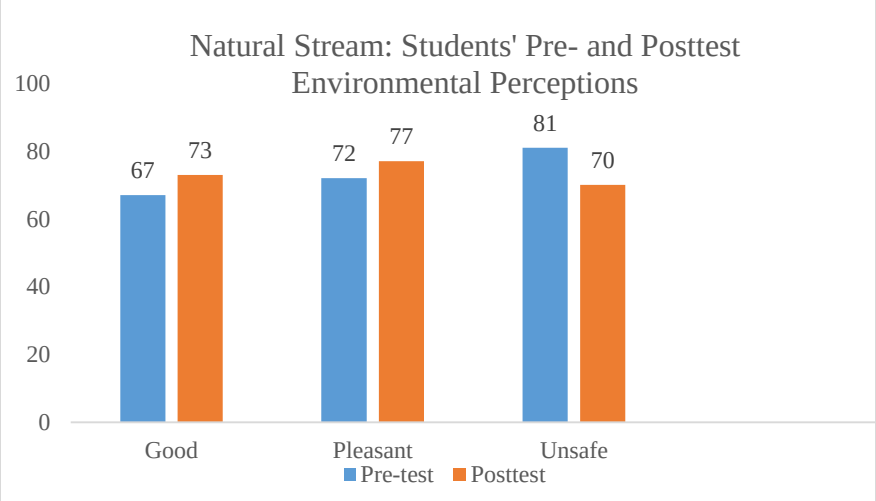


Figure 1: Pre- and posttest perceptions of the Natural Stream. Results are in %.

Urban Waterfront. The majority of respondents perceived the urban waterfront as good, pleasant, and safe both in pre- and posttests as depicted in Figure 2. Wilcoxon

signed-rank tests show no statistically significant difference in the respondents' pre- and posttest environmental perceptions.

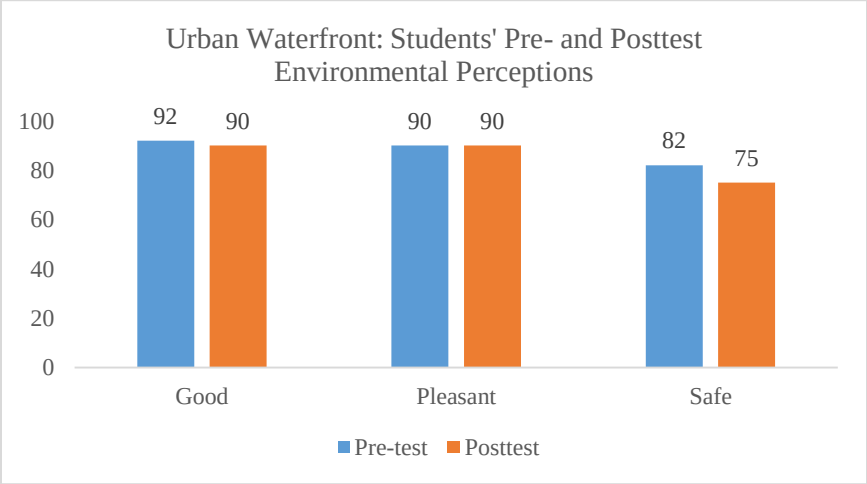


Figure 2: Pre- and posttest comparisons of the Urban Waterfront. Results are in %.

House in the Woods. The majority of respondents perceived the house in the woods as good, pleasant, and safe both in pre- and posttests as depicted in Figure 3. Wilcoxon signed-rank tests show no statistically significant differences in the respondents' pre- and posttest perceptions of this environment's goodness or pleasantness. However, there was a statistically significant difference in the respondents' pre- and posttest perceptions of this environment's safety (Z = - 71.5, p = .02), with significantly fewer respondents perceiving this environment as safe in posttests.

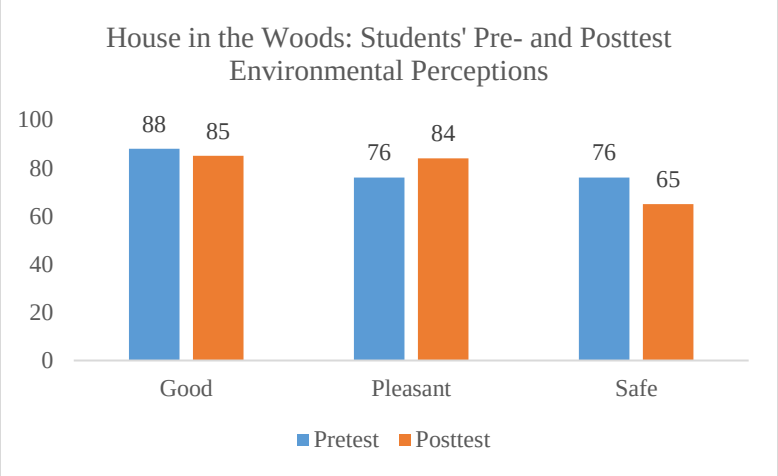


Figure 3: Pre- and posttest comparisons of the House in the Woods. Results are in %.

Urban Houses. The majority of respondents perceived the urban waterfront as bad, unpleasant, and unsafe both in pre- and posttests as depicted in Figure 4. Wilcoxon signed-rank tests show no statistically significant difference in the respondents' pre- and posttest environmental perceptions.

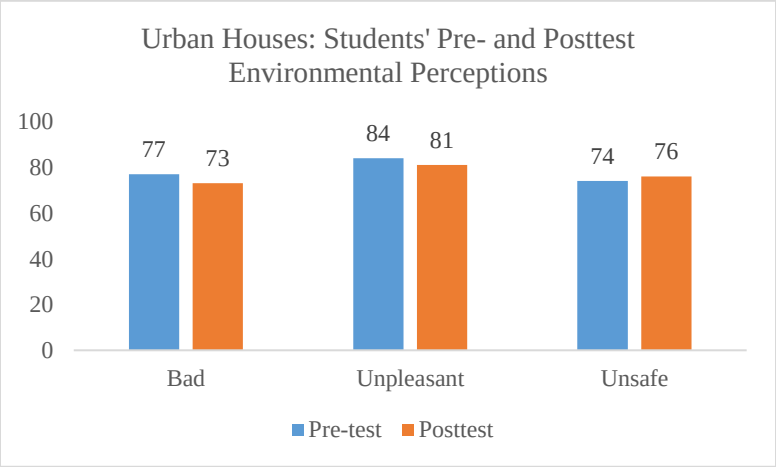


Figure 4: Pre- and posttest comparisons of Urban Houses. Results are in %.

Wild Animals. The majority of respondents perceived the wild animals as good, pleasant, and unsafe both in pre- and posttests as depicted in Figure 5. Wilcoxon signed-rank tests show statistically significant differences in the respondents' pre- and posttest

perceptions of this environment's goodness (Z = 152.0, p = .0002); and pleasantness (Z = 99.0, p = .03), with significantly more respondents perceiving this environment as good and pleasant in posttests. There was no statistically significant difference in the respondents' pre- and posttest perceptions of this environment's safety.

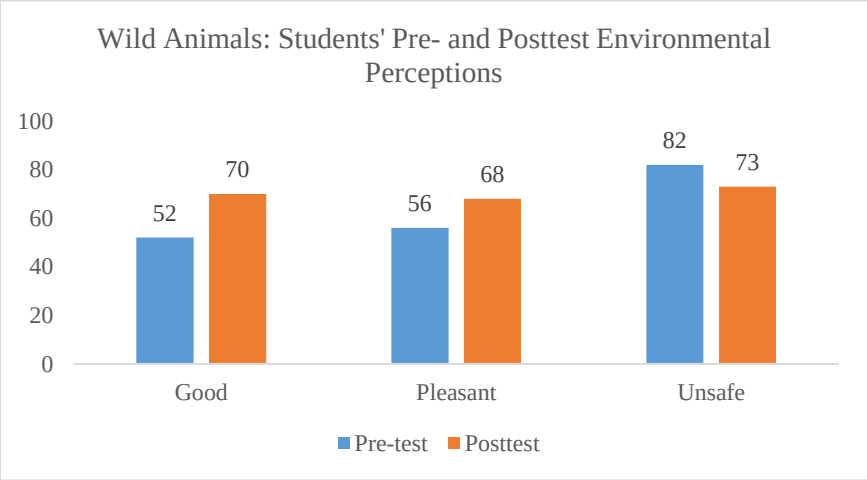


Figure 5: Pre- and posttest comparisons of Wild Animals. Results are in %.

Domesticated Animals. The majority of respondents perceived the domesticated animals as good, pleasant, and unsafe both in pre- and posttests as depicted in Figure 6. Wilcoxon signed-rank tests show no statistically significant differences in the respondents' pre- and posttest perceptions of this environment's goodness or pleasantness. However, there was a statistically significant difference in the respondents' pre- and posttest perceptions of this environment's safety (Z = 101.5, p = .006), with significantly fewer respondents perceiving this environment as unsafe in posttests.

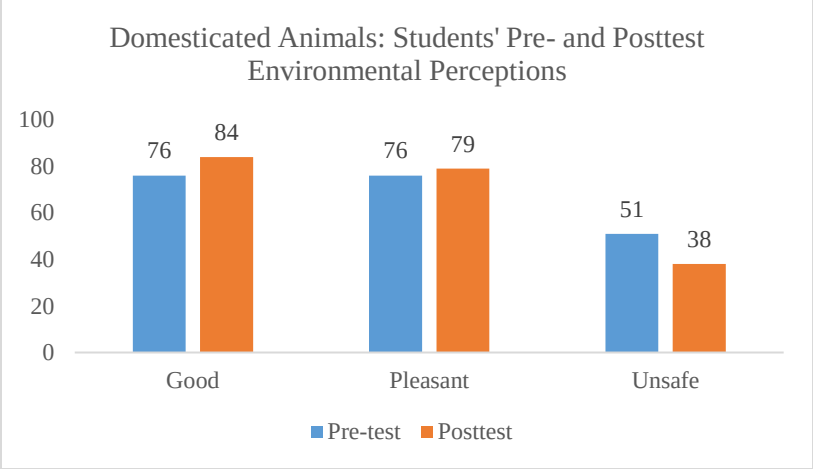
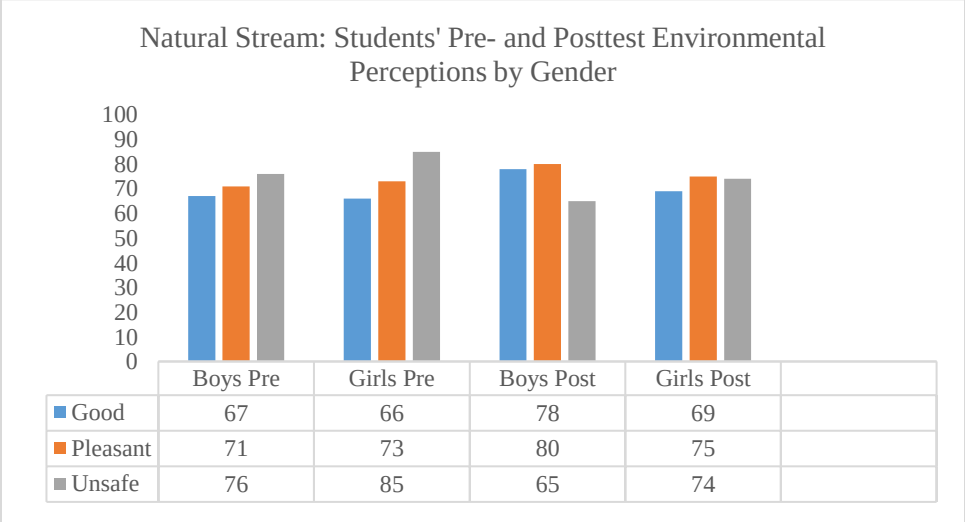


Figure 6: Pre- and posttest comparisons of Domesticated Animals. Results are in %.

Comparisons by Gender

Natural Stream. The majority of male and female respondents perceived the natural stream as good, pleasant, and unsafe both in pre- and posttests as depicted in Figure 7. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental perceptions (Z- and p-values can be found in Appendix C).



	Boys Pre	Girls Pre	Boys Post	Girls Post	
Good	67	66	78	69	
Pleasant	71	73	80	75	
Unsafe	76	85	65	74	

Figure 7: Pre- and posttest comparisons of the Natural Stream by gender. Results are in %.

Urban Waterfront. The majority of male and female respondents perceived the urban waterfront as good, pleasant, and safe both in pre- and posttests as depicted in Figure 8. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental perceptions.

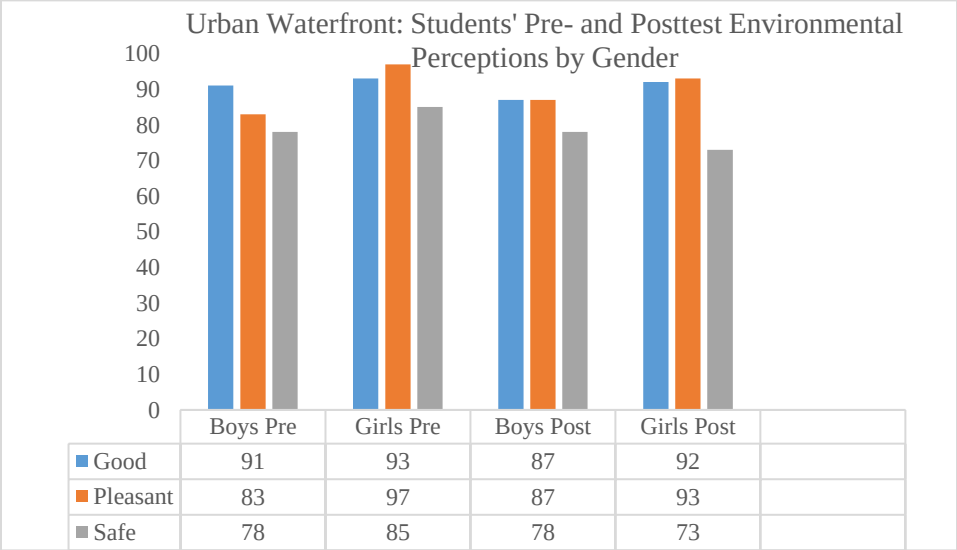


Figure 8: Pre- and posttest comparisons of the Urban Waterfront by gender. Results are in %.

House in the Woods. The majority of male and female respondents perceived the house in the woods as good, pleasant, and safe both in pre- and posttests as depicted in Figure 9. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental perceptions.

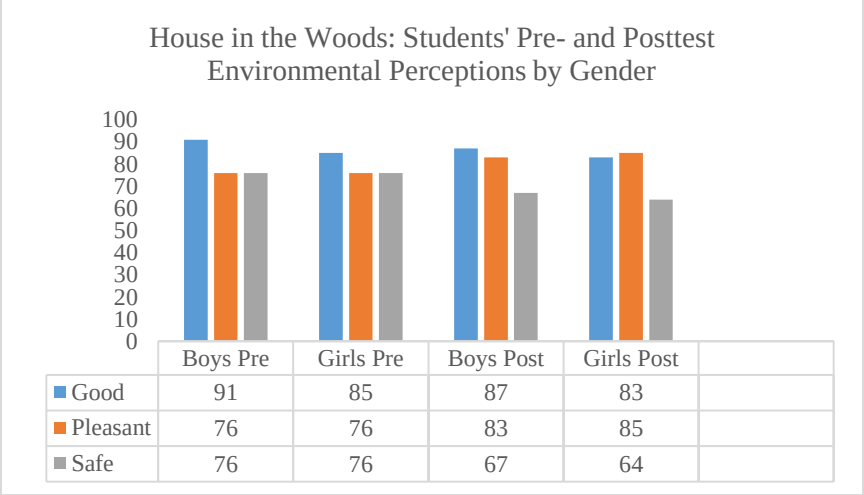


Figure 9: Pre- and posttest comparisons of the House in the Woods by gender. Results are in %.

Urban Houses. The majority of respondents across gender perceived the urban houses as bad, unpleasant, and unsafe both in pre- and posttests as depicted in Figure 10. Wilcoxon signed-rank tests show no statistically significant within group pre- or posttest differences or across group pre-test differences in environmental perceptions. However, there were significant across group posttest differences, with significantly more female than male respondents perceiving this environment as unpleasant in posttests ($Z = 51.0$, $p = .004$).

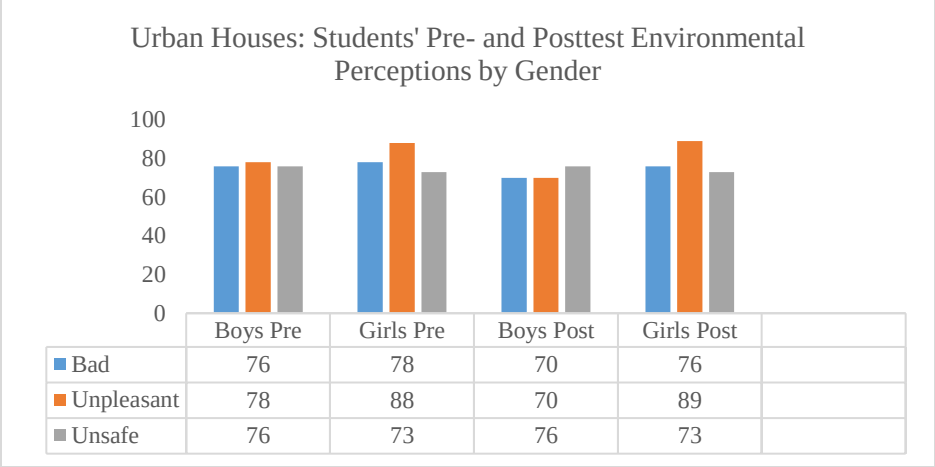


Figure 10: Pre- and posttest comparisons of Urban Houses by gender. Results are in %.

Wild Animals. The majority of male and female respondents perceived the wild animals as good, pleasant, and unsafe both in pre- and posttests as depicted in Figure 11. Wilcoxon signed-rank tests show a statistically significant within group posttest difference, with significantly more female respondents perceiving this environment as good (Z = 36.0, p = .03) and safe (Z = 10.5, p = .03) in posttests. However, there was no significant within group difference in female respondents' pre- and posttest perceptions of this environment's pleasantness. There were no within group differences between male respondents' pre- and posttest perceptions. Additionally, there were no statistically significant across group pre- or posttest differences in environmental perceptions.

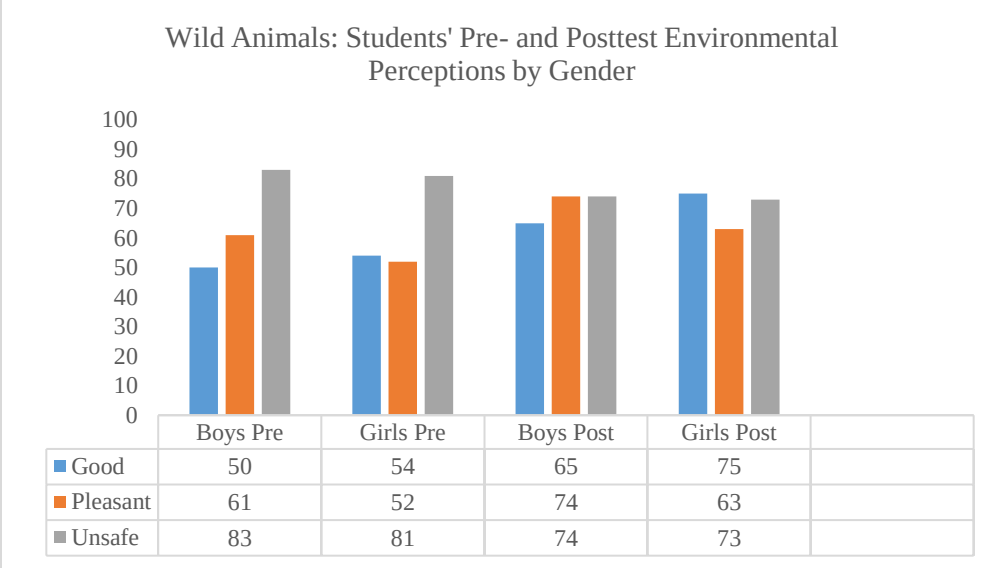
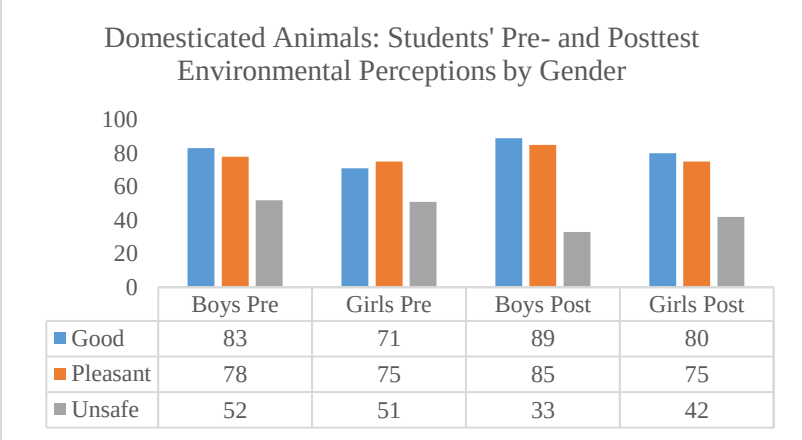


Figure 11: Pre- and posttest comparisons of the Wild Animals by gender. Results are in %.

Domesticated Animals. The majority of male and female respondents perceived the domesticated animals as good, pleasant, and unsafe in pre-tests, but perceived this environment as safe in posttests as depicted in Figure 12. Wilcoxon signed-rank tests show no statistically significant within group pre- or posttest differences in the respondents' perceptions of this environment as good and pleasant. However, there was a statistically significant within group difference, with significantly more males perceiving this environment as safe after attending the environmental education program ($Z = 36.0$, $p = .04$). There were no statistically significant across group pre- or posttest differences in environmental perceptions.

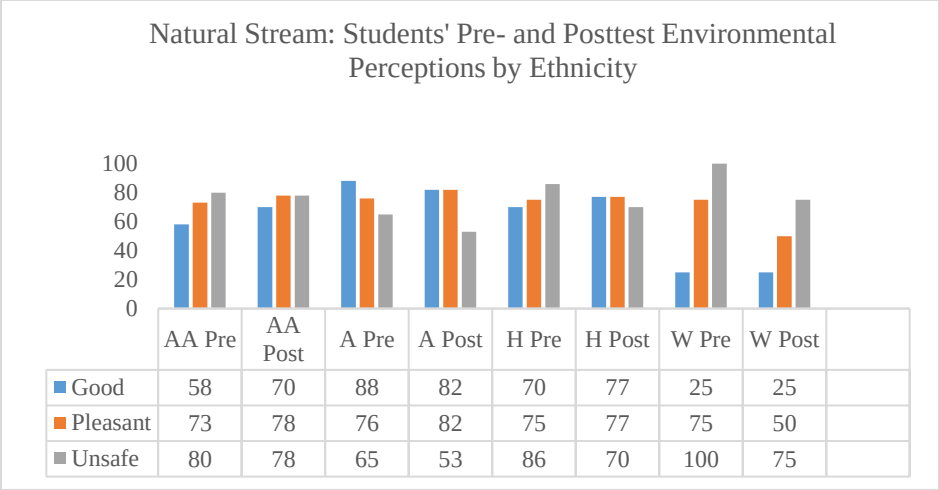


	Boys Pre	Girls Pre	Boys Post	Girls Post
Good	83	71	89	80
Pleasant	78	75	85	75
Unsafe	52	51	33	42

Figure 12: Pre- and posttest comparisons of the Domesticated Animals by gender. Results are in %.

Comparisons by Ethnicity

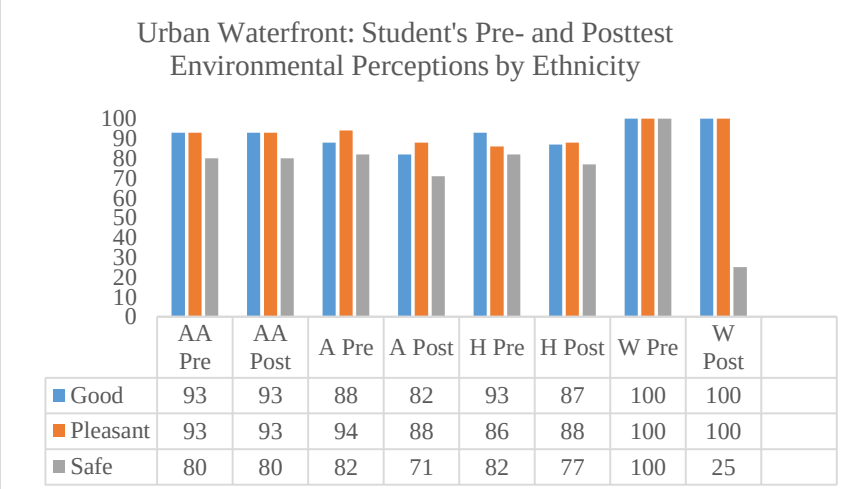
Natural Stream. The majority of respondents across ethnicity perceived the natural stream as good, pleasant, and unsafe, except for Whites, who perceived this environment as bad, as depicted in Figure 13. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental perceptions (Z- and p-values can be found in Appendix C).



	AA Pre	AA Post	A Pre	A Post	H Pre	H Post	W Pre	W Post
Good	58	70	88	82	70	77	25	25
Pleasant	73	78	76	82	75	77	75	50
Unsafe	80	78	65	53	86	70	100	75

Figure 13: Pre- and posttest comparisons of the Natural Stream by ethnicity. Results are in %. Abbreviations: AA = African American, A = Asian, H = Hispanic, and W = White.

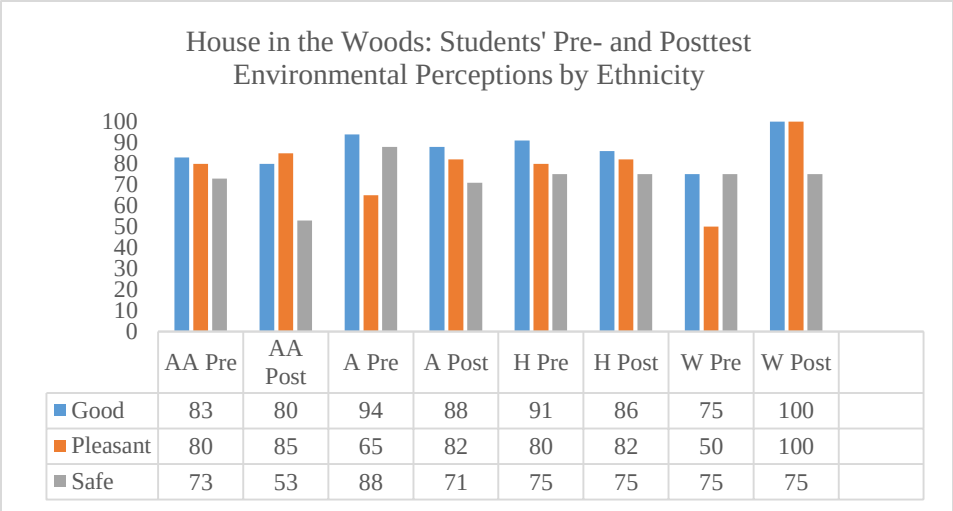
Urban Waterfront. The majority of respondents across ethnicity perceived the urban waterfront as good, pleasant, and safe in pre-tests, but the majority of Whites perceived this environment as unsafe in posttests, as depicted in Figure 14. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental perceptions.



	AA Pre	AA Post	A Pre	A Post	H Pre	H Post	W Pre	W Post
Good	93	93	88	82	93	87	100	100
Pleasant	93	93	94	88	86	88	100	100
Safe	80	80	82	71	82	77	100	25

Figure 14: Pre- and posttest comparisons of the Urban Waterfront by ethnicity. Results are in %. Abbreviations: AA = African American, A = Asian, H = Hispanic, and W = White.

House in the Woods. The majority of respondents across ethnicity perceived the house in the woods as good, pleasant, and safe in pre- and posttests as depicted in Figure 15. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental perceptions.



	AA Pre	AA Post	A Pre	A Post	H Pre	H Post	W Pre	W Post
Good	83	80	94	88	91	86	75	100
Pleasant	80	85	65	82	80	82	50	100
Safe	73	53	88	71	75	75	75	75

Figure 15: Pre- and posttest comparisons of the House in the Woods by ethnicity. Results are in %. Abbreviations: AA = African American, A = Asian, H = Hispanic, and W = White.

Urban Houses. The majority of respondents across ethnicity perceived the urban houses as bad, unpleasant, and unsafe, except for Whites who were evenly divided between safe and unsafe, as depicted in Figure 16. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental perceptions.

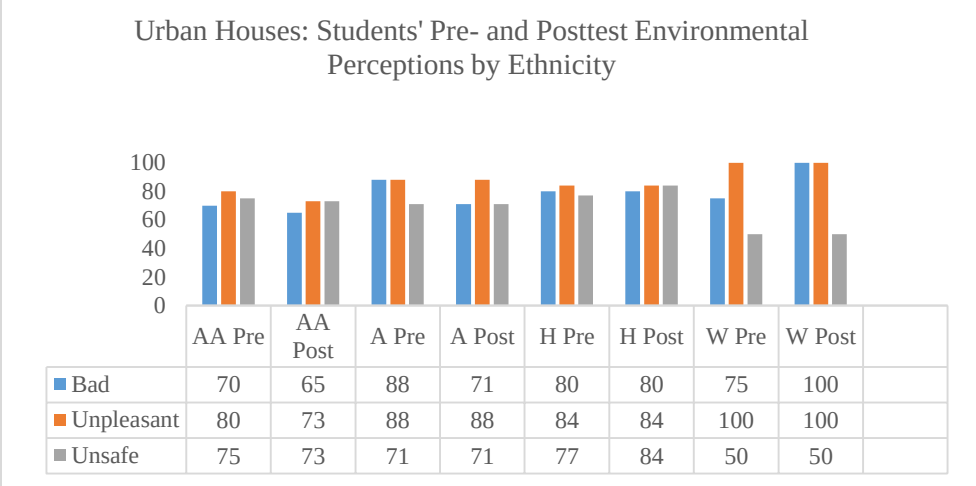
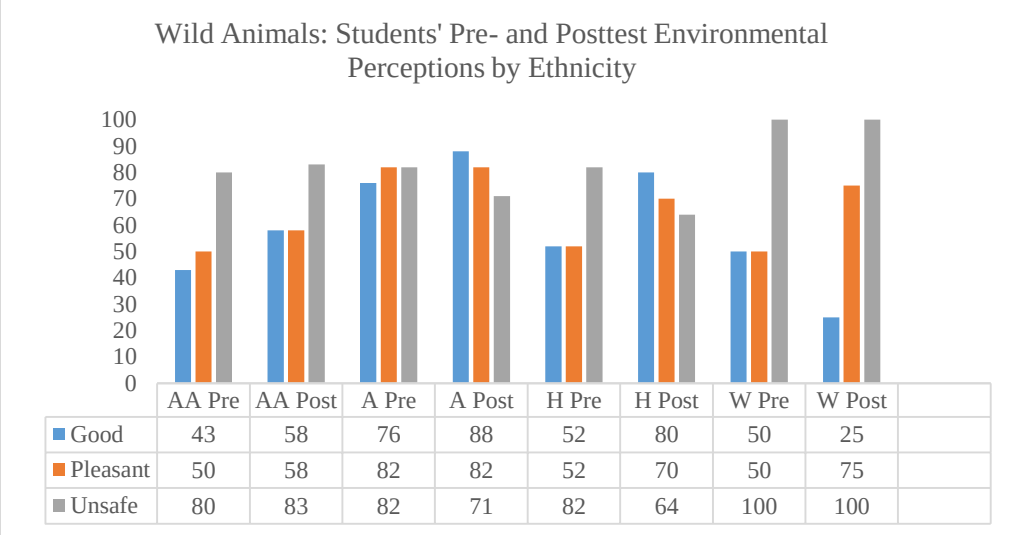


Figure 16: Pre- and posttest comparisons of Image Urban Houses by ethnicity. Results are in %. Abbreviations: AA = African American, A = Asian, H = Hispanic, and W = White.

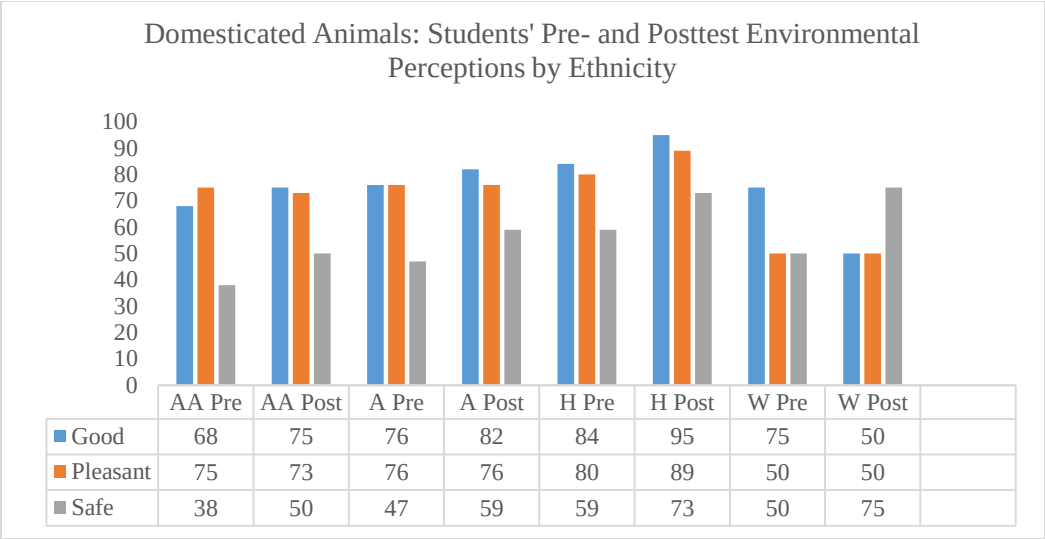
Wild Animals. The majority of respondents across ethnicity perceived the wild animals as good, pleasant, and unsafe, except for Whites who were evenly split between good and bad and pleasant and unpleasant in pre-tests, and African Americans who were evenly split between pleasant and unpleasant in pre-tests, as depicted in Figure 17. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental perceptions.



	AA Pre	AA Post	A Pre	A Post	H Pre	H Post	W Pre	W Post
Good	43	58	76	88	52	80	50	25
Pleasant	50	58	82	82	52	70	50	75
Unsafe	80	83	82	71	82	64	100	100

Figure 17: Pre- and posttest comparisons of Image Wild Animals by ethnicity. Results are in %. Abbreviations: AA = African American, A = Asian, H = Hispanic, and W = White.

Domesticated Animals. Respondents were ambivalent about the domesticated animals, as depicted in Figure 17. Pre-tests show that the majority of respondents thought this environment was good and pleasant, except for Whites who were evenly split between good and bad, and pleasant and unpleasant. The majority of African Americans and Asians thought that this environment was unsafe, a slight majority of Hispanics thought it was safe, and Whites were evenly split between safe and unsafe. Posttests show that the majority of respondents perceived this environment as good and pleasant, except for Whites who remained evenly split between good and bad, and pleasant and unpleasant. The majority of respondents thought that this environment was safe, except for African Americans who were evenly split between safe and unsafe. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental perceptions.



	AA Pre	AA Post	A Pre	A Post	H Pre	H Post	W Pre	W Post
Good	68	75	76	82	84	95	75	50
Pleasant	75	73	76	76	80	89	50	50
Safe	38	50	47	59	59	73	50	75

Figure 18: Pre- and posttest comparisons of Image Domesticated Animals by ethnicity. Results are in %. Abbreviations: AA = African American, A = Asian, H = Hispanic, and W = White.

Environmental Preferences

Natural Stream or Urban Waterfront. The majority of respondents preferred the urban waterfront in both pre- (56%) and posttests (52%). Wilcoxon signed-rank tests show no statistically significant differences between pre- and posttest environmental preferences (Z – and p-values can be found in Appendix C).

The majority of male and female respondents preferred the urban waterfront in pre- and posttests as depicted in Table 1. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental preferences.

Gender	Pre-test % of Respondents	Posttest % of Respondents
Male	55	52
Female	58	53

Table 1: Percent of respondents by gender who preferred the Urban Waterfront in pre- and posttests.

Environmental preferences differed across ethnicity. The majority of African Americans preferred the urban waterfront in both pre- and posttests. The majority of Hispanic and White respondents preferred the natural stream in pre-tests and the urban waterfront in posttests. The majority of Asian respondents preferred the natural stream in both pre- and posttests as depicted in Table 2. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental preferences.

Ethnicity	Pre-test % of Respondents	Posttest % of Respondents
African American	57	55
Asian	43	29
Hispanic	42	56
White	25	75

Table 2: Percent of respondents by ethnicity who preferred the Urban Waterfront in pre- and posttests.

House in the Woods or Urban Houses. The majority of respondents preferred the house in the woods in both pre- (88%) and posttests (84%). Wilcoxon signed-rank tests show no statistically significant differences between pre- and posttest environmental preferences.

Both male and female respondents preferred the house in the woods in pre- and posttests as depicted in Table 3. Wilcoxon signed-rank tests show no statistically

significant within group pre- or posttest differences. Furthermore, Wilcoxon signed-rank tests show that there were no across group pre-test differences in environmental preferences. However, there was a statistically significant across group posttest difference, with a significantly greater majority of females preferring this environment ($Z = 27.5$, $p = .002$).

Gender	Pre-test % of Respondents	Posttest % of Respondents
Male	89	77
Female	88	89

Table 3: Percent of respondents by gender who preferred the Urban Waterfront in pre- and posttests.

The majority of respondents across ethnicity preferred the house in the woods in pre- and posttests as depicted in Table 4. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental perceptions.

Ethnicity	Pre-test % of Respondents	Posttest % of Respondents
African American	85	88
Asian	93	93
Hispanic	91	79
White	75	75

Table 4: Percent of respondents by ethnicity who preferred the House in the Woods in pre- and posttests.

Wild Animals or Domesticated Animals. The majority of respondents preferred the domesticated animals in both pre- (65%) and posttests (60%). Wilcoxon signed-rank tests show no statistically significant differences between pre- and posttest environmental preferences.

Female respondents preferred the domesticated animals in both pre- and posttests; however, male respondents preferred the domesticated animals in pre-tests and the wild animals in posttests as depicted in Table 5. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental preferences.

Gender	Pre-test % of Respondents	Posttest % of Respondents
Male	61	48
Female	68	63

Table 5: Percent of respondents by gender who preferred the Domesticated Animals in pre- and posttests.

Environmental preferences differed across ethnicity. The majority of African American, Hispanic, and White respondents preferred the domesticated animals in pre- and posttests; whereas, the majority of Asian respondents preferred the wild animals in pre- and posttests as depicted in Table 6. Wilcoxon signed-rank tests show no statistically significant within or across group pre- or posttest differences in environmental preferences.

Ethnicity	Pre-test % of Respondents	Posttest % of Respondents
African American	60	68
Asian	36	43
Hispanic	79	72
White	75	75

Table 6: Percent of respondents by ethnicity who preferred the Domesticated Animals in pre- and posttests.

Qualitative Analysis

Natural Stream: Pre-test			
Aesthetic	**Affective**	**Descriptive**	**Environmental/Ecological**
I like how the water is so clear (1)	good place to explore (1)	middle of the forest (1)	mean to wildlife (1)
dirty (6)	scary (1)	moss (6)	polluted (1)
unclean (1)	amazing (1)	water (1)	destroyed (1)
gross (1)	enchanted (1)	trees (1)	habitat for wildlife (1)
unpleasant (1)	peaceful (5)	colorful (1)	nature (4)
messy (2)	calming (4)	moldy (1)	
nice (2)	relaxing (1)	slimy (1)	
beautiful (6)	tranquil (2)	the trees have fallen (5)	
pretty (2)	dangerous (3)		
	unsafe (1)		
Totals: 22	**20**	**17**	**8**

Table 7: Pre-test adjectives for the Natural Stream with number of times each adjective was listed in parenthesis.

The majority of responses to the natural stream were aesthetic and evenly split between positive and negative reactions to the environment's appearance as depicted in Table 7. The children expressed concern about the environment being *unclean*, or *messy*. However, an equal number of respondents thought that the environment was *beautiful* or *pretty*. No one thought that the environment was clean, although one student commented on the clarity of the water. The children demonstrated positive affective responses to this environment. Of the 20 comments, five were negative and reflected safety concerns. Despite these concerns, the majority of the respondents believed that this environment had positive affective qualities, particularly that it was *peaceful*, *calming*, *relaxing*, and

tranquil. Many respondents described the environment and pointed out the moss and fallen trees. Four of the respondents made comments that could indicate environmental or ecological awareness. For example, one respondent perceived this environment as a *habitat for wildlife*, although another child perceived it as *mean* to wildlife.

Natural Stream: Posttest			
Aesthetic	**Affective**	**Descriptive**	**Environmental/ Ecological**
nice (1)	dangerous (7)	very green and lots of trees and bushes (1)	good for wildlife (1)
nasty (1)	peaceful (2)	too much lichen (1)	nature (1)
dirty (2)	relaxing (1)	the woods (1)	
old (1)	tranquil (1)	stick (1)	
beautiful (5)	nice place to visit or live (1)	the forest (1)	
	unsafe (2)	fallen trees (2)	
		slippery (1)	
		swampy (1)	
		clear (1)	
		tropical (1)	
Totals: 10	**14**	**9**	**2**

Table 8: Posttest adjectives for the Natural Stream with number of times each adjective was listed in parenthesis.

Fewer respondents commented on this environment during the posttest, and response rates dropped across all categories, as depicted in Table 8. The children continued to have mixed feelings about this environment's aesthetics, with responses almost evenly split between positive and negative. Comments about this environment being *dirty* or *nasty* were accompanied by comments about it being *beautiful* and *nice*. The respondents demonstrated changes in their affective responses to this environment. Of the 14 comments, more than half were negative and reflected the children's safety

concerns. Two of the respondents commented about the fallen trees, and the environment was described as *slippery*, *swampy*, and having *too much lichen* (presumably moss). One respondent commented that this environment is *good for wildlife*.

Urban Waterfront: Pre-test			
Aesthetic	**Affective**	**Descriptive**	**Environmental/ Ecological**
beautiful view of water (1)	livable place (1)	busy (2)	habitat for people (1)
beautiful (4)	I love the buildings (1)	loud (2)	
neat (1)	safe (1)	lots of buildings (2)	
clean (1)	comfortable (1)	boats (1)	
amazing sight/view (3)	peaceful (2)	Jersey City (2)	
pretty (4)	graceful (1)	where I live (1)	
nice (2)	amazing (1)	my home town (1)	
colorful (1)		buildings and signs (2)	
		city (4)	
		urban (1)	
		tall (2)	
		big/large (3)	
		a view (1)	
Totals: 17	**8**	**24**	**1**

Table 9: Pre-test adjectives for the Urban Waterfront with the number of times each adjective was listed in parenthesis.

The majority of respondents either described what they saw in the image, or placed themselves in the image in order to describe what they thought they would see or experience as residents of this city, as depicted in Table 9. Many of the children correctly identified the waterfront as belonging to the city where they resided. The children perceived this environment as *urban* and described it as a place that is *busy*, *loud*, or *large*. The respondents demonstrated strong positive reactions to this environment. They

thought that the water and the waterfront view were *beautiful*, *amazing*, or *pretty*. One respondent commented that this environment was *clean*, while another thought that it was *neat*. The children appreciated this environment and thought that it was *amazing* and did not display concerns for their safety. They perceived this environment as *peaceful*, *comfortable*, and *livable*. This environment was identified by one respondent as a *habitat for people*.

Urban Waterfront: Posttest			
Aesthetic	**Affective**	**Descriptive**	**Environmental/ Ecological**
nice view (4)	safe (1)	water (1)	destroys plant life (1)
lovely (1)	good (1)	noisy (1)	the earth is full of buildings (1)
beautiful (3)	peaceful (2)	quiet (1)	there can be floods (2)
amazing sight/view (1)	nice spot to have fun in (1)	small (1)	too many cars and factories (1)
fantastic view (2)	fantastic (1)	lots of buildings (2)	pollution (1)
pretty (2)	cool (1)	Jersey City (1)	
okay (1)	unique (1)	city (3)	
	amazing (1)	urban (1)	
	awesome (1)	home (1)	
	great (1)	big river (1)	
	magnificent (1)	gorgeous (1)	
Totals: 14	**12**	**14**	**6**

Table 10: Posttest adjectives for the Urban Waterfront with the number of times each adjective was listed in parenthesis.

Once again, many of the respondents described what they saw in the image when sharing their perceptions of this environment, as depicted in Table 10. Fewer children described this environment as a *city* or *urban* landscape than in pre-tests. Children continued to perceive this environment as aesthetically-pleasing and exhibited positive reactions. The children particularly enjoyed the view and commented on the

environment's aesthetic appeal or beauty. They continued to think that this environment was visually attractive. The respondents thought that this environment was *peaceful*, *awesome*, *magnificent*, and *great*, and was described as *safe* by one respondent. However, more respondents were critical of the environmental impacts of this environment. For example, they commented on the destruction of plant life, pollution, the excess cars and factories, the potential for flooding, and overdevelopment.

House in the Woods: Pre-test			
Aesthetic	**Affective**	**Descriptive**	**Environmental/ Ecological**
unclean (2)	good place to live (1)	trees (4)	nature (2)
dirty (1)	too much plant life (1)	bushes (1)	environmental (1)
pretty (1)	dangerous (2)	leaves (1)	
ordinary (1)	nice place to stay (1)	cabin (3)	
okay (3)	trees can fall on the house (1)	light (1)	
vivid (1)	safe (1)	house (3)	
	healthy (1)	plants (1)	
	calm (1)	moss (1)	
	restful (2)	large (1)	
	peaceful (2)	warm (1)	
	home (1)	green (1)	
	too many animals (1)	hot (1)	
	bears or animals could come (1)	quiet (2)	
		outdoors (1)	
		rural (1)	
Totals: 9	**16**	**23**	**3**

Table 11: Pre-test adjectives for the House in the Woods with the number of times each adjective was listed in parenthesis.

The majority of responses were descriptive and included adjectives such as *rural*, *outdoors*, *cabin*, and *house*, as depicted in Table 11. A couple of the children perceived this environment to as *quiet* while another thought it would be *hot*, although there was no reason given to justify this perception. Some of the children perceived this environment as a *good* and *safe*, and a few thought that it was *peaceful*, *restful*, and *healthy*. Yet, other

children thought that the environment was *dangerous* presumably because of the presence of non-human nature (*too much plant life*) and concerns about the presence of animals, bears in particular. The children were not impressed with the environment and thought it was *ordinary* or *okay*, although one child thought that it was *pretty*, and another *vivid*. However, three of the children thought that the environment was *unclean* or *dirty*.

House in the Woods: Posttest			
Aesthetic	**Affective**	**Descriptive**	**Environmental/ Ecological**
beautiful (3)	peaceful (2)	quiet (1)	may see wildlife (1)
nice (3)	joyful (1)	cabin (2)	nature (4)
not a place to live (1)	calm (1)	house (2)	
cheap looking house (2)	unsafe (2)	bushes (1)	
dingy (1)	safe (3)	trees (2)	
dirty (2)	dangerous (2)	shady (1)	
clean (1)	trees are dangerous in storm (1)	house in the forest (1)	
too grassy (1)	amazing (1)	colorful (1)	
junky (1)	happiness (1)		
pretty (1)	unsafe to wild animals (1)		
too many rocks and leaves (2)	leaves look gentle and safe (1)		
okay (2)	cozy (1)		
Totals: 19	**17**	**11**	**5**

Table 11: Posttest adjectives for the House in the Woods with the number of times each adjective was listed in parenthesis.

The majority of responses consisted of the children's affective perceptions of the environment depicted in the image, as depicted in Table 11. The children perceived this environment as *calming*, *peaceful*, and *joyful*, and one child thought that it symbolized *happiness*. However, a few of the children thought that the environment was dangerous to

both people and animals. The children remained unimpressed with the environment's aesthetics. Generally, the respondents would not like to live in this setting and pointed out that the environment was *dirty*, *junky*, that there were *too many rocks and leaves*, and that the house looked *cheap*. However, a couple of the respondents thought that the environment was *nice*, *clean*, *pretty*, or *beautiful*. The potential to run into wildlife was mentioned without positive or negative connotations.

Urban Houses: Pre-test			
Aesthetic	**Affective**	**Descriptive**	**Environmental/ Ecological**
disgusting (1)	bad environment (1)	urban (1)	buildings destroy wildlife (1)
too many bushes/trees (3)	scary (1)	city (1)	blocking plant life (1)
abandoned (2)	creepy (1)	small community building (1)	nature (1)
ugly (2)	unsafe: trees might fall (3)	old (2)	
dirty (1)	can get hurt (1)	middle of nowhere (1)	
horrible (1)	unsafe to get caught behind fence due to wildlife (1)	dark (1)	
messy (2)	not safe: someone can hide there (1)		
simple (2)	safe place (1)		
basic (1)	gloomy (1)		
	dangerous (1)		
Totals: 15	**12**	**7**	**3**

Table 12: Pre-test adjectives for the Urban Houses with the number of times each adjective was listed in parenthesis.

This environment was described as *old*, *dark*, *gloomy*, *urban*, and *in the middle of nowhere*, as depicted in Table 12. In general, the responses were negative. The children thought that this environment was *unsafe* (except for one respondent, who thought it was

safe) because of wildlife, that *trees might fall*, or that *someone can hide there*. The children perceived this environment as aesthetically unpleasant describing it as *disgusting*, *ugly*, and *horrible*. A few of the respondents thought there were *too many bushes* or *trees* in the area and that the place looked *abandoned*, *dirty*, *simple*, and *messy*. Two of the respondent's comments could be classified as environmental in that they perceived that the *buildings destroy wildlife* and that they were *blocking plant life*.

Urban Houses: Posttest			
Aesthetic	**Affective**	**Descriptive**	**Environmental/Ecological**
horrible (2)	place of joy (1)	trees surround house (1)	wood in the center could attract bugs (1)
dirty (2)	bad neighborhood (3)	bushes (1)	
ugly (4)	hood is dangerous (2)	trees (1)	
filthy (1)	someone could hide in the bushes (1)	warm (1)	
destroyed (1)	unsafe: could fall and get hurt (1)	grass (1)	
unclean (1)	danger from wildlife behind the fence (1)	wires (1)	
a non-house: don't like its looks (1)	danger (2)	houses (1)	
dull (1)	uncomfortable (1)	urban (1)	
okay (1)	unsafe (3)		
ratchet (1)	boring (1)		
Totals: 15	**16**	**8**	**1**

Table 13: Posttest adjectives for the Urban Houses with the number of times each adjective was listed in parenthesis.

This environment was described as *urban* once; however, many of the respondents commented about the trees and shrubs near the buildings, as depicted in Table 13. In general, the children responded negatively to this environment using strong words to denounce its aesthetics, including *ugly*, *horrible*, *dirty*, *filthy*, *destroyed*, and *ratchet (*presumably a misspelling of wretched). Some of the respondents thought that the

environment was *unsafe* or *dangerous* and commented that the neighborhood is *bad*, and that *someone could hide in the bushes*, someone *could fall and get hurt*, or that *wildlife could be hiding behind the fence*. Yet, one child thought that this environment was a *place of joy*. One child made a comment that could indicate environmental awareness by noting that the *wood in the center could attract bugs*.

Wild Animals: Pre-test			
Aesthetic	**Affective**	**Descriptive**	**Environmental/Ecological**
cute (14)	unsafe (2)	trees (3)	mistreated (1)
pretty (1)	terrifying (1)	bears in trees (2)	
adorable (2)	they could attack/kill you (3)	bears (2)	
nice (2)	cool (3)	animal life (1)	
beautiful (1)	funny (1)		
	scary (4)		
	harmless (1)		
	dangerous (4)		
	sweet (1)		
	cuddly (1)		
	fierce (1)		
	good for wildlife, not for me (1)		
Totals: 20	**23**	**8**	**1**

Table 14: Pre-test adjectives for the Wild Animals with the number of times each adjective was listed in parenthesis.

The children had strong reactions to the image of the bear sow and cubs. The majority the respondents thought that the bears were *scary*, *unsafe*, or *dangerous*, as depicted in Table 14. They were concerned about safety, and one child commented that this environment was *good for wildlife, not for me* and others thought that the bears could attack or kill. However, many of the respondents thought that the bears were *cute* while others thought that the bears were *sweet, cuddly,* and *harmless*. One respondent's

perception could be interpreted as environmentally-oriented in that the respondent thought that the bears were *mistreated*, the respondent did not elaborate, so it was not possible to determine exactly why the child thought this to be the case.

Wild Animals: Posttest			
Aesthetic	**Affective**	**Descriptive**	**Environmental/Ecological**
pretty (2)	rough place (1)	bears climbing up a tree (3)	they are used to the wild (1)
cute (11)	who would go there? (1)		the wild (1)
nice (2)	safe (2)		very wild animals, use caution (1)
adorable (1)	nice to see cubs playing (1)		nature (1)
beautiful (2)	bears are dangerous and kids may get hurt (1)		
lovely (1)	unpleasant: bears can fall and get hurt (1)		
ugly (1)	family bonding (1)		
clean (1)	dangerous (5)		
	playful (1)		
	unsafe because of the bears (2)		
	disturbing (1)		
	bears may make the trees fall (1)		
	not safe for people (1)		
Totals: 21	**19**	**3**	**4**

Table 15: Posttest adjectives for the Wild Animals with the number of times each adjective was listed in parenthesis.

The respondents continued to exhibit strong emotional reactions to the image of the bear sow and cubs, as depicted in Table 15. Posttests demonstrate increased concern over personal safety in the presence of bears than what was reflected in pre-test comments. The majority of the respondents thought that the environment depicted in the picture was *unsafe* or *dangerous* for them. They were concerned with their safety and that of the bears. The respondents thought that the bears' presence was a threat and that by

being in the tree, they could cause it to fall, increasing the danger to humans. However, one child thought that it was possible that the bears could fall from the tree and hurt themselves, demonstrating ecocentric awareness. Despite safety concerns, the respondents thought that the bears were aesthetically-pleasing, using adjectives such as *cute*, *pretty*, *adorable*, and *clean* to describe them. A few of the children identified the bears as *wild* animals.

Domesticated Animals: Pre-test			
Aesthetic	**Affective**	**Descriptive**	**Environmental/Ecological**
adorable dogs (3)	kids shouldn't play here (1)	dogs playing (2)	nature (1)
cute (7)	good dogs (3)	colorful (1)	
nice (2)	funny (4)	dogs running (1)	
clean (2)	play rough but are sweet (1)	grass (1)	
lovely (1)	good habitat to play (1)	dogs (3)	
pretty (1)	cool (2)		
beautiful (1)	safe (1)		
	unsafe (1)		
	healthy (1)		
	hilarious (1)		
	good place to bring your dog (1)		
	joy of dogs playing (1)		
	friendship (1)		
	sharing (1)		
	exciting (1)		
	fun (1)		
	dangerous (3)		
	cuddly (1)		
	love it (1)		
	active (1)		
	fighting (3)		
	attacking (1)		
	wild animals (2)		
Totals: 17	**34**	**8**	**1**

Table 16: Pre-test adjectives for the Domesticated Animals with the number of times each adjective was listed in parenthesis.

The image of the dogs affectively resonated with respondents, as depicted in Table 16. Respondents' perceptions ranged from those who thought that the dogs were *good dogs, funny, cool, healthy,* and *exciting* to those who thought that the dogs were *dangerous, fighting, wild animals,* and *attacking*. Respondents pointed out that this was a

good place for play, particularly for dogs. The children thought that the dogs were *cute* or *adorable* and perceived the environment as aesthetically-pleasing.

Domesticated Animals: Posttest			
Aesthetic	**Affective**	**Descriptive**	**Environmental/Ecological**
adorable (2)	dangerous - animals growling and fighting (1)	noisy (1)	nature (1)
nice (2)	safe because only dogs are there (1)	dogs playing (5)	
cute (13)	good (1)	fence (1)	
unclean (1)	cheerful (1)	grass (1)	
beautiful (1)	fun (1)	dogs (1)	
clean (1)	sweet (2)		
	safe (1)		
	good habitat for dogs, but bad for kids (1)		
	playful (3)		
	unsafe, dogs may get hurt (1)		
	dangerous (2)		
	someone could steal dogs (1)		
	amazing (1)		
	funny (2)		
	scary (3)		
	violent (1)		
Totals: 20	**23**	**9**	**1**

Table 17: Posttest adjectives for the Domesticated Animals with the number of times each adjective was listed in parenthesis.

The respondents perceived this image less positively in posttests, and demonstrated greater concerns for their safety in this environment, as depicted in Table 17. Respondents perceived the dogs in the image as *playful*, *sweet*, and *funny*. A few of the children thought that the environment was *dangerous*, *violent*, and *scary* or that the habitat is *good for dogs, but bad for kids*. One child perceived the image as dangerous because the animals were growling and fighting. Respondents thought that the dogs were

cute, *adorable*, and *nice*. One respondent perceived the environment as *clean*, however, another thought it was *unclean*.

Discussion

Environmental Perceptions

Overall, the group of children in this study held positive perceptions of all of the landscapes they assessed except for the Urban Houses, which featured an urban landscape that was visibly abandoned and dilapidated. The fact that these children appreciated both natural and urban environments that were not overtly dilapidated suggests an appreciation for diverse environments. Living in an urbanized environment did not appear to affect their ability to enjoy landscapes that are natural or urban. With this in mind, it is possible that long-term exposure to neglected environments could impact children's environmental perceptions, potentially limiting their concern for, or participation in environmental protection in the future. Previous studies have shown, children negatively perceive unkempt urban areas (Ataov, 2004; Home et al., 2010; Luckmann et al., 2013). This has environmental management and social justice implications in that many urban children are surrounded by run-down places due to disinvestment. As such, it is possible that children who live in similar areas will lack strong affective connections to the environment in which they live. As this study demonstrates, when the children were asked their perceptions of the urban houses, which is a blighted environment, they had negative reactions, particularly fear. This suggests that it may be necessary to supplement outdoor EE with local EE programs that teach children to appreciate the environments in which they live and for educators to

understand the potential long-term environmental and psychological implications of living in similar places.

Pre- and Post-Program Environmental Perceptions

One of the goals of this study is to determine if the NJSOC program impacted the children's environmental perceptions. According to the findings, the program had mixed effects on the children's environmental perceptions. When respondents' pre- and posttest perceptions were compared without accounting for gender or ethnicity, the data demonstrate that the EE program significantly impacted the children's perceptions of the Natural Stream, the House in the Woods, the Wild Animals, and the Domesticated Animals. After attending the environmental education program, significantly fewer children perceived the Natural Stream as unsafe and significantly fewer children perceived the House in the Woods as safe. The children's perceptual shifts in regards to the Natural Stream may be related to the water and stream ecology classes they attended while at the NJSOC. As such, it was not surprising to find an improved sense of safety in the forested stream environment because the children directly experienced similar environments at the NJSOC through class lectures and specimen collection activities. It is likely that by directly touching, feeling, and interacting with streams, wetlands, lakes, fish, and invertebrates that the children became familiar with environments similar to those featured in the image of a Natural Stream, explaining the decrease in the percentage of children who perceived this environment as unsafe. Additionally, it is likely that the significant decrease in the percentage of children who perceived the House in the Woods as safe can be attributed to their experience in the NJSOC's rustic cabins. Part of the

NJSOC experience includes living in naturalistic settings without access to phones and computers in order to avoid distractions and to foster connection to nature through complete immersion. It is possible that this was the first time many of the children lived in the woods in cabins without access to technology, family, or friends. This may have caused the children to feel vulnerable and unsafe, and to project their feelings onto the landscape featured in the image. This is pure speculation, because it was not possible to follow-up with the children to inquire about their rationale. However, Rickinson (2001), found that children construct mental models of the environment and nature that although rich, are poorly structured, so nature can be both a place for recreation, leisure, and solitude, and also a place that is threatening and dangerous (Shepardson, Wee, Priddy, & Harbor, 2007). Additionally, Strommen (1995), found that children had incomplete conceptions of the forested environment, and that their conceptions lacked structure and was characterized by misconceptions. Similarly, Payne (2014), found that children's conceptions of nature may not be fully developed, as some children viewed nature as a place exclusive of humans and human artifacts, yet others viewed nature as inclusive of humans and human artifacts. This may, in part, explain the seemingly contradictory perceptual shifts observed in regards to the Natural Stream and the House in the Woods.

Attending the environmental education program significantly impacted the children's perceptions of the Wild Animals. It was not surprising to find an increase in the percentage of children who perceived the Wild Animals as good and pleasant because the NJSOC specifically teaches children about black bears, a resident New Jersey species. While at the NJSOC, the children attend black bear ecology classes that feature lessons

on the biology, ecology, and natural history of black bears. Educators take great care to teach children the facts about black bears in order to dispel fears and inform them about the potential dangers of human-black bear interactions. Myers & Saunders (2007), found that direct interaction with animals can foster greater connection with and an ethic of care for wild animals. Although the children did not directly interact with live bears, they did handle skins and paws from a deceased bear which appeared to capture the children's interest and inspire fascination. The children's shift in perceptions was apparent in their behavior and comments while still in residency. Whereas, upon arrival they seemed both excited and nervous about spending time in "black bear county" and possibly running into black bears while on the trails; by the end of the trip, they exhibited less fear, were confident that they knew what to do if they encountered a black bear, and even lamented not having actually seen live black bears while at the NJSOC.

Significantly more children perceived the Domesticated Animals as safe after attending the environmental education program. Although the program did not specifically address Domesticated Animals, the children were taught about and interacted with animals. Dogs are commonly encountered at the NJSOC as many of the resident staff and visitors are accompanied by their pet dogs. Teaching children about, and allowing them to directly interact with dogs could have decreased their fears of animals in general. Additionally, if the children encountered well-behaved dogs while in attendance, it is possible that fears of strange dogs could have decreased. It is important to note that many urban children may perceive loose dogs as unsafe due to the prevalence of stray dogs in cities. Children are typically taught that stray dogs are dangerous, likely

to bite or attack, and are therefore to be avoided, this could cause children to perceive all dogs as dangerous and unsafe. It is likely that limited exposure to well-behaved and trained dogs under controlled circumstances could improve their perceptions of the species.

Environmental Perceptions and Gender

In this study, that data demonstrate that gender was a factor in children's environmental perceptions in relation to a few of the images. Pre-tests show that male and female respondents exhibited similar environmental perceptions across all landscapes. Although there were more similarities than differences, in posttests across gender, three significant posttest differences were detected. Although respondents across gender perceived the Urban Houses as bad, unpleasant, and unsafe, a significantly greater percentage of female respondents perceived this environment as unpleasant in posttests. This suggests that the environmental education program may have differentially impacted female participants. It is possible that this could be due to their experience residing in the cabins or as a result of rushing to finish the survey instrument. Additionally, significant within group posttest differences arose in female respondents' perceptions of the Wild Animals. After attending the environmental education program, a greater percentage of females perceived the Wild Animals as good, and a lower percentage perceived them as unsafe. This suggests that the program impacted female participants' perceptions of the Wild Animals, which as previously discussed, could be due to the programs' focus on black bears. Finally, a significant posttest change in male respondents' perceptions of the Domesticated Animals occurred. After attending the environmental education program, a

lower percentage of males perceived it as unsafe. This suggests that the program impacted male participants' perceptions of the Domesticated Animals, which as previously discussed, could be attributed to positive experiences with dogs or increased exposure to animals in general while at the NJSOC. Overall, this study demonstrates that environmental perceptions are minimally related to children's gender in this study's population, and that the NJSOC experience could have played a role in those changes.

Environmental Perceptions and Ethnicity

In this study, the data demonstrate that ethnicity was not a factor in children's environmental perceptions. Respondents of all ethnicities shared similar pre- and posttest environmental perceptions. No statistically significant pre- or posttest differences in environmental perceptions within or across ethnicity occurred.

Environmental Preferences

One of the goals of this study is to determine if the NJSOC program impacted the children's environmental preferences. According to the findings, the environmental education program had little effect on the children's environmental preferences. When the group was examined a whole, no statistically significant pre- or posttest differences were found. The majority of respondents preferred the Urban Waterfront, the House in the Woods, and the Domesticated Animals both in pre- and posttests. This suggests that children's environmental preferences may be stable and persistent, and that the environmental education program did not effectuate significant change. It was noted that the overall group showed a preference for urban or domesticated landscapes, except when those landscapes were blighted or dilapidated. This contrasts with many studies that have

found that humans prefer natural environments that exhibit some human influence or management (Home et al., 2010; Luckmann et al., 2013). However, it is in keeping with other studies that show that children prefer environments with which they are familiar (Herzog et al., 2000), except when those landscapes are abandoned, unkempt, or disorganized (Ataov, 2004; Luckmann et al., 2013). It is likely that urban children may have a preference for built environments with natural features that meet their developmental needs (Herzog et al., 2000), and that EE programs may not be effective change agents. This could be a product of children's age, developmental stage, or upbringing.

Environmental Preferences and Gender

In this study, the data demonstrate that male and female respondents had similar environmental preferences both in pre- and posttests, with only one significant posttest difference in environmental preferences arising. Although the majority of male and female respondents preferred the House in the Woods in pre- and posttests, after attending the environmental education program, a significantly greater percentage of female respondents preferred the House in the Woods compared to males. This could be related to the previous discussion that alluded to dissatisfaction with the NJSOC cabins or housing arrangements, however this is pure speculation. It is possible that attending the NJSOC program improved the female respondents' preferences due to a host of other factors, including socialization opportunities, or novel exposure to the environment that dispelled misconceptions or fears.

Environmental Preferences and Ethnicity

In this study, the data demonstrate that ethnicity was not a factor in children's environmental preferences. According to the findings, there were no statistically significant differences in environmental preferences across ethnic groups.

Qualitative Assessment

The writing-response portion of this study which was used to understand how urban children perceived the environments in the images in their own words, elicited low response rates. It is likely that the open-ended nature of the adjective list yielded less interest, and was therefore glossed over by the respondents. As a result of the low response rates, the data was assessed for the group as a whole and did not account for differences based on gender or ethnicity. The findings reveal that the children were less likely to describe landscapes in terms of environmental or ecological relationships in either pre- or posttests. Although it was unlikely that many pre-test descriptions would demonstrate environmental or ecological understanding, it is disconcerting to find that after attending the program, the children remained less likely to perceive the images in terms of environmental or ecological relationships. Research by Burgess and Mayer-Smith (2011), demonstrate that although urban children are less likely to make scientific-ecological connections prior to attending an EE program, they found that after attending a program, they were more likely to do so. This suggests that either the program was not effective in engendering appropriate understanding of environmental topics or ecological relationships, or that children's perceptions are skewed to aesthetic or affective domains.

The children's descriptions were informative in that they reveal that they scrutinize an environment's aesthetics, particularly its cleanliness when assessing its value. This suggests that urban children may associate nature with dirtiness and perceive the discernible form and structure of hardscaped environments as orderly and therefore clean. Additionally, the children's responses demonstrate that children assess environments for their safety. In this study, respondents demonstrated fear toward many of the natural environments, this appears to be the norm as work by Bixler et al. (1994), Pyle (2002), and Sobel (2008), demonstrate that many children fear the natural world. However, although environments can be perceived as potentially hazardous, the children's responses demonstrate that they can still be perceived as restorative despite safety concerns. This coincides with the Kaplans' (1995), *attention restoration theory* which finds that natural environments are a source of respite for urban residents, demonstrating nature's powerful and positive effects on children's mind-states. Finally, the children's responses reveal few instances in which the images are perceived as natural or urban. Although surprising, this could be explained by the children's age and developmental stage. Perhaps children of this age do not think in dualistic terms in regards to the environment. Instead, it is possible that socialization at school and in the adult world leads to the development of distinctions between the so-called natural and not-natural. This seems reasonable, since Herzog et al. (2000), found that primary and secondary students differed in their perceptions of the natural world, which they conclude may be related to socialization and maturation. Conversely, Shepardson et al. (2007), found that children from urban backgrounds exhibited different mental models of the

environment than those from rural and suburban backgrounds and were more likely to perceive the environment as a built or polluted place. This suggests that other contributing factors, that were not explored in this study may be impacting urban children's environmental perceptions.

A few of the written responses brought to light information about children's environmental perceptions that warrant further discussion. For example, in pre-test responses to the Natural Stream, one child perceived the environment as *mean*. Although it is not possible to determine why this child perceived this environment as such, it is a possibility that the child recognized human impacts in the image or that the child has become so accustomed to hearing that the *natural* environment is polluted or destroyed that the child now perceives all of *nature* as polluted or negatively impacted by human action. Additionally, it is possible that the meanness the child is referring to is due to the potential dangers the environment harbors and less about human impacts on the environment, this seems to be the likelier of the two because the children in this study were more likely to assess an environment in terms of themselves, not in terms of environmental or ecological relationships. Of course, it is possible that the child perceived the environment in this manner for a host of other reasons, unfortunately it was not possible to explore this perception with the respondent in greater detail. In posttest responses to the natural stream, one child commented that this is an environment that is *good for wildlife*. This suggests that the environment is not good for humans. Although the children in this study did not appear to think in dualistic terms when it comes to describing environments as natural or not-natural, this statement shows that some

individuals may perceive nature to be a place for non-human species, but not for humans. This could be related, once again, to the potential safety hazards that this environment poses to humans as evinced by other comments that included that this environment had *too much lichen*, was *slippery*, and *swampy*. Unlike the Natural Stream, the Urban Waterfront elicited comments that suggest that the children perceive the Urban Waterfront environment as *clean, neat*, and a *habitat for people*. The children perceived this environment as s*afe, comfortable, nice*, and being host to an *amazing sight* or *view*. It is not surprising that the children responded positively to the waterfront environment, since other authors report that urban children tend to perceive urban waterfronts positively (Ataov, 2004). This suggests that although these respondents did not perceive environments in terms of nature or not-nature, that they may perceive them in terms of what is an appropriate, safe, or livable environment for themselves.

The images of the Wild Animals and the Domesticated Animals elicited the most responses, and demonstrate that although the children continue to perceive environments in terms of their safety, they are also able to connect emotionally to the animals featured in the images. For example, in pre-tests, despite describing the environment as *scary, unsafe, dangerous*, and demonstrating concerns about a bear attack, many of the children perceived the bears as *cute, sweet, cuddly*, and *harmless*. This perceptual dichotomy could be explained by an innate response to fear or aversion to the natural world, particularly that which is unfamiliar (Burgess & Mayer-Smith, 2011), while simultaneously feeling the pull of an innate tendency to affiliate with life and lifelike processes, such as animals in nature as suggested by E.O. Wilson in his book *Biophilia*

(1984). Although charismatic species such as black bears can trigger aesthetically-pleasing and positive affective responses in children, who may associate them with teddy bears, it is essential that they remain cautious, informed, and aware of the potential dangers of not respecting a bear's boundaries and learning to keep a safe distance, particularly from a mother bear with cubs. It appears that the NJSOC program was effective at teaching the children to remain cautious of bears while in their territory since posttest responses demonstrate increased concern over personal safety in the presence of bears. The majority of respondents perceived the environment as *unsafe* or *dangerous* for them. Additionally, it appears that learning about black bears at the NJSOC was effective at creating awareness of ecological relationships or ecocentric concerns for the species. One child showed concern for the bears' safety, worrying that they could fall out of the tree and hurt themselves. Overall, the children's responses to the Wild Animals demonstrate that bears attracted their attention, they enjoyed viewing them and recognized that they belonged in the *wild.* However, the children felt threatened or in danger as a result of the presence of the bears. One child commented *who would go there* in response to the Wild Animals image, again highlighting a perceptual dichotomy triggered by a species considered to be dangerous to humans. Of course, it is critical for children, and the continued existence of bears in NJ, that children are aware of the potential dangers of getting too close to bears, but it is necessary to create a balance of informed awareness that promotes a desire to spend time in the *wilderness* despite of, or even because of, the presence of bears.

The respondents demonstrate mixed perceptions toward the image of the Domesticated Animals. This image elicited the most affective responses, demonstrating that the children connected to the animals and environment depicted in the image, despite the usual safety concerns. The respondents appeared to appreciate the appearance and playfulness of the dogs as evinced by the comments *adorable dogs, good dogs, funny, exciting, fun, and a good habitat to play*. However, a few of the respondents perceived the image as *dangerous* and described what they saw as the dogs *fighting* or *attacking.* One child acknowledged that the dogs' *play was rough but [they] are sweet.* One did not think this was an appropriate place for children to play, while another thought that it was a *good place to bring your dog.* Like the Wild Animals image, the children were able to appreciate the environment, while assessing it in terms of potential hazards. Posttests demonstrate that the children showed greater concern for safety and perceived the image less positively than in pre-tests. This suggests that they may have shifted their perceptions after attending the NJSOC program. This runs counter to the findings from the quantitative portion of the study, wherein the children demonstrated more positive reactions to the dogs. It is not clear why this occurred. Fewer children responded to the written portion of the posttest which could have impacted the results. These findings suggest that the instrument used to evaluate perceptions could impact the outcome of study findings. Perhaps, closed-ended questions elicit more positive responses than open-ended questions and caution should be taken to include both closed- and open-ended questions when conducting similar research studies.

Conclusions

This study demonstrates that urban children's environmental perceptions and preferences can be assessed using a mixed-methods approach that includes photo-elicitation and written-response open-ended questions. The children were capable of sharing their perceptions of the environments featured in the images using the photo-elicitation technique applied in this study. Although response rates to the written-response open-ended portion of the study were low, the children listed their perceptions of the environments utilizing responses that were categorized as: aesthetic, affective, descriptive, and (to a lesser degree) environmental or ecological. Generally, the children in this study responded to photo-elicitation by describing what they saw in the images. However, many of the respondents demonstrated aesthetic and affective responses to the images. Few responses indicated that the children perceived environments in terms of environmental or ecological relationships in either pre-or posttests.

The findings show that the urban children who participated in this study held positive perceptions of all of the environments they assessed, except the urban houses, a blighted landscape. This demonstrates that the participants appreciated both natural and urban landscapes that appeared to be safe, although they showed slight preferences for environments that were structured.

The NJSOC program that the participants attended appeared to have mixed-effects on the participants' environmental perceptions. The changes observed in the children's perceptions of the natural stream, the house in the woods, the wild animals, and the domesticated animals could be attributed, in part, to exposure and increased

knowledge of similar environments and species at the NJSOC. Additionally, the NJSOC program may have differentially impacted the environmental perceptions of respondents based on their gender. For example, prior to attending the program, gender was not a variable in the children's environmental perceptions. However, after attending the program, statistically significant differences in male and female respondents' perceptions of the Urban Houses, Wild Animals, and Domesticated Animals occurred. Unlike gender, ethnicity did not appear to be a factor in the children's environmental perceptions, as no significant differences were detected in pre- or posttests.

The respondents' environmental preferences appear to be stable and persistent as no pre- or posttest significant differences were detected. Both in pre- and posttests, the children preferred the Urban Waterfront, the House in the Woods, and the Domesticated Animals. This suggests that the program did not have an effect on the children's preferences and that changes in environmental preferences may be difficult to effectuate. Neither gender or ethnicity appeared to be a factor in environmental preferences in this study. It is likely that one's environmental preferences are related to previous experience, family influence, and social mores and are not easily changed by short-term environmental interventions.

Study Limitations

This study's limitations include a lack of probability sampling, an inability to follow-up with participants due to time and access limitations, a small sample size of White participants, and a low response rate to the open-ended questions. The lack of control group limits the generalizability of this study. As such, it should be understood

that this study's findings are representative of the environmental perceptions and preferences of one group of urban children who attended the NJSOC. In future studies, control groups or comparison groups should be utilized in order to improve generalizability. Due to access and time limitations, this study utilized a pre-post-test design with no follow-up. As a result, it was not possible to question participants who chose not to respond to the written-response open-ended portion of this study. In future studies, it is recommended that, whenever possible, studies include interviews so that participants can explain their choices, and answer questions that arise during the research process. Additionally, longitudinal studies should be conducted to determine the long-term effects of EE interventions on children's environmental perceptions and preferences to see if they change over time and with reflection.

Chapter 4. Using the Draw Nature Test and Adjective Lists to Assess the Nature Conceptions of Urban Children Who Attended the New Jersey School of Conservation Outdoor Environmental Education Program

Introduction

Today's children are experiencing a disconnect from nature that threatens to impact their health and well-being, and that of the environment (Aaron & Witt, 2011; Frumkin & Louv, 2007; Kellert, 2005; Louv, 2008; Maller, Townsend, Pryor, Brown & St. Leger, 2005; Sorin, Brooks, & Haring, 2012; Spencer & Woolley, 2000; Stone & Hanna, 2003). Factors such as increased urbanization, fear-based stranger danger, sedentary and increasingly indoor-based lifestyles have contributed to this disconnect and are affecting the amount of time children have to interact with the natural world (Louv, 2008; Skouteris et al., 2014; Sallis & Glanz, 2006; Sorin et al., 2012; Spencer & Woolley, 2000). This is of concern because studies have shown that meaningful early childhood experiences in nature are integral to children's physical and cognitive development, and cultivate environmental values and connection to nature that last well into adulthood (Arnold, Cohen & Warner, 2009; Berman, Jonides & Kaplan, 2008; Chawla, 1998, 2006; Chawla & Cushing, 2007; Kuo & Sullivan, 2001; Sorin et al., 2012; Ward Thompson et al., 2011). As the disconnect between nature and children grows, the chances that children will participate in nature activities or in environmental protection decreases. Of particular concern are the effects of this disconnect on the nature conceptions of ethnically-diverse urban children, who are rapidly increasing in numbers and in political importance; yet are the most likely to lack regular access to nature due to

their proximity to urban areas, socioeconomic disparities, and cultural barriers (Lewis & James, 1995; Strife & Downey, 2009; Wilhelm & Schneider, 2005). These same children are less likely to be represented in the decision-making process and the academic research (Chawla & Heft, 2002; Lewis & James, 1995). However, urban children with their diverse backgrounds and experiences will be tomorrow's voters, leaders, and decision-makers and will be instrumental in shaping the actions and policies that will impact nature and environmental protection in the future. Therefore, understanding their nature conceptions provides insight into what they perceive *nature* to be, and what they may value enough to protect in the future. Knowledge of urban children's conceptions of nature is of particular importance to environmental educators who have the ability to directly impact and teach urban children, and to environmental managers who are shaping urban children's landscapes.

In order to enable a diversity of voices to be heard, it is critical that environmental, nature, and childhood researchers utilize research instruments that allow children of all cultural backgrounds and developmental abilities to express their thoughts and beliefs (Horstman, Aldiss, Richardson & Gibson, 2008; Sorin et al., 2012). In recognition that all children do not have the words to describe what they think, feel, or experience; children's drawings can be used to glean insight into children's conceptions about a broad range of topics, including nature (Sorin et al., 2012). In this chapter drawings, adjective lists, and closed-ended questions are used to explore the nature conceptions of a diverse group of urban children attending an outdoor environmental education program. The children's drawings and the adjectives they listed to describe

nature were analyzed to determine if there are differences in the nature conceptions of urban children of different genders and ethnicities. Closed-ended questions were used to determine whether the children thought they had sufficient access to nature, and if they wanted to spend more time in nature. It is expected that this research will contribute valuable information about urban children's nature conceptions that can inform environmental education, environmental psychology, environmental and social justice, and urban children and nature research, and will improve knowledge on the use of drawings and adjective lists as tools to understand children's conceptions and thoughts.

Literature Review

Children's Drawings

Research that evaluates children's conceptions, beliefs, and knowledge has grown in prominence due to widespread recognition that children and childhood are worth investigating, and that children, particularly urban and minority children, have been marginalized both in the literature and in the decision-making process (Einarsdottir, Dockett & Perry, 2009; Horstman et al., 2008). The unique voices of children in general, and urban and minority children in particular, must be included in environmental research because they are disproportionately impacted by environmental and social injustices. As such, in order to increase diversity and inclusivity, and inform environmental education and management, researchers have developed and utilized research methods, such as projective testing to allow children of all abilities and backgrounds to share their unique perspectives effectively and in a child-friendly manner. In order to increase children's participation, researchers have acknowledged that evaluative instruments must not only

be topical and address research questions, but must also be engaging, fun, age-appropriate, and easy for diverse groups of children to understand and complete (Horstman et al., 2008). As such, researchers have increasingly used drawing instruments combined with written text or narrative to enable children to share their experiences and viewpoints (Einarsdottir et al., 2009; Horstman et al., 2008; Kalvaitis and Monhardt, 2012). Drawing instruments are increasing in use because studies have shown that children are more likely to enjoy drawing activities rather than answering a series of survey questions (Barraza, 1999; Einarsdottir et al., 2009; Finson, Beaver & Cramond, 1995). Furthermore, drawings are a preferred means for working with children, because they allow children to show researchers things that they may not be able to put into words, whether due to limited linguistic and cognitive abilities, or a lack of comfort with written text or verbal expression (Bowker, 2007; Finson et al., 1995; Horstman et al., 2008; Roland, 2006; Sorin et al., 2012). Using drawing as a means to communicate comes naturally to many children and allows them to express their feelings and thoughts in a less intimidating manner than through solely text-based instruments (Roland, 2006; Tamoutseli & Polyzou, 2010). Drawings, unlike semantic studies, stimulate children's perceptual senses, which has been shown to improve children's ability to access information about their past experiences (Horstman et al., 2008). Additionally, studies have shown that children's drawings are powerful evaluative tools for understanding children's viewpoints and experiences and can be used to gather information quickly and simply (Barraza, 1999; Tamoutseli & Polyzou, 2010). Drawings are a reflection of the images children carry in their own minds (Barraza, 1999; Thomas & Silk, 1990). As

such, when used in conjunction with narrative text generated by children, drawings can give researchers insight into the meanings, attitudes, perceptions, and preconceived notions children hold about a subject (Einarsdottir et al., 2009; Rebar, 2005). Finally, combining drawings with narrative has the potential to improve data interpretation and understanding by limiting researcher bias and allowing children's unique perspectives to emerge directly from the data (Rebar, 2005).

Drawing tests have increased in prevalence since the 19th century when psychologists used them to explore children's thoughts and development (Barraza, 1999). Although it is difficult to pinpoint when figure-drawing projective tests originated, their formal beginning is largely accepted as 1926 when child psychologist Florence Goodenough introduced the 'Draw-a-Man' test for use in assessing children's and young people's maturity (Bond, Southers & Sproul, 2010). Over the years, several psychologists have applied, used, and refined the test to improve its efficacy, reliability, and data quantification abilities (Bond et al., 2010). For example, Dale Harris used the test to measure children's intelligence by revising and expanding the original test to include drawings of a woman as well as the test subject (Bond et al., 2010; Strommen, 1987). In 1949, Karen Machover used the Draw-a-Person test in conjunction with written narrative so that children could explain the images they drew (Bond et al., 2010). This allowed children to verbally explain why they drew what they drew, clarifying the drawing's meaning and participant's rationale, thereby providing deeper understanding of the children's personalities. Subsequently, Elizabeth Koppitz developed the best known quantitative version of the 'Draw-a-Man' test in which a scoring system based on a series

of emotional indicators was used to analyze children's drawings (Bond et al., 2010). The 'Draw-a- Man' test's continual refinement and successful uses inspired the creation of a multitude of other figure-drawing based projective tests that include the 'Draw-a-Scientist' test (Bond et al., 2010) and, more recently, the 'Draw-an-Environment' test (Moseley, Desjean-Perrota, & Utley, 2010).

In 1981, David Chambers developed the Draw-A-Scientist test (DAST) to determine the extent of children's stereotypical perceptions of scientists (Finson, 2002). This instrument is of particular relevance because it serves as the foundation for the 'Draw Nature' test used in this study. In developing the 'Draw-a-Scientist' test, Chambers asked 4,807 elementary school-aged children of diverse cultural backgrounds to draw a scientist on a blank sheet of paper (Finson, 2002). It was his contention that children in grades K-5 lack the verbal and writing abilities to express their perceptions clearly, but that through the medium of art, it was possible to use children's depictions of scientists to understand and interpret their perceptions of scientists in general (Finson, 2002). Through his research, Chambers ultimately identified seven elements and characteristics of these elements that regularly appeared in children's drawings of scientists, leading him to conclude that children across cultures hold stereotypical images of scientists (Finson, 2002). Subsequent uses of the DAST have revealed that children across gender, culture, age-group, grade-level, and over time continue to hold stereotypical perceptions of scientists, suggesting that children's perceptions are persistent and stable (Finson, 2002). Informed by the successful application of the DAST, scholars interested in understanding children's conceptions of nature have adapted the

instrument by prompting children to draw what nature is to them using the prompts "Nature is" or simply "Nature". By doing so, they have also found that children also hold stereotypical and stable conceptions of nature (and the environment) that remain consistent across cultures and populations (Keliher, 1997; Rejeski, 1982). This suggests that the 'Draw Nature' test can be used to understand children's nature conceptions. However, it is important to note that although promising, 'Draw Nature' tests are still in development, and lack the years of testing and refinement of the DAST.

Recently, Mosely et al. (2010), developed the 'Draw-An-Environment' Test and Rubric (DAET-R) to assess the mental models (or images of the environment) held by pre-service teachers. Although the instrument was administered to a diverse population of undergraduate pre-service teachers, not children, its development and findings are important to note, because it is one of the first drawing tests designed specifically to understand a population's environmental perceptions. Moseley et al. (2010), used a draw-and-explain protocol consisting of a single sheet of paper with the prompts: *My drawing of the environment is*, and *My definition of the environment is*. White space followed each prompt in order to allow the respondents to draw their responses. The researchers found that pre-service teachers did not hold a relational view of the environment. An object view was revealed through their drawings wherein most of the pre-service teachers depicted the environment as living factors such as plants, trees, and animals in isolation, demonstrating no direct interactions between the living factors and the environment (Mosely et al., 2010). Although drawn less frequently than living factors, a majority of the respondents drew human-designed environments, such as houses, bedrooms,

neighborhoods, schools, or classrooms when describing the environment. Additionally, the authors found that respondents hold incomplete mental models of the environment because they did not depict human beings as part of the environment. The pre-service teachers' drawings revealed similarities with other studies conducted with children that reveal that the majority of respondents take an object view the environment, and that it is a place where there is little to no human interference. Findings from the DAET-R suggest weaknesses in curricula and reveal potentially stereotypical views of the environment that are held by children and educated adults.

As previously discussed, drawing tests have been increasingly used and refined by psychologists in order to improve knowledge of children's development and perceptions for over a century; however, these tests are not without their limitations. Although many children enjoy drawing, not all children have an interest in drawing and may struggle to express their perceptions using this medium (Roland, 2006). Additionally, children's expressive abilities may be hampered by both an actual or perceived lack of artistic ability, both of which can inhibit creativity and affect study participation rates and outcomes (Einarsdottir et al., 2009; Rebar, 2005; Roland, 2006). Furthermore, drawing tests lack standardized interpretive frames and their qualitative nature can make them susceptible to researcher biases, and generate data that are difficult to quantify (Bond et al., 2010). As such, more research using drawing tests is necessary to address limitations, to test for cross-disciplinary applications, and for continued refinement.

Assessing Children's Nature Conceptions with Drawings

Although psychologists have used drawing tests to assess children's cognition and development for generations, the use of drawing tests in combination with narrative text to assess the nature conceptions of children is still in the early stages of development (Barraza, 1999). However, scholars interested in understanding children's nature conceptions have recognized the potential to use drawing tests to understand and interpret children's thoughts and beliefs, and have adapted drawing tests for use in environmental education research. Taking into consideration a growing need to understand children's nature conceptions, particularly in this era of widespread environmental crises and demographic shifts, developing and utilizing drawing tests in environmental education research is imperative, yet remains underutilized. Although there are no agreed upon interpretive protocols, drawing tests have been successfully developed and used to tap into the nature and environmental conceptions of children of varied socioeconomic, demographic, and cultural backgrounds, leading to diverse findings and deeper insight into children's conceptions. An oft-cited and critical contribution to children's environmental perception and education research is David Rejeski's 1982 study in which he utilized children's drawings to make the case for a developmental approach to environmental education (Rebar, 2005; Rejeski, 1982). In his study, he presented children with a blank sheet of paper and asked them to respond to the prompt *Nature is* in text, drawings, or both. As a result, he found that maturity and prior exposure to nature were related to correct placement and understanding of nature and the natural world (Aaron & Witt, 2011). Keliher (1997), utilized children's drawings, in combination with structured

and unstructured interviews, photographs, questionnaires, and observations to understand children's perceptions of nature. Children were asked to draw a picture of what they thought "nature" is and these drawings were later analyzed using Rejeski's indicators including species, environment, relationships, and transformations (Keliher, 1997). The author found that children had well developed perceptions of nature that are similar to those of adolescents, suggesting that childhood perceptions of nature are established early and change little as children mature (Keliher, 1997; Rebar 2005). The majority of the children in her study perceived nature as "flowers, trees, and animals," and no matter the family background or the children's previous outdoor experience, believed that nature could be found anywhere (Keliher, 1997). When the children were asked to specifically define nature, all of the respondents mentioned trees and most mentioned birds (Keliher, 1997). Keliher suggests that children's perceptions of nature are developed early in life, and may not change without direct intervention (Keliher, 1997). Additionally, she attributes children's perceptions of nature to what they learn in school, previous nature experience, children's literature, and television media (Keliher, 1997; Rebar, 2005). Similarly, Barraza (1999), utilized children's drawings to evaluate English and Mexican children's environmental perceptions, expectations, and concerns for the future. The author found that children exhibited more similarities than differences in their drawings despite hailing from countries with significant cultural and structural differences, thus giving credence to the theory posited by Kellog and O'Dell that there is a "universal pattern of development to children's art" (Barraza, 1999). Additionally, she found that, across cultures, children similarly responded to environmental crises and showed deep

environmental concern as depicted by their drawings (Barraza, 1999). Aaron and Witt (2011), used semi-structured interviews, and drawings to understand urban children's definitions and perceptions of nature. They studied children from Houston, TX and found that urban children understand, interpret, and experience nature differently depending on the degree of previous nature experience. In essence, urban children with direct nature experience demonstrated greater awareness of nature and the natural environment than students with only indirect or vicarious nature experiences (Aaron & Witt, 2011). This was reflected in the depth and clarity of the children's nature drawings. Those with limited to no experience with nature drew it as cartoonesque, featuring stereotypical images of nature, such as trees, flowers, or butterflies, and demonstrated no specific meaning or connection to nature through their drawings. However, those children with direct experience with nature drew real places or natural elements and described actual interactions with the natural world that were meaningful or impactful to them (Aaron & Witt, 2011).

Shepardson, Wee, Priddy, and Harbor (2007), took a cognitive approach to their inquiry about environmental perceptions by administering the 'Environments Task' consisting of drawings and text, in order to understand Australian students' conceptions of the environment. The authors contend that drawings and text represent and communicate meaning that students' construct about the environment, and provide information about the social, educational, and cultural experiences that inform their meaning-making (Shepardson et al., 2007). These internal representations (or mental models) of the environment have their basis in prior knowledge, existing conceptions or

ideas, and past experiences, and change over time as individuals acquire new knowledge, or are exposed to new experiences or ideas (Shepardson et al., 2007). As a result of the study, the authors identified four mental models of the environment consisting of: the environment as a place where animals and plants live – a natural place; the environment as a place that supports life (animal, plant, and human); the environment as a place impacted or modified by human activity or intervention; and the environment as a place where animals, plants, and humans live (Shepardson et al., 2007). In general, the authors found that the majority of the students perceived humans as separate from nature, conceived of the environment as a natural place where plants and animals live, and a place that supports life by providing the resources necessary for species' survival (Shepardson et al., 2007). However, the authors found a significant difference between urban students' conceptions of the environment in contrast to those of suburban and rural students, wherein urban students were more likely to hold the belief that built landscapes are environments, and/or that the environment is a polluted place (Shepardson et al., 2007). This suggests that children's experiences of local environments influence what they perceive environments to be. As such, urban children who are less likely to directly interact with the so-called natural world are more likely to conceive of the "environment" differently than children who hail from suburban or rural backgrounds.

Rob Bowker (2007), used children's drawings to measure changes in UK children's perceptions and learning after they attended an environmental education program about tropical rainforests. He found that before attending the program, children had prior environmental knowledge that they had acquired from sources outside of school

(Bowker, 2007). Pre-program drawings featured stereotypical images of a pristine rainforest environment with no human habitation, and stylized trees and plants that bore little resemblance to actual tropical species (Bowker, 2007). Additionally, he noted that children's pre-program drawings prominently featured animals such as snakes, monkeys, colorful birds, and big cats with plants acting as a backdrop for the animals (Bowker, 2007). After attending the environmental education program, the children demonstrated new knowledge, presumably gained from the program's focused workshop and peer-to-peer/adult interactions. This suggests that children were capable of learning about new environments in a short period of time (two hours). Furthermore, his findings demonstrate that children from schools in lower socioeconomic areas started with a lower base of understanding than those from higher socioeconomic areas. However, after attending the program, the children had similar levels of knowledge and understanding of tropical rainforests. Post-program drawings demonstrated changes in the quality of the drawings in regards to depth, scale, and perspective (Bowker, 2007). In their first drawings, children drew trees and plants in linear lines, whereas in the post-program drawings there was a sense of being immersed within the rainforest. In essence, the first drawings took the perspective of an outside observer; however, the second drawings were drawn from the perspective of being in the rainforest (Bowker, 2007). Animals did not feature as prominently in post-program drawings, and if any animals were drawn, they were typically snakes. Finally, although the program stressed indigenous peoples' presence in tropical rainforests, very few children drew people in their drawings. Overall, Bowker found that children are capable of revealing what they know and understand

through drawings as evinced by the post-program changes in the children's drawings, which included an increase in the number of plant and tree species drawn, greater accuracy in plant drawings, the scale and perspective taken, and an increase in rainforest features (Bowker, 2007).

Rationale

The rationale for this study is to utilize a drawing instrument, specifically an adaptation of the Draw Nature test in combination with adjective lists to determine the nature conceptions of a group of urban children before and after they attended the NJSOC EE program. Although drawing instruments have been used in psychological research for generations (Barraza, 1999), they remain underutilized in EE research. Using drawings to solicit information from children could prove to be a more effective and enjoyable means for children to contribute to the literature and have their voices heard. Incorporating children's voices in the research by using drawing instruments can broaden understanding of children's nature conceptions and how they communicate their conceptions. Furthermore, exploring urban children's nature conceptions creates a more inclusive EE research literature, by expanding not only whose voices are being heard, but whose nature conceptions are being considered when creating environmental education curricula and environmental management plans. Creating diversity in EE research is relevant now more than ever, as environmental education has gained international recognition as a way in which to connect children to the natural world (Athman & Monroe, 2001; Rickinson, 2001). As such, this study will contribute to the EE research

by bridging this research gap and giving voice to urban children who, heretofore, remain relatively silent.

Research Objectives and Goals

The research objectives of this study are: (1) to utilize the 'Draw Nature' test to determine the nature conceptions of a group of urban children (2) to utilize adjective lists to understand what words urban children utilize to constitute *nature*, (3) to compare which approach generates more responses, (4) to determine if children's gender or ethnicity are variables in their conceptions of nature, and (5) to determine if children's nature conceptions differed before and after attending an environmental education field program. The overall research goals are to utilize children's drawings and adjective lists to understand urban children's nature conceptions and to determine which approach, drawings or adjective lists, is more effective at expressing children's nature conceptions. Additionally, another research goal is to contribute to the EE research, by utilizing and refining the available tools with which to understand the nature conceptions of children in general.

Materials and Methods

Draw Nature Test

In this study an adaptation of the 'Draw-a-Scientist' test was utilized to delve into urban children's nature conceptions. The 'Draw Nature' test used in this study was influenced by the work of Rejeski (1982), Keliher (1997), Barraza (1999), Rebar (2005), Bowker (2007), and Aaron and Witt (2011), and was adapted to meet the subject-matter and research interests, specifically the nature conceptions of urban children of diverse

genders and ethnic backgrounds. The 'Draw Nature' test itself is not a standard instrument to assess children's nature conceptions, as such, this is an exploratory study to determine if and how a drawing assessment tool can be used to understand a population's nature conceptions and if they change after an environmental education intervention.

The 'Draw Nature' test was administered to a group urban children scheduled to attend a 3-day 2-night immersive outdoor environmental education program at the (NJSOC) in Branchville, NJ. The participants consisted of 81 5-7th grade students. However, 75 of the children's responses were included in the final study, because 6 tests had to be excluded due to incomplete responses. The children's ethnicities consisted of Hispanic (43%), African American (30%), Asian (20%), and White (5%). More females (60%) than males (40%) participated in the study. The 'Draw Nature' test was conducted, in conjunction with an adjective list generated by the children, in a pre-posttest approach in order to capture any changes in the children's nature conceptions after they attended an EE program. For simplicity's sake and in order to differentiate between pre-and posttest responses, each child utilized a black ink pen to complete pre-tests and a blue ink pen to complete posttests (Rebar, 2005). Pre-tests were conducted upon the children's arrival at the New Jersey School of Conservation (NJSOC) during program orientation, and posttests were conducted during program summation. Each participant was given a white sheet of paper that included identification and demographic questions, the prompt *NATURE*, blank space and two closed-ended *yes* or *no* questions. The children were prompted to draw nature, to use their own words to list what they think of as nature, and to answer the closed-ended questions: *Do you think you have enough nature where you*

live? and *Would you like to spend more time in nature?*. During posttests, the children had the opportunity to make changes to their drawings and lists. They were informed that they could leave their answers as is, add or cross off words, make changes to their drawings, or change their answers to the *yes* or *no* questions. The children had 15 minutes to complete the tasks. They were informed that there are no right or wrong answers, and were asked to keep their answers to themselves. The author conducted the surveys and was available to answer the children's questions.

Data Analysis

Contingency tables were created to assess the data for relationships amongst the variables under examination including gender, ethnicity, and attendance in the environmental education program. Adjective and drawn object frequencies were calculated, and the two-sided Fisher's exact test was used to determine if there were any statistically significant associations between the respondents' gender and/or ethnicity and their conceptions of nature. The Fisher's exact test, not the Pearson Chi-square, was used to examine the relationship between the variables, because convention states that it improves accuracy when cell values are < 5 or sample sizes are small (Handbook of Biological Statistics, 2009). Additionally, inductive coding was used to analyze the children's written responses which allowed for themes to arise from the written data (Bernard, 2002).

Results

Post-Program Changes

In order to conduct pre- and posttest comparisons of changes in the children's nature conceptions that occurred as a result of attending the NJSOC program the data were pooled and analyzed based on pooled responses because only 23 of the children made posttest changes to their drawings or adjective lists. Of the participants who chose to make posttest changes, the majority (17) added new words to their adjective lists, and none of the participants chose to cross off any words. Only 4 females and one male respondent chose to make changes to their drawings, and all chose to add items to their drawings; none of the respondents crossed anything off. A male respondent added a bear to his posttest drawing, but did not make any changes to his adjective list. One female respondent added scat to her drawing and the words *deer poop* to her adjective list. Another female respondent added a bear to her drawing (she had already included *bear* in her pre-test adjective list), but made no posttest changes to her adjective list. Yet another female respondent added an insect to her posttest drawing and added the names of the classes she attended during the NJSOC immersion to her adjective list. Another female respondent added a tree, a pond, and a duck to her posttest drawing, but made no changes to her adjective list. Finally, another female respondent added waves to the lake in her drawing and added the words *hiking, trolley, communication, eagle, owl,* and *Kramerfly* to her posttest adjective list. Overall, the adjectives that were added to the respondents' posttest lists consist of: *amazing, animals, bears, beauty, black bear ecology, blue, conservation photography, Darwin's theory of evolution, dirt, dirty, ducks, eagle, fire,*

fun, fungi, hikes, hiking, hills, history, insects, Kramerfly, lakes, leaves, love, owl, peace, photos, quiet, reptiles, rivers, rocks, scat, shelter, stars, sticks, streams, sun, survival, teepee, trees, trolley, twigs, water, water ecology, white, wildlife, wind, and *wood.* Of the posttest changes made to the adjective lists and drawings, two instances of increased nature or environmental knowledge occurred that could be attributed to attendance in the NJSOC program. Inclusion of the adjectives *Kramerfly* and *Darwin's theory of evolution* indicate that the children remembered and retained information that they learned at the outdoor environmental education program. The children's general responses signal that they made affective connections to nature as expressed by the adjectives *amazing, beauty, fun, love,* and *peace*. However, the adjectives *dirt* and *dirty* carry negative connotations and suggest that some children may have had a less than pleasurable experience while in attendance.

Adjective Lists

The children's adjective lists yielded a total of 214 unique adjectives to constitute nature, the majority of which were listed once (57%). The data were repeatedly and systematically coded, and 7 distinct categories of children's nature conceptions were identified. The categories consisted of: *Living Things, Non-living things, Biological/Environmental Concepts, Human-made Objects, Emotional/Affective Responses, Colors, and Activities*. *Living things* grouped together animals, plants, people, and other living organisms. *Non-living things* included weather, non-living objects found in nature, landforms, waterbodies, and other objects not created by human beings. *Human-made Objects* included items such as cabins, boats, and other objects created by

human beings that may be found in or used to enjoy nature. *Emotional/Affective Responses* included feelings or emotional reactions that the children described as associated with nature. *Colors* consisted of colors the children described as associated with nature. Finally, *Activities* consisted of pursuits that individuals could participate in while in nature (adjective lists can be found in Appendix F). The most commonly listed adjectives were *trees* (61 times) and *animals* (55 times). However, when all mentions of animals were grouped together whether the word *animal* was listed as an individual adjective or whether an individual species was identified, animals as a group were listed 177 times. Appearing with less frequency, but important to note, were *lakes* (listed 30 times), *grass* (listed 26 times), *plants* (listed 25 times), *bears* (listed 23 times), *insects* (listed 23 times), and *leaves* (listed 23 times). Of the most often listed adjectives, all but one, *lakes*, consisted of living things.

The number of adjectives listed by respondents varied based on gender or ethnicity. For example, female respondents listed a greater number of adjectives, describing nature with a total of 154 adjectives to male respondents' 134. Hispanics listed the greatest number of adjectives with a total of 148, followed by Asians who listed 90, African Americans who listed 86, and Whites who listed 40. No statistically significant associations between gender and the adjectives listed were found; however, when responses were assessed for associations between the adjectives listed and the respondents' ethnicity, four instances of statistically significantly associations were found. According to the data, a greater percentage of Asian respondents (41%) identified *forest* as nature; whereas African Americans (9%), Hispanics (6%), and Whites (0%)

were less likely to identify *forest* as nature; $p = .01$. White respondents (25%) were more likely to list *bunnies* as nature than Asians (6%), Hispanics (0%), or African Americans (0%); $p = .03$. White respondents (25%) were more likely to list *mud* as nature than African Americans (14%), Asians (12%), or Hispanics (0%); $p = .05$. Finally, Whites (50%) were more likely to list *soil* as nature than Asians (18%), Hispanics (6%), or African Americans (5%); $p = .04$.

Drawings

The children in this study drew nature as a stereotypically forested environment in which trees and the sun feature prominently. The data were repeatedly and systematically coded, and four distinct categories constituting nature were identified consisting of: *Living things, Non-living things, Human-made Objects*, and *Activities*. Overall, the children's drawings yielded a total of 42 unique objects that constituted nature. Of the 75 drawings included in this study, the majority (83%) depicted a forest, or a natural environment in which tree(s) and/or the sun were central features. The majority of children drew trees (71 times) and the sun (43 times); however, although drawn with less frequency, animals were important constituents of nature - drawn 26 times when examined as a group. In the instances that the animals that were depicted in the drawings could be identified as specific species, these were listed separately from the general *animals* descriptor. Additionally, the children drew other environments that consisted of waterfalls (2), an individual camping at night (1), the NJSOC (1), a farm (1), and a suburban home (1). However, not all drawings depicted specific environments. For

example, six of the drawings featured living or non-living objects that were not connected to one another.

The number of items drawn to describe nature varied by gender and ethnicity. For example, female respondents drew a greater number of objects, depicting nature with a total of 35 objects to male respondents' 29. Of the 42 objects drawn, two instances of significant associations by gender were found. The data show that a greater percentage of female respondents (100%) drew trees and grass as nature compared to male respondents (87%); $p = .02$. Hispanics drew the greatest number of objects depicting nature with a total of 31 objects, followed by Asians who drew 28 objects, African Americans who drew 24 objects, and Whites who drew 15 objects. When testing for significant associations by ethnicity, two instances of statistically significant association were found. The data show that a greater percentage of African American respondents (54%) drew animals as nature compared to Asians (29%), Whites (25%), and Hispanics (21%); $p = .04$. Finally, a greater percentage of African American respondents (40%) drew bears as nature compared to Whites (25%), Hispanics (6%), and Asians (6%); $p = .004$.

Questions about nature

Due to time and access restrictions, it was not possible to interview the children in order to determine their local access to nature, or desire to spend time in nature. In lieu of interviews, the children responded to two closed-ended questions: (1) *Do you think you have enough nature where you live?* and (2) *Would you like to spend more time in nature?*. No statistically significant associations across gender or ethnicity were found. Both female (76%) and male (67%) respondents were in agreement that they did not have

enough nature where they live; $p = .44$, and both male (87%) and female (82%) respondents were in agreement that they wanted to spend more time in nature; $p = .75$. Asians (76%), Whites (75%), African Americans (73%), and Hispanics (69%) thought that they did not have enough nature where they live; $p = .98$, and Hispanics (88%), Asians (82%), African Americans (82%) and Whites (75%) were in agreement that they wanted to spend more time in nature; $p = .74$.

Discussion

What is nature?

The respondents in this study exhibit an object view of nature, describing and depicting it as living things such as animals, trees, and plants that exist separate from other living factors and human beings. This is similar to the findings of Mosely et al. (2010), who concluded that pre-service teachers did not hold a relational view of the environment, instead they conceived of it as a series of disparate objects, or environmental scenes in which living and non-living components of an environment did not interact with one another, and human beings remained absent. Similarly, the children in this study rarely drew images of human beings interacting with the natural environment or living factors interacting with one another and non-living things. Additionally, when the children were asked to describe nature in their own words, the majority listed *trees, animals* or different species of animals as constituting nature. They did not identify interrelationships amongst disparate factors of nature, nor did they indicate that human beings were part of nature. This is similar to previous findings by Rejeski (1982), Keliher (1997), and Kalvaitis and Monhardt (2012), who conclude that

trees and animals are important symbols of nature. This suggests that children conceive of nature as a series of objects that are outside of themselves, and as a place that does not necessarily include a human presence. This can indicate a sense of separation from nature that has environmental and social implications which may require more intensive and focused environmental education interventions in order to address and ameliorate.

Post-Program Responses

The majority of the children (70%) who participated in the study did not make posttest changes to their adjective lists or drawings, therefore, it was not possible to evaluate the effects of the NJSOC's programming on their nature conceptions. It remains uncertain why posttest participation rates declined and the majority of the children chose not to make changes to their responses. However, it is possible that the children's conceptions of nature were unchanged by the experience and therefore limited posttest changes were made. Keliher (1997), in her study of urban children found that children have stereotypical images of nature that are developed early in life and may not change without specific interventions, supporting the conclusion that a short-term experience may not be sufficient to change nature conceptions. According to Roland (2006), once children establish a schema (or definite symbol) about a person it will be repeated in drawings unless an experience causes the child to change the concepts involved. As such, it is possible that children of this age range have already established stereotypical, fixed, and stable conceptions of nature that are not easy to change unless a program specifically targets a particular environment or stresses changes in nature conceptions. It is possible that the NJSOC experience, which focuses on general environmental and nature topics

was not able to affect children's pre-existing conceptions of nature. Bowker (2007), who used children's drawings to assess the effects of a targeted environmental education program on children's perceptions of tropical rainforests found meaningful posttest changes in the respondents' post program drawings. However, his study specifically evaluated the effects of a targeted environmental education program whose subject matter directly focused on tropical rainforests, not a general subject such as nature or the environment. This suggests that although children's general nature conceptions may be fixed and stable, that environmental education programs targeting specific subjects or ecosystems have the potential to shape and change children's conceptions. As such, it may be necessary to create environmental education programs that emphasize particular environments or concepts in order to change pre-existing nature conceptions.

It is possible that the majority of the children in this study experienced no post-program changes to their nature conceptions; however, the possibility that the children simply chose not to complete posttests despite conceptual shifts cannot be ruled out. Furthermore, posttest response rates could have been low due to several factors, including exhaustion from the outdoor experience, a desire to return home, or disinterest in the assessment instruments. The NJSOC program requires the children to spend an extensive amount of time outdoors which could be physically and mentally exhausting, affecting children's focus and motivation to complete tasks not required by the program. Additionally, posttests were administered during program summation when children are distracted and anxious to go home. Perhaps if posttests had been administered in school after allowing the children enough time to reflect on the experience, they may have been

more likely to make posttest changes to their adjective lists or drawings. Additionally, it is possible that posttest response rates could have improved if the surveys included pre- and post-program interviews. Directly interviewing children establishes a rapport between researchers and participants and can improve response rates, because children feel that their voices are being heard (Einarsdottir et al., 2009). Although the adjective lists and drawings permitted the children to share their conceptions of nature in their own words, it is possible that the children felt unheard, or thought that the activities were tiresome, boring, or immature. For example, generating adjective lists may have seemed more like schoolwork than fun. If children expected the outdoor program to provide an escape from schoolwork, it is possible that they would be less likely to participate in activities that reminded them of school. Einarsdottir et al. (2009), in discussing the use of children's drawings to assess their conceptions and thoughts, found that many children did not care for drawing tests and opted to leave the paper blank or to spend little time on drawing activities. The authors suspect this is due to boredom with school activities in general or a discomfort with drawing borne of a perceived lack of drawing ability (Einarsdottir et al., 2009; Rebar, 2005). If the children felt like work was imposed on them or that they lacked drawing skills, they may be less likely to follow-up on their drawings and descriptions. Furthermore, the participants in this study ranged from 9 – 11 years of age, a period in which children tend to lose interest in drawing, and simultaneously experience an increased need to impress others (Roland, 2006). Therefore, it is possible that drawing nature was perceived as immature, or that the children were so concerned with the quality of their drawings that they were unable to

enjoy drawing as an experience in and of itself, and chose not to participate. Unfortunately, this is all speculative, because it was not possible to ask participants why they chose not to make posttest changes. As such, it may be necessary to include interviews in research utilizing adjective lists and drawing activities to truly understand children's nature conceptions.

Socioeconomic factors such as lack of free time and lack of access to resources with which to draw may impact urban children's familiarity and, therefore, comfort with drawing, which could, in part, explain the low posttest response rates. Studies have shown that impoverished children are less likely to spend time engaged in artistic endeavors such as drawing (Einarsdottir et al., 2009; Smith, 2009). This could explain why the children in this study appeared to lack full engagement with the drawing activity. Furthermore, it is possible that the drawing activity as it was implemented in this study was less inspirational due to the limited tools available for the children to draw their pictures. This study followed the protocol used by Rebar (2005), and provided the children with one black ink pen to complete the pre-test, and one blue ink pen to complete the posttest. It is possible that had the children been given colored pencils or crayons that they would have displayed greater engagement with the drawing activity and produced more nuanced drawings. The use of two different colored pens was chosen due to time constraints, resource limitations, and Rebar's (2005) success in capturing meaningful changes in children's nature conceptions using the same approach. However, other studies have shown that providing a broad range of artistic tools engages children's imagination and improves participation (Einarsdottir et al., 2009; Roland, 2006).

However, despite the limited range of drawings, assessing the children's drawings in conjunction with the adjective lists yielded clear visual representations of their nature conceptions. As such, children's drawings used in conjunction with written text can be valuable and yield rich information.

Factors influencing urban children's nature conceptions

In this study, gender and ethnicity did not strongly affect the children's conceptions of nature. It is possible that several factors that were not taken into account, shape urban children's nature conceptions, including age and developmental stage, previous experiences in nature, and parental and school influences (Bonnet, 2004; Kalvaitis and Monhardt, 2012; Loughland, Reid, Walker, & Petocz, 2003; Shepardson, 2005; Vining, Merrick, & Price, 2008). Kalvaitis and Monhardt (2012), asked children of different grade levels to draw pictures of themselves outside and to write about their picture and relationship to nature. They found variations in children's meanings of nature and in how children of different grade levels experience nature. They conclude that children undergo developmental changes in their relationship with nature as they grow and mature, and suggest that age group experiences and interests differ (Kalvaitis & Monhardt, 2012). For example, they found that younger children's relationships tend to be mediated by family, friends, pets and animals and have a nearby-nature focus (Kalvaitis & Monhardt, 2012). Whereas, older children portray relationships with nature that occur in more distant locations and are comprised of more solitary activities such as hiking, enjoying views, and working outside (Kalvaitis & Monhardt, 2012). Alerby (2000), in her study of children's thoughts and thinking on the environment found that

children of different ages and developmental stages exhibit different thoughts about the environment as revealed by their drawings and descriptions. She found that younger children were more likely to think of the environment in terms of it being a good place or unspoiled nature, whereas older children were more likely to think of an environment dialectically as both clean and beautiful unspoiled nature, and a polluted or destroyed place (Alerby, 2000).

Previous experience in diverse nature may impact children's conceptions of nature, therefore, increased exposure to nature may lead to a more dynamic and less dualistic understanding of what constitutes the natural world. If children are exposed to a variety of natural environments early in life, they may be likely to recognize nature as a more diverse concept than what is found in forests. This is more likely to be the case when children are raised by parents who purposefully take children out into nature to experience the diverse array of natural habitats available for exploration. Studies by Arnold et al. (2009), Chawla (1998, 2006 & 2010), Chawla and Flanders Cushing (2007), and Kellert (2005), have shown that directly experiencing nature, and parental or adult role models are instrumental in children's development of a lifelong affect for nature and the environment. Additionally, studies have shown that formal and informal environmental education can impact children's relationship to nature and their conceptions of the environment and nature based upon how curriculum is structured and delivered (Loughland et al., 2003; Robottom, 2014). For example, Loughland et al. (2003), found that primary school students were more likely to hold a relational conception of nature than high school students who hold an object conception of nature.

They believe this is a product of integrated environmental education in primary schools, whereas environmental education is taught as a separate subject in high school where it becomes more scientific, objective, and fact-based (Loughland et al., 2003). It is possible that exposure to environmental education programs at an early age that teach about local nature, particularly in urban environments, can assist children in developing deeper and wider conceptions of nature that extend beyond merely trees, animals, and the sun. It is likely, as Keliher (1997) suggests, that if interventions are conducted in the elementary years, that children's conceptions of nature can be broadened, so that they can see nature everywhere.

It is possible that the children's responses were, in part, influenced by the location in which the surveys were conducted, as researchers have suggested that children draw what they see and experience (Barraza, 1999, Einarsdottir et al., 2009). Although it is unlikely that these children experienced forested environments in their daily lives, at the time of the surveys, they were surrounded by stereotypically natural environments at the NJSOC and are likely to have drawn what they saw in their immediate surroundings. Perceiving the NJSOC as nature was likely the case if the children were primed by teachers that they were going on a field trip to specifically experience nature, which could have biased their drawings. In order to tease out whether or not urban children have pre-existing conceptions of nature that vary from forested or stereotypical nature, future studies may need to be structured so that pre-tests are conducted in urban children's home or school environments, posttests are conducted in so-called natural environments, and follow-up posttests are conducted in the respondents' home city to capture their long-

term nature conceptions. This structure will improve the chances of capturing whether or not children's drawn conceptions of nature are contextual and shift with their immediate surroundings and direct experiences, or if they are fixed and unaffected.

Nature Questions

The majority participants in this study, across gender and ethnicity, believed that they did not have enough nature where they live, and wanted to spend more time in nature. This suggests that although urban children lack nature where they live, they may spend more time in nature if it were available to them locally. Although it is not possible to deduce whether or not these children feel that they need more nature from this study, a perceived lack could affect their ability to connect to the natural world and protect it in the future. The need for nature appears to be cultivated despite a lack of regular access to nature, suggesting as E.O. Wilson has theorized, that human beings have an innate tendency to affiliate with nature (Wilson, 1984). Therefore, it is not surprising that urban children believe they lack nature locally, since they live in an environment where the dominant features are buildings, industrial complexes, highways, and other urban infrastructure, and are taught that nature is *out there*. In many instances, the few existing nature areas within cities are sparse, poorly maintained, or dangerous. This makes direct and regular interactions with nature next to impossible or potentially life-threatening. As such, actions should be taken to ensure that urban children have equitable access to safe and local nature. This could be accomplished by cleaning up existing parks and natural spaces and by creating place-based urban environmental education programs that complement off-site programs like those of the NJSOC. This requires an understanding

of the unique environmental needs of urban populations and an expansion of current definitions of nature and the environment (Payne, 2014; Wilhelm & Schneider, 2005) to include not only so-called nature such as forests, but also urban nature. Urban nature programs must take children out into local natural spaces and address the unique circumstances and concerns of urban children such as pollution, safety, environmental and social injustices, and public health (Chawla, 1994; Spencer & Woolley, 2000; Wilhelm & Schneider, 2005). It is simply not enough to take urban children out into so-called nature or to teach them about traditional environmental issues such as endangered species, habitat destruction, or climate change (Chawla & Heft, 2002; Lewis & James, 1995; Payne, 2014). Urban children's environmental education must include local issues and concerns that not only allow urban children to learn about nature and the environment in a relevant context, but that provide them with the information and skills necessary to act as empowered advocates for the natural and environmental concerns situated where they live (Chawla & Heft, 2002; Lewis & James, 1995). Undoubtedly, developing and implementing urban environmental education programming will require political will, public involvement, and cooperation between parents, schools, teachers, and environmental educators. Yet the findings of this study demonstrate that urban children want to spend more time in nature, but that they believe it is not locally available.

Conclusions

This study demonstrates that urban children, across gender and ethnicity, have an object view of nature, conceiving it as a series of living and non-living things that exhibit

limited interactions with one another, and feature little to no human interference. Neither gender nor ethnicity appeared to impact children's responses to the describe and depict nature prompts, although females listed more adjectives and drew more objects than males. However, although children's conceptions of nature tended to be consistent, their descriptions and depictions of nature varied, suggesting that the instrument used to gauge nature conceptions matters. For example, when asked to describe what they conceive of as nature, the children in this study identified nature as trees and animals. However, when asked to draw nature, the majority of the children drew forested environments in which trees and the sun were the most prominent features, although animals were present in the background to a lesser extent. Additionally, the children demonstrated a greater ability to communicate their conceptions using written text. For example, when asked to describe nature, the children listed 214 adjectives; however, when asked to draw nature, the children drew 42 objects. This strongly suggests a greater ability and comfort with written text, and indicates that using drawings as a source of information gathering and a form of communication and self-expression may not be appropriate across all populations of children. Yet, many studies have shown that drawing is form of communication that children enjoy, and that permits children with limited verbal abilities to express themselves and unarticulated experiences freely (Einarsdottir et al., 2009; Horstman et al., 2008). As such, drawing assessments may be appropriate for younger children or those with developmental challenges who may be more comfortable expressing their nature conceptions in drawings. This suggests that mixed-methods approaches to research into children's nature conceptions may be necessary in order to capture the conceptions

of children of different ages, abilities, and talents, and to ensure that a diversity of conceptions are included.

Unfortunately, it was not possible to evaluate the effects of the NJSOC program on the children's nature conceptions, because the majority of the respondents chose not to make posttest changes to their drawings or adjective lists. The reasons why the children chose not to make posttest changes remains unclear. However, several factors could have impacted response rates, including that the NJSOC program did not elicit changes in the children's nature conceptions or that the children simply chose not to complete posttests whether due to lack of interest or feelings of boredom, distraction, or exhaustion. Due to lack of access and time restrictions it was not possible interview children in order to determine what impacted their posttest response rates. As such it is recommended that future studies include, whenever possible, pre- and posttest interview sessions to clarify children's choices, conceptions, and any other questions that could arise during the research process.

Finally, this study demonstrates that despite growing up in an urban environment, the majority of the children who participated in this study believe that they do not have enough nature where they live, and would like to spend more time in nature. Their responses to the closed-ended questions suggest an understanding that nature is lacking where they live, and indicates that the children would, if they could, spend more time in nature. This is cause for hope that urban children can, with appropriate experiences in nature and targeted environmental education programs, develop an interest and desire to

protect the natural world in the future. The key is to create the conditions for urban children to connect with the natural world in a safe, informed, and enduring fashion.

Study Limitations

This study's limitations include a lack of probability sampling, a small sample size of White participants, and an inability to follow-up with participants due to time and access limitations. The lack of control group limits the generalizability of this study. As such, it should be understood the findings are representative of the nature conceptions of one group of urban children who attended the NJSOC. In future studies, control groups or comparison groups should be utilized in order to improve generalizability across populations. Due to access and time limitations, this study utilized a pre-post-test design with no follow-up. As a result, there was no ability to question participants who chose not to make changes to their posttests drawings or adjective lists or determine why this was the case. Finally, due to resource limitations, drawing tools were limited to one black and one blue ink pen, which may have impacted children's engagement with the study and desire to participate. In future studies, it is recommended that, whenever possible, more diverse drawing tools are provided to children to improve the chances that they will be engaged with drawing activities, and that interviews are conducted to clarify questions that arise during the research process.

Chapter 5. Stakeholders' Perceptions of the New Jersey School of Conservation's Outdoor Environmental Education Program: A Post-Program Analysis

Introduction

The New Jersey School of Conservation has a history of providing nature and environmental education to children and adults across New Jersey. Originally, it provided environmental education to elementary, middle, high school students, the general public, and future teachers (R. Fitzgerald, personal communication, November, 2015). Currently, the NJSOC provides nature and environmental education to hundreds of children from diverse cultural and socioeconomic backgrounds across the state of New Jersey, as well as graduate students and Americorps teachers. Additionally, urban school districts in NJ utilize the NJSOC as a place to not only send their students to learn about nature and the environment, but to provide exposure to the natural world that the students may have never previously experienced. This is done in the hopes of creating connection to nature and care for the environment that will improve the students' environmental knowledge, self-development, and provide an impetus for environmental advocacy in the future. Anecdotes from sending schools, teachers, and the students themselves, suggest that the NJSOC EE experience has effectuated positive change in the lives of participating children, and post-visit reviews by educators and school administrators characterize the NJSOC experience as enjoyable and valuable. Although program summation, when a review of what was taught while in attendance, includes a few moments for the children to share what they learned and their favorite experiences while in residency, there is no information about the participants' direct opinions of the program. Furthermore, although

the NJSOC provides student teaching opportunities to Americorps teachers, there is little insight about their thoughts about the NJSOC EE experience. As such, this is an ethnographic study that explores the opinions of students of the NJSOC and Americorps teachers in order to understand their experiences and perceptions of the program which will provide valuable information about the NJSOC and EE in general. To augment this study, the viewpoints of an NJSOC administrator are included in order to provide further insight on the program, particularly its history and future directions. This research contributes to the EE literature by providing first-hand information about the NJSOC experience from the perspective of its stakeholders - participants, student teachers, and a program administrator - which can guide curriculum development, assist in future funding opportunities, and provide important feedback for similar EE programs.

Literature Review

Outdoor environmental education programs were first implemented in the 1950's to address a growing disconnect between human beings and nature that had occurred largely as a result of urbanization (Athman & Monroe, 2001). As societies urbanized, direct daily contact with the non-natural world decreased, while environmental problems simultaneously increased. This, coupled with growing awareness of the effects of anthropogenic environmental impacts, lead to efforts to educate the public, particularly children, about nature and the environment. Operated largely without formally established curricula, outdoor environmental education taught conservation-related lessons and other school subjects in the out-of-doors in the hopes of creating greater connection to and knowledge of the non-human natural world (Athman & Monroe,

2001). By the 1970's, environmental education transitioned from education in or about the environment, to education for the environment in response to marked growth in environmental awareness and humanity's increasingly apparent impacts (Athman & Monroe, 2001). In the United States, passage of the National Environmental Education Act of 1970, established environmental education as a national goal with the intention of promoting "the awareness and understanding of the environment, our relationship to it, and concern and responsible action necessary to assure our survival and to improve the quality of life" (qtd. in Athman & Monroe, 2001, p. 39). This formalized EE, and lead to its growth nationally and internationally.

In 1972, the United Nations conference on the Human Environment recommended the establishment of environmental education programs internationally in order to increase awareness about environmental problems (Athman & Monroe). By 1975, the Belgrade Charter established environmental education's goal statement (Athman & Monroe, 2001) "to develop a world population that is aware of, and concerned about, the total environment and its associated problems, and which has the knowledge, attitudes, skills, motivation, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones" (UNESCO-UNEP, 1976). The first international conference of environmental education was held in 1977 in Tbilisi, the former Soviet Republic of Georgia, leading to the release of the Tbilisi Declaration which proclaimed the "important role of environmental education in the preservation and improvement of the world's environment, as well as in the sound and balanced development of the world's communities" (Wisconsin DPI, 1994,

p. 157 as cite in Athman & Monroe, 2001). The Tbilisi Declaration officially codified environmental education at the international level (Carter & Simmons, 2010) and continues to serve as the framework of environmental education locally, nationally, and internationally (Athman & Monroe, 2001; Carter & Simmons, 2010). The Tbilisi Declaration is considered by many to be the "definitive statement on what EE is and ought to be" (Carter & Simmons, 2010) and provides the foundation for most of the progress that has been accomplished in the field thus far. The goals of the Tbilisi Declaration are:

(1) to foster clear awareness of, and concern about economic, social, political, and ecological interdependence in urban and rural areas;

(2) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment, and skills needed to protect and improve the environment;

(3) to create new patterns of behavior of individuals, groups, and society as a whole towards the environment (UNESCO, 1978, p. 26).

More recently, the field of environmental education has evolved, placing a greater emphasis on principles of sustainability, urbanization, and the human dimensions of environmental change (Archie & McCrea, 1996). EE's evolution challenges environmental educators to integrate economics, social equity, and the natural and built environment into the curricula in order to yield a more environmentally literate populace (Archie & McCrea, 1996). Further driving this interdisciplinary approach to environmental education is Richard Louv's 2005 book *Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder*, wherein direct exposure to nature is linked

to children's healthy cognitive, emotional, and physical development. Louv draws attention to the growing disconnect between children and nature in light of growing urbanization, a rise in indoor lifestyles, the ubiquitous presence of technology, and children's highly structured sports-oriented lifestyles. As such, Louv draws attention to the linkages between children's health and the outdoors, the role of environmental education in promoting a healthy future for children and the environment, and spurred the No Child Left Inside movement to provide funding for environmental education, to promote environmental literacy in grades K-12, and to foster an understanding of, and ability to analyze, interpret, and solve environmental problems (Carter & Simmons, 2010; Chesapeake Bay Foundation, 2015). This resurgence in outdoor childhood culture places an emphasis on the human dimensions of environmental issues, and the need to integrate environmental education at all levels of the educational system. Of particular importance to EE, is the role that outdoor environmental education programs play in renature-ing urban children's lives by providing them with opportunities to directly experience natural environments they are unlikely to encounter in cities. Despite the importance of outdoor education programs to creating connection between urban children and nature, few studies have explored children's perceptions of outdoor environmental education programs after they have been in attendance.

Rationale

The rationale for this study is to understand the NJSOC EE program from the perspective of individuals who participated in the environmental education program whether as students, teachers, or administrators. Many environmental education studies

focus on participant's ecological or environmental perceptions, and although program evaluations are often conducted by individual providers, few studies specifically address the overall perceptions of those closest to the programs. For EE programs to remain relevant, particularly in today's increasingly urban and demographically-diverse society, it is important to include the voices of those directly impacted by EE programs to determine if programming is resonating with their needs, meeting (or exceeding) expectations, and providing an educational experience that not only teaches, but inspires environmental advocacy, care, and concern.

Research Goals and Objectives

The research objectives of this study are to (1) understand the NJSOC experience from the perspective of participants who attended the 3-day 2-night EE program; (2) understand the NJSOC experience from the perspective of Americorps teachers who teach diverse groups of students while in residency; (3) understand the NJSOC experience from the perspective of a program administrator in charge of curriculum and oversight; and (4) gain insight on the history, current status, and future directions of the NJSOC. The overall research goal is to provide insight on the NJSOC experience to understand what the institution is doing well, what areas may require improvement, and the organization's impact on its stakeholders.

Materials and Methods

Participant Post-Program Survey

In order to understand urban children's perceptions of the NJSOC program, a five-statement closed-ended survey was created using a true/false response format. The survey consisted of the following statements:

1. The program I just completed had too many rules.
2. The program I just completed was just what I expected.
3. The program I just completed makes me feel closer to nature.
4. The program I just completed gave me enough free time in nature.
5. I would come back to do this program again.

Due to time and access limitations, the instrument had to be short, but still tap into the children's experiences, opinions, and perceptions of their experience. The survey was attached to posttests the children completed for related dissertation research. In order to quantitatively analyze the data, the dummy variables of 0 and 1; with 0 = false and 1 = true were assigned to the dichotomous true/false responses. Contingency tables were created and the Pearson Chi Square test was utilized to test for relationships between the respondents' gender and ethnicity and their responses. After conducting list-wise deletion of incomplete surveys, the responses from 219 students who completed the post-program surveys were analyzed. More females (58%) participated in this study. The respondents' ethnicities consisted of Hispanic (42%), African American (36%), Asian (17%), and Whites (5%).

Americorps Volunteer Surveys

In order to gain a greater understanding the effects of the NJSOC program on urban children and their connection to nature, Americorps teachers who lead and taught

classes were recruited to answer a six-question open-ended online questionnaire regarding their thoughts and experiences as NJSOC teachers. A total of four Americorps volunteers were contacted via email to participate in the online questionnaire. Three of the four volunteers agreed to participate; all of whom were female. The questionnaire consisted of six open-ended questions that were designed to allow the volunteers to share their thoughts and insights on the NJSOC program experience from their perspective as teachers. The questions are listed below:

1. What changes, if any, have you seen in the students that attend the NJSOC overnight program?
2. In your opinion, what are some of the benefits of the NJSOC overnight program?
3. Do you think the NJSOC overnight program benefits rural, urban, and suburban children equally? What about individuals of different genders?
4. What, if any, changes would you make to the NJSOC overnight program to make it better for participants?
5. In what ways did the program conform to your expectations? In what ways did it not?
6. Do you have any additional insight to offer about the NJSOC program?

The Americorps volunteers' responses were compiled and read to generate a narrative of the NJSOC experience from a volunteer teacher's perspective.

Program Administrators' Viewpoints

A program administrator's viewpoints on the NJSOC program were solicited in order to gain greater understanding of the program's history, current status, and future directions. Additionally, the administrator provided information such as program demographics, and strengths and weaknesses from the perspective of someone charged with advising and designing curricula. The program administrator's responses were recounted in narrative form, that the researcher analyzed for recurring themes that could

give greater insight into the NJSOC experience from the administrator's perspective. The questions are listed below:

1. What is your perception of the efficacy of the NJSOC nature education program?
2. In what direction is the NJSOC program moving into the future?
3. In your opinion, what are the strengths and weaknesses of the NJSOC program?
4. How many students have attended the NJSOC program?
5. What are the students' demographic and socioeconomic characteristics (i.e.: are they from rural, urban, or suburban areas and what are their ethnic backgrounds)?

Narratives in Ethnographic Studies

In narratives, narrators tell a story about their experience and give it "narrative form," positioning themselves in time and space, while giving order to, and making sense of, what occurred (Bamberg, 2012). Narratives, therefore, provide a way for researchers to understand another's realm of experience from the narrator's point of view, giving insight into the meanings they draw from an experience, thus informing researchers on the means in which narrator's make sense of a particular experience (Bamberg, 2012; Kohler Reismann, 2005; Sikes & Gale, 2006). Therefore, when conducting a narrative analysis, researchers systematically analyze narratives in order to interpret narrative means or to better understand a particular experience (Bamberg, 2012; Kohler Reismann, 2005). In this study, the area of interest was not to understand how the narrators told their stories, but to understand the particular experiences or themes the narrators described.

Using narratives to recount experiences has a storied history that dates back to 1500 BCE when epic forms recorded historical experiences (Bamberg, 2012). Epic forms of narrative were soon joined by folk tales, fables, and travelogues that evolved into in

the Romantic novel form beginning around 1200 and culminating around 1600-1750 (Bamberg, 2012). This quickly gave rise to the writing and reading of letters, confessions, and memoirs that lead to interest in personal histories, biographies, life histories, and autobiographies of lived events and self-exploration (Bamberg, 2012). As such, the narrative form is an acknowledgement that who individuals are, or who they think they are, is revealed by the stories they tell (Bamberg, 2012). By extension, when researchers interpret narratives, they enter into a process of co-creating stories with narrators, as researchers interpret stories through their unique perspectives that may not reflect the narrators' true meanings or intentions (Sikes & Gale, 2006). Therefore, although the researcher in this study took care to remain unbiased and refrain from inserting preconceived notions of the NJSOC experience into the final narrative, caution must be taken not to extrapolate these findings to reflect the exact intentions and meanings of the narrators. Furthermore, it is possible that the narrators themselves were influenced to frame their experiences in a more positive light, whether due to personal interests, such as not wanting to offend administrators and impact their professional references, or to detract from any personal weaknesses as outdoor environmental educators.

Results

Participant Post-Program Responses

The majority of student participants (83%) disagreed that the program had too many rules. There was no relationship between a respondent's gender, χ^2 (1, N = 219) = 0.22, p = .64; or ethnicity, χ^2 (1, N = 219) = 2.8, p = .42, and their perceptions of the program's rules.

A slight majority of the respondents (65%) disagreed that the program was just what they expected. There was no relationship between a respondent's gender, χ^2 (1, N = 219) = 0.89, p = .34; or ethnicity, χ^2 (1, N = 219) = 2.0, p = .56, and their expectations of the program.

The majority of respondents (95%) agreed that the program made them feel closer to nature. There was a significant relationship between the respondent's gender and their perceptions of closeness to nature, χ^2 (1, N = 219) = 4.34, p = .04. Females' were more likely to agree that the program made them feel closer to nature than males. There was no relationship between a respondent's ethnicity and their perceptions of closeness to nature, χ^2 (1, N = 219) = 2.1, p = .55.

The majority of respondents (85%) agreed that the program gave them enough free time in nature. There was no relationship between the respondent's gender, χ^2 (1, N = 219) = 3.63, p = .06; or ethnicity, χ^2 (1, N = 219) = 4.5, p = .21, and their perceptions that the program gave them enough free time in nature.

The majority of respondents (95%) agreed that they would come back to the program again. There was no relationship between the respondent's gender, χ^2 (1, N = 219) = 1.3, p = .25; or ethnicity, χ^2 (1, N = 219) = 1.9, p = .60, and their likelihood of returning to attend the program in the future.

Americorps Teachers' Responses

The Americorps teachers were in agreement that the program fosters increased connection to the natural world due to the immersive nature of the program and the novelty of the environment. One volunteer commented that "students are more aware of

their surroundings, more curious about their environment, and retain and repeat the facts they learned during their NJSOC trip." The respondent stated that the participants are "less afraid of nature" and become "more interested in protecting it" through actions such as "picking up litter, turning off the lights when leaving a room, and being careful not to step on insects." Additionally, she commented that the children develop a sense of camaraderie with one another as a result of attending and completing the program together. Another teacher commented that she loves working at the NJSOC because urban students who may not get to experience nature like that found at the NJSOC "really enjoy and soak up everything they can while visiting." She stated that it was "rewarding to see students who at first are not thrilled about being here, and how that changes as they learn, and do more activities." Another teacher commented about the effects of learning at the NJSOC and how many visiting students who may have never been exposed to similar environments, i.e. "being outside in the woods" are "cautious and hesitant and, at times, afraid of new species they encounter;" however, "during their stay they learn about the plants, animals, and insects they were unsure of before" and the "more they learn, the more comfortable they get." She noted that "by the end of their stay, students will be touching, taking photos of, and positively interacting with the organisms they were so cautious of a few days prior."

The teachers agreed that the NJSOC program is beneficial to participating students and visiting teachers. One teacher commented that the program offers students many benefits including the ability "to learn in a new environment through discussion and exploration in the field, and by fostering a connection between themselves and their

environment." She believes that this not only "makes the students more likely to care about conservation," but that "it allows them a break from the traditional classroom environment, in favor of spending time in nature, something many of the students don't do often." Another teacher commented that learning outdoors allows students who may not succeed in the traditional classroom environment to flourish. Two of the teachers noted that an important benefit of the NJSOC experience is that children gain independence while away from home. For example, one teacher stated that the program is a "great way for kids to learn how to be more independent without their parents being around" while having access to adult role models. Two of the teachers noted that the NJSOC is a bonding experience for the students. They believe this is a result of the novel nature of the program, the "unique experience of an overnight trip," and team-building activities. Finally, one of the teachers commented that the NJSOC program also benefits visiting teachers who are able to gain "new insight into ways to incorporate outdoor and experiential learning into their own curricula."

The teachers agreed that the program was beneficial to participants regardless of their place of residence or gender. They noted that there were baseline differences in the nature and environmental perceptions, knowledge, experience, and comfort levels of children from rural, suburban, and urban environments, but did not mention noticing differences in perceptions based on children's gender. For example, one teacher commented that "students from local rural schools tend to have more background knowledge and have less fear than urban students" and that "urban students tended to have more fear about nature, but depending on the individual student as well as the

leadership from the visiting schools, urban students seemed to have the potential for the most impactful trip." The teachers credited adaptive instruction and a focus on creating a learning environment that is positive, fun, and enjoyable with the NJSOC's success with children of different cultures and genders.

The teachers suggested several changes in order to improve the NJSOC experience, including improving chaperones' training, updating facilities, and linking NJSOC lessons with what the children are learning at school. For example, two of the teachers commented that there is a need to "prep visiting adults thoroughly." One teacher stated that "some chaperones are obviously uninterested, distract from class with their conversations or cell phone use, or are very unsure or confused by what their trip entails." This same teacher thought it was important to avoid "scaring the students by telling scary stories, jumping out to scare them in the dark and spreading misinformation about bears and other wildlife." Another teacher noted that "students grow and learn more without parents present" and stated that "when parents are around they inhibit their child's ability to be fully present in the class." She recommended separating parent chaperones from their children during lessons or classes. Another teacher shared that there is value to knowing what the participants are learning in school in order to "tie everything together" and demonstrate how what is taught at the NJSOC applies "to the outside world." She recounted a previous experience in which Americorps teachers took NJSOC lessons to the classroom, and linked their teachings to those of the school's curriculum. It was her belief that this helped supplement what the students were learning at school. Finally, a

teacher recommended that the cabins and other facilities were updated in order to "be more welcoming and comfortable" to visiting students.

The teachers agreed that the NJSOC experience conformed to, or exceeded their expectations, and contributed to their own development as educators. One teacher commented that she "learned quite a lot" including the "facts or skills for each class" and "teaching and classroom management skills." She believes the programming is "excellent and varied, and that it provides a rich learning experience." Another teacher thought that the "techniques used in teaching and the independence given to the students during class is great" and that the students are "engaged, and encouraged to ask questions and explore on their own." She thought that this approach accommodated participants' unique learning personalities, i.e. solitary learners could explore on their own, and students who preferred to learn in pairs or in groups could do so as well. Finally, another teacher shared that the experience allowed her to learn, and better herself as a result of the diverse activities offered at the NJSOC.

The three teachers agreed that the program was a positive experience for participating students and teachers. One teacher commented that she wishes that "everyone could experience something like the NJSOC program" and that programs like the NJSOC "create life-long memories for students and teachers alike." She believes that the program is "a great way for the students to bond with one another and their teachers," and that it is "a great hands-on learning experience" that "benefits students immediately as well as in the long term." Finally, another teacher thought that the program "is an excellent opportunity for the schools it serves as well as the Americorps members who

serve there." However, she suggests that there is room for improvement and that "with a little bit more innovation to update lesson plans and classroom buildings" that the "program can go from excellent to outstanding."

Program Administrator's Responses

The program administrator commented that "the program is very effective in reaching a majority of our participants with the conservation message." According to the administrator, the NJSOC's present audience consists of mainly fifth, sixth, and seventh graders and their teachers, but that the organization has a 65-year history of "offering environmental education programming for teachers, students, and interested citizens." He commented that "many believe that the roots of environmental education emerged from a handful of conservation professionals that passed through the NJSOC early on and left their mark" there.

The administrator commented that the main emphasis of the NJSOC has always been and continues to be "to bring participants into the outdoor classroom and immerse them in hands-on activities involving exploration and discovery." He notes that "as students become even more disconnected from the natural environment, this emphasis becomes even more important." He highlights the fact that the goal of the organization is to "turn them on" to the wonders of the natural world, a goal that continues to drive the NJSOC to this day. He notes, that although the goals have stayed the same, the organization has incorporated new technology into the experience including digital cameras and GPS units to facilitate bridging the gap between children and nature.

The administrator provided his opinion of the strengths and weaknesses of the NJSOC program, stating that there are "three prongs to every residential EE experience," which include educational sessions, food, and lodging. He states that the NJSOC's strength has always been the quality of the educational sessions they deliver. These strengths lie in the fact that "the majority of the classes are taught by full-time faculty that have dedicated their professional lives to delivering high quality classes about the environment." Faculty not only teach visiting students, but go on to train and be supported by graduate students and Americorps members, who themselves "receive high quality training and are evaluated in the field to ensure they are delivering the very best programming." Despite the strengths of the educational prong of the NJSOC, the administrator admits that one of the program's weaknesses is the food that is fed to participants. Although he asserts that the food is good, he notes that the NJSOC "could do a better job of introducing a more nutritious, environmentally-friendly diet, i.e. a diet that includes less meats and more organic vegetables." Finally, he acknowledges that the lodging facilities do not meet the needs of modern society, and that "buildings that are comfortable and environmentally-friendly would be more livable and serve as examples for how we can live with a smaller carbon footprint."

The administrator estimates that the NJSOC has served over a half a million people in its 65 years of existence. When he first arrived at the school in 1989 they were serving 10,000 students and teachers each year, but as a result of changes in state funding and an increased emphasis on testing, they are currently serving half that number.

The program administrator responded that the NJSOC serves "a wide variety of schools including some from the wealthiest districts to the poorest districts in the state; private and public institutions, ethnically-diverse and homogeneous, rural, urban, and suburban." In short, the audiences are diverse, suggesting that the program does what it can to reach out across populations to ensure access to nature and outdoor environmental education.

Discussion

Participants' Responses

Overall, participating children positively perceived the NJSOC environmental education program. The majority of the respondents were in strong agreement that the program did not have too many rules, that it made them feel closer to nature, and that it gave them enough free time in nature. Additionally, the majority of respondents agreed that they would return to the program if they were given the opportunity to do so. Although a slight majority of the children did not think the program was what they had expected, it is difficult to tell whether they thought the program fell beneath or exceeded their expectations because of the way the question was framed and because space for additional comments was not provided.

When assessing the children's responses to determine if their gender or ethnicity were associated with their experience and perceptions about the NJSOC program, there was one instance of statistical significance by gender in relation the statement: *The program I just completed makes me feel closer to nature.* A significantly greater percentage of females thought that the program made them feel closer to nature.

Although it is pure speculation, it is possible that the program allowed girls to spend more time in nature than they are allowed at home. Studies have shown that female children tend to have smaller home ranges, and greater restrictions on their daily travels than their male counterparts (Brown, Mackett, Gong, Kitazawa, & Paskins, 2008; Matthews, 1986; O'Brien, Jones, Sloan, & Rustin, 2000; Spilsbury, 2005; Villanueva et al., 2012). For example, O'Brien et al. (2000), found that girls spend less time using public urban spaces, and that when they are outside they are more likely to be supervised by adults. Similarly, Brown et al. (2008), found that girls rarely or never played outside and particularly not out of sight of their home. Spilsbury (2005), found differences between girls' and boys' home ranges in a neighborhood with elevated levels of violence. He notes that a girl's home range when playing alone consisted of the sidewalk on her side of the street and extended to friends' houses adjacent to her home (Spilsbury, 2005). However, when the girl was accompanied by a friend, her home range extended around the block. Unlike the girl, the boy's home range, whether alone or accompanied by friends, extended to two or more blocks in all directions (Spilsbury, 2005). Girls' limited home ranges are largely attributed to parental fears of abduction, stranger danger, and traffic, and can affect girls' development, agency, independence, and confidence (Brown, et al., 2008; O'Brien et al, 2000; Villanueva, et al, 2012). It is possible that girls' limited home ranges can create a psychological distance from nature that could have serious environmental and social repercussions, as previous research has shown that females tend to espouse stronger pro-environmental worldviews and behaviors (Hunter, Hatch, & Johnson, 2004; Ozanne, Humphrey, & Smith, 1999; Zelezny, Chua, & Aldrich, 2000).

Therefore, limiting access to local nature and the environment and suggesting that nature or outdoor environments are threatening or dangerous places could impact females' abilities to develop pro-environmental attitudes and connections to nature. However, this study's results suggest that spending time "in nature" without parental supervision, while accompanied by peers, may allow females to develop a closeness to nature that they were previously unable to cultivate. It is likely that allowing girls, particularly girls growing up in urban environments, access to nature through outdoor environmental education programs can positively impact their connection to nature and self-development in light of truncated home ranges.

Americorps Teachers' Responses

Although strictly anecdotal, the Americorps teachers' responses are valuable for assessing the effects and impacts of the NJSOC outdoor environmental education program in that they provide a first-hand account from the perspective of individuals who have lived with and taught participating students and visiting teachers. Additionally, the teachers themselves spent countless hours immersed in the NJSOC environment and curriculum, making them intimately familiar with the program's nuances, educational materials, and state of the facilities. As such, they provide valuable information to administrators and those interested in EE about what works and doesn't work when teaching children of diverse backgrounds, and when training future environmental educators. It is encouraging to note that all three of the teachers provided positive feedback about the program that included a visible change in participants and visiting teachers, and in their own professional and personal development. While it is difficult to

measure exactly how impactful or lasting the NJSOC program ultimately is, it is apparent that according to the Americorps teachers, it has the capacity to effectuate positive change and lead to greater connection between participants and nature. For example, although participants from urban areas arrived with distinct perceptions of nature and different comfort and knowledge levels, the program bridges experiential and knowledge gaps to meet and reach students across the board, resulting in an impactful experience. Urban children experience a marked and noticeable increase in comfort with and knowledge of nature that the Americorps volunteers were able to detect. This suggests that the program reaches a population of children who may have previously not had the opportunity to connect with the natural world except through the direct contact and experience provided by the NJSOC. Yet, despite the perceived positive impact the program has on urban children, the teachers' responses about what needs improvement suggests that the NJSOC has room to grow, particularly in regards to linking lessons with what the children are learning at school, improving chaperones' education, and updating facilities so that they are modernized.

Program Administrator's Responses

The program administrator describes an organization that prides itself in reaching out to a diverse array of students through strong educational and experiential programming. He frames the NJSOC as an organization with a historical reputation for delivering successful and impactful environmental education with both societal and environmental reach. Although his perspective is likely biased toward the NJSOC as a result of his decades of tenure and involvement in creating and shaping programming

materials, his input is important in lending a deeper understanding of the program's efficacy and its future direction as a force in outdoor environmental education. The administrator did not note any particular curricular or programming changes that need to be made in order to make the experience more relevant to students from diverse socio-economic backgrounds, suggesting that the program does its best to consider diverse audiences and their unique needs. However, he does suggest that there is room for improvement in the food and housing options. Although seemingly unimportant in relation to EE and curricular development, what participants experience, including their housing and food options would appear to matter in that they can influence how children will ultimately feel about an experience. Furthermore, providing food options that include less meat and more organic or locally-grown foods would suggest a greater commitment to environmental protection that can be turned into an educational moment. As such, it is highly recommended that the NJSOC make the changes necessary to improve both the experience of attending the program and the program's place as a leader in environmental protection.

Conclusions

The NJSOC 3-day 2-night program appears to be influential to its stakeholders, including participants, student educators, and administrators. The program is an experience that participants enjoyed, perceived as valuable, and that appeared to improve connections between the natural world and female respondents, in particular. According to Americorps teachers, the program is beneficial to students from diverse backgrounds in that it provides the knowledge, exposure to nature, and opportunities to grow as

individuals and as part of the group that are necessary for children in this age range. Additionally, the program administrator believes that the program with its rich history of EE and its ability to reach audiences of diverse backgrounds, ages, and educational levels, has and continues to contribute to EE in New Jersey. The NJSOC program, despite decreased funding, appears poised to continue to educate children and adults in NJ about the environment. It creates a positive environment for participants to learn and grow and to cultivate a relationship with the natural world that is particularly important to urban children whose numbers are increasing and whose opportunities to connect with the natural world are often limited. As such, the organization is taking strides to be a change agent in the world of EE and in the lives of countless children.

Study Limitations

This study's limitations include an inability to conduct interviews with the children who participated in the study, and a lack of a comments section where children could have explained or elaborated on their answers. As such, similar studies, whenever possible should include an interview session with respondents and/or include a comments section to gauge participants' interest in a program and to clarify their responses. This allows participants to share their perceptions, opinions, and experiences in their own words, and provides much needed insight and feedback about what programming works and what may need improvement from the perspective of the children who attend the program, which would yield more nuanced results and more detailed information that researchers and administrators can draw from.

Chapter 6. Conclusions, Implications, and Future Research

Introduction

This dissertation has explored the nature conceptions, ecological worldviews, and environmental perceptions and preferences of urban children from a city in northern NJ who participated in the NJSOC's 3-day 2-night outdoor environmental education program. This dissertation utilized a pre- and posttest design in order to determine the effects of the NJSOC's EE program. Children's nature conceptions, ecological worldviews, and environmental perceptions and preferences were compared in terms of gender and ethnicity, in order to determine if these factors are variables in children's nature conceptions, ecological worldviews, and environmental perceptions and preferences. A mixed-methods approach was utilized that included the following instruments: (1) the NEP Scale for Children to determine children's pre- and post-program ecological worldviews; (2) photo-elicitation techniques designed for this dissertation to determine children's environmental perceptions and preferences; and (3) the Draw Nature test adapted for this dissertation to determine the children's nature conceptions. For additional insight, the children completed a post-program closed-ended questionnaire about their NJSOC EE experience. Americorps teachers and an NJSOC program administrator completed open-ended online questionnaires designed for this dissertation in order to share their insights about the NJSOC program from their unique perspectives. Americorps teachers and the program administrator were asked to share their perceptions of the program's efficacy, noticeable impacts on students, and its strengths and weaknesses. Additionally, the program administrator provided valuable

historical context, information about the current state of the NJSOC, and its future directions. Overall, the dissertation demonstrates that urban children: (1) espouse pro-ecological worldviews as measured by the NEP Scale for Children that are comparable to, and at times, stronger than children from other suburban, rural, or urban areas; (2) hold positive perceptions of both *natural* and *urban* environments that are not dilapidated and exhibit a form of detectable structure; (3) perceive environments for their safety or lack thereof; (4) have stable and persistent environmental preferences that do not appear to be impacted by a short-term EE intervention; and (5) have an object view of nature and conceive it as consisting of a series of living and non-living things that exhibit limited interactions with one another and include little to no human presence. Finally, the findings of this dissertation demonstrate that the NJSOC EE program had limited and mixed-effects on the children's nature conceptions, ecological worldviews, and environmental preferences and perceptions.

This dissertation is important because it provides insight on the nature conceptions, ecological worldviews, and environmental perceptions and preferences of urban children, who are an increasingly important, yet underrepresented group. Although recent EE and NDD scholarship suggests that children are growing up distanced from nature due, in part, to increasing urbanization; the EE literature tends to over-represent adults and suburban or rural children's nature conceptions, ecological worldviews, and environmental perceptions and preferences. As such, there is limited knowledge of urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences. By extension, there is little knowledge of the effects of EE programs on

urban children. However, with increased awareness of the effects of disconnection from nature on both urban children and the environment, researchers are increasingly exploring and calling for additional research on this population (Aaron, 2009; Aaron & Witt, 2011; Ataov, 2004; Bixler, Carlisle, Hammit, & Floyd, 1994; Boeve-DePauw & Van Petegem, 2012; Bogner & Wiseman, 2004; Bowker, 2007; Burgess & Mayer-Smith, 2011; Charles & Louv, 2009; Faber Taylor & Kuim 2006; Johnson, Bowker, Bergstrom, & Cordell, 2004; Kahn & Friedman, 1995, 1998; Larson, Castleberry, & Green, 2010; Milton & Cleveland, 1995; Rebar, 2005; Rickinson, 2001; Rideout, 2000; Shepardson, 2005; Shepardson, Wee, Priddy, & Harbor, 2007; Simmons, 1994; Strife & Downey, 2009; Van Petegem & Blieck, 2006; Warren, 2005; Wilhelm & Schneider, 2005). This dissertation has contributed to the research by increasing understanding of this populations' baseline nature conceptions, ecological worldviews, and environmental perceptions and preferences, by providing insight on whether children from urban environments are less likely to espouse pro-ecological worldviews, by helping to determine what constitutes nature to children from urban areas, and by providing insight on the effects of a long-standing EE program on urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences. This information is of particular importance to environmental educators and curriculum developers who require this knowledge in order to design EE programs that address and allay fears and misconceptions, improve acquisition of environmental awareness and knowledge, and create connections to the natural world. Furthermore, the insight provided by this dissertation is of value to environmental managers who will increasingly manage urban and urbanizing

environments, and, therefore, interact with urban stakeholders who tend to be differentially impacted by the process of urbanization and may be less trusting of officials and the development process. By understanding urban children's nature conceptions, ecological worldviews, and environmental perceptions and preferences, environmental managers can better communicate with urban stakeholders to ensure that management plans meet the populations' needs, which can create livable environments that not only protect non-human nature, but also protect the people living in managed areas.

This final chapter of the dissertation begins with a summary of the major insights and contributions to environmental education. It concludes with implications for EE and environmental management, questions raised by the dissertation, and suggestions for future research.

Major Insights and Contributions to Environmental Education

New Ecological Paradigm Scale for Children – Urban Children's Ecological Worldviews

The extant literature suggests that children in general, and urban children in particular, lack access to nature and may therefore be less likely to espouse pro-ecological worldviews. However, this dissertation shows that the group of urban children who participated in the research espoused strong ecological worldviews that are comparable to children from other urban, suburban, and rural areas, and countries. This suggests that other factors such as age, social mores, and school curriculum, not place of residence, ethnicity, or gender, may be factors in the development of pro-ecological worldviews. For example, the original NEP Scale was developed in the 1970's in

response to shifts in worldviews from the American dominant social paradigm that encouraged a commitment to abundance, continual progress, individualism, property rights and laissez faire economics, to a new ecological paradigm recognizing that human beings can upset the balance of nature, that growth has limits, and that human beings do not have the right to rule over nature (Amburgey & Thoman, 2012; Boeve-de Pauw, Donche, & Van Petegem, 2011; Dunlap, Van Liere, Mertig, & Jones, 2000; Dunlap, 2008; Dunlap & Van Liere, 2008). The notion that there has been a paradigm shift in social and environmental values since the 1970's can explain why today's children, even those growing up in urban areas where access to nature may be limited, hold pro-ecological worldviews. It is likely that schools teach children to value the natural world, the importance of taking action to protect the environment and its resources, and to behave in ways that can curtail environmental degradation and destruction. This would explain, why despite less access to nature than their suburban or rural counterparts, urban children espouse comparable pro-ecological worldviews. Of course, due to limited access to participants, it was not possible to interview them to inquire what influenced their ecological worldviews, but from the work in this dissertation and previous research, it seems possible that urban children have been inculcated into an environmentally-conscious mindset that is largely a product of Western society's greater environmental awareness and knowledge.

This dissertation demonstrates that the NJSOC program did not positively influence participating children's ecological worldviews. According to the findings of this dissertation, in many cases, the children arrived at the NJSOC with stronger pro-

ecological worldviews than when they took the posttest survey at the end of the EE program. This is not to suggest that NJSOC programming had a negative impact on urban children's ecological worldviews. Instead, it is possible that the program did not target ecological worldviews as measured by the NEP Children Scale or that a host of factors could have acted to impact posttest scores. A possible explanation is that the children had such high NEP Scale for Children baseline scores that a ceiling effect was reached. This seems likely because participants' scores were not only comparable to those of children who participated in other NEP Children Scale studies, but in many cases, they were slightly higher. Furthermore, it is also possible that the decline in scores could be attributed to boredom with the survey instrument. The pre-test survey was administered during program orientation when the children arrived at the NJSOC excited, uncertain, and receptive to teachers, administrators, and the researcher, so it is possible that they gave greater attention and importance to the survey instrument. However, after 3-days and 2-nights in attendance, it is likely that the children were fatigued and less enthusiastic to engage in an activity that resembles school work. This could have resulted in a devaluation of the survey, and rush to complete the it in order to return home. In addition, situational factors at the NJSOC could have contributed to a decline in posttest scores. It is possible that extended inclement weather, disappointment with housing options, general exhaustion from continuous activities, and cognitive overload from exposure to new environments, information, rules, and social interactions could have led to a posttest decline. As such, although the findings suggest that the NJSOC program did not positively impact the children's ecological worldviews, it is not possible to claim that the

program was ineffective, as many factors remain to be explored. Despite the unknowns, the findings of this dissertation suggest that EE programs may not effectuate positive changes in ecological worldviews, particularly in populations that already demonstrate strong adherence to pro-ecological worldviews.

Photo-elicitation – Urban Children's Environmental Perceptions and Preferences

This dissertation utilized photo-elicitation to capture urban children's environmental perceptions and preferences. Images depicting so-called *natural* and *urban* environments consisting of a Natural Stream, an Urban Waterfront, a House in the Woods, Urban Houses, Wild Animals (a trio of black bears in a tree), and Domesticated Animals (dogs playing in a park) were projected on a white screen and children were asked to determine whether they thought they were *good* or *bad*, *pleasant* or *unpleasant*, *safe* or *unsafe.* Additionally, the participants were asked to circle the environment they preferred and to share what they thought of the environments they viewed by generating an adjective list. The findings of this dissertation demonstrate that participating children held positive perceptions of all of the environments they assessed, except the urban houses which depicted an abandoned and dilapidated urban landscape. This suggests that children can find value in diverse environments as long as they do not appear unstructured. Furthermore, the findings of this dissertation demonstrate that participating children regularly perceived the environments they viewed in terms of the affordances, particularly the safety of, the environment in question. Although their personal safety was a primary concern, the respondents demonstrated that whether they perceived an

environment as *safe* or *unsafe*, it was still possible for them to develop affective connections to an environment, and to appreciate an environment's aesthetic value.

The respondents generated adjective lists that were grouped into the categories aesthetic, affective, descriptive, and environmental/ecological responses. The majority of respondents simply described the images that they viewed, and many children, although to a lesser degree, perceived environments in terms of their aesthetic and affective qualities. The children who participated in this research were less likely to perceive an environment in terms of its environmental or ecological properties, or the affordances it could provide other species. This is particularly relevant in light of EE. Although Burgess & Mayer-Smith (2011), found that children were less likely to think in terms of ecological relationships prior to attending an EE program, after completing the program, their study population demonstrated an increase in ecological awareness. In this dissertation, both pre- and posttests demonstrate that participants had low rates of ecological awareness, and that this was not improved by attending the NJSOC program. This observation is important, because it suggests that despite attending a program that is geared toward increasing environmental and ecological awareness, connection, and knowledge, the children's pre-existing perceptions did not appear to change as measured by posttests. This is not to suggest that the NJSOC program did not improve participating children's overall environmental or ecological awareness, but that it was not detected by the instrument used in this assessment. Determining the reasons why awareness did not appear to increase would have been possible had the researcher been granted the opportunity to conduct posttest interviews with respondents. Furthermore, the adjective

list portion of this instrument elicited low response rates, particularly in posttests, which impacted analysis and generalizability even within the study population itself.

Pre- and post-program assessments of the children's environmental preferences were conducted in order to determine if attending the NJSOC EE program effectuated changes. According to the findings, participating children appear to have stable and persistent environmental preferences that were only minimally impacted by the NJSOC EE program. Pre-tests demonstrated that the majority of the children preferred the environments depicted in the Urban Waterfront, the House in the Woods, and the Domesticated Animals. Posttests demonstrated that after attending the NJSOC program, there was a slight, but significant increase in the percentage of female respondents who preferred the House in the Woods. Although it was not possible to ask respondents what impacted their preferences due to access limitations, it is possible that the observed changes could be explained by the respondents' experience in the NJSOC cabins. The NJSOC cabins resemble a smaller version of the house featured in the House in the Woods image. Perhaps, female respondents positive experience staying in the cabins than impacted posttest responses. Although purely speculative, changes in preference by gender could be attributed to a host of factors including socialization preferences, or exposure to novel environments. For example, while staying in the cabins, participants live communally in a small shared space. Females may be more receptive to these living arrangements than males. Furthermore, it is possible that female respondents were less likely to have gone camping or participated in outdoor pursuits than their male counterparts, increasing the novelty of the experience while addressing any pre-existing

misconceptions and fears of nature and the outdoors. Despite the speculative nature of these conclusions, the findings of this dissertation are of relevance to EE, because they demonstrate that environmental preferences can, in some cases, vary by gender and may be impacted by program characteristics, socialization preferences, and previous experience.

Draw Nature – Urban Children's Conceptions of Nature

This dissertation utilized adjective lists and an adaptation of the Draw Nature test to capture participating children's nature conceptions. These two approaches were utilized in conjunction in order to compare children's nature conceptions using both the written word and drawings in order to understand how they describe and depict nature, and if their descriptions and/or depictions changed after attending the NJSOC EE program. The findings of this dissertation demonstrate that participating children communicated their nature conceptions more effectively using the written word, indicating that drawing tests may not always be an appropriate evaluative tool. For example, when asked to describe nature in their own words, the children listed 214 unique adjectives; however, when asked to draw nature, the children drew 42 unique objects. Additionally, female respondents communicated more nature conceptions both in writing and drawings. Female respondents listed 154 adjectives to males' 134, and females drew 35 objects to males' 29. The discrepancy between writing and drawing, could be explained by several factors. This dissertation included children in their middle years, who are less likely to utilize drawing as a form of self-expression. At this age, writing has largely replaced drawing as a way in which to express one's thoughts,

feelings, and perceptions. As such it is likely that children in this age range lose their comfort expressing themselves by drawing or may no longer find it appealing. A lack drawing practice or a belief that one lacks drawing abilities could also make drawing for self-expression challenging (Einarsdottir, Dockett, & Perry, 2009). Furthermore, this dissertation's methodological protocol limited the drawing implements to a black ink pen for pre-tests and a blue ink pen for posttests. The lack of drawing implement diversity could have inhibited or dulled children's interest and inspiration, which could have impacted the outcomes of the Draw Nature measure. Prevailing social mores could explain differences in the expressive abilities of male and female respondents. In general, females are encouraged to communicate their feelings and to share their ideas with others, which may increase their comfort and ability to express their nature conceptions as demonstrated by the data in this dissertation.

According to the findings, participating children, across gender and ethnicity, exhibited consistent and stable conceptions of nature that did not appear to be impacted by the NJSOC EE program. Both pre- and posttests demonstrate that children have an object view of nature in which it is conceived of as a series of living and non-living things that exhibit limited interactions with one another, and feature little to no human interference. However, although children's conceptions of nature were consistent across pre- and posttests, their descriptions and depictions of nature varied from one another. For example, when asked to describe in words, what they conceive of as nature, the majority of children listed trees and a variety of animals in their responses. However, when asked to draw nature, the majority drew forested environments that prominently

featured trees and the sun, and included animals to a lesser extent than they were mentioned in adjective lists. The differences between adjective lists and drawings could be explained by differing comfort levels with writing and drawing. Perhaps participating children could draw trees and the sun with a greater ability than they could draw animals. Unfortunately, due to access limitations, it was not possible to interview the children to understand why their nature conceptions varied across instruments. This suggests that the instruments and methodological protocols used to gauge nature conceptions are important. As such, in order to capture the broadest range of nature conceptions, and to include participants of all abilities, a multiple-methods approach that accounts for various communicative and expressive abilities should be utilized, and a diverse array of drawing implements should be provided in order to ensure fuller engagement and participation.

The pre- posttest approach taken in this dissertation did not allow for an evaluation of the NJSOC's program on participating children's nature conceptions, because posttest response rates were low. The approach utilized in this study was similar to Rebar's (2005) research approach in which he provided the participants in his study with a sheet of paper on which they could both describe and draw nature. Participants were provided with black ink pens to complete pre-tests, and blue ink pens to complete posttests, which allowed the researcher to detect changes to the children's nature conceptions. The same approach was taken in this dissertation, because there is no standard Draw Nature protocol, and because Rebar successfully captured changes in his study population's nature conceptions. Unfortunately, the majority of respondents in this study population chose not to make posttest changes to their adjective lists or drawings.

Although this could suggest that the NJSOC program did not impact the children's nature conceptions, it is also possible that the children chose to ignore the post-program evaluation for several reasons including boredom with the measure, fatigue from program activities, or a lack of desire to share their conceptions. Unfortunately, it was not possible to determine whether the program did or did not have an effect on the children's nature conceptions, because interviews were not granted.

Post-program Assessment – Stakeholders' Perceptions of the NJSOC

In order to understand stakeholders' perceptions of the NJSOC program, closed-ended questionnaires were presented to participating students and open-ended online questionnaires were presented to Americorps teachers and a program administrator. Participants' responses were assessed quantitatively using contingency tables and the Pearson Chi Square test to test for relationships between the respondents' gender and ethnicity and their responses. Americorps teachers' and the program administrator's responses were compiled and read to generate a narrative of the NJSOC program from their perspectives. Due to access and time restrictions, it was not possible to provide participants with open-ended questionnaires, so their post-program evaluations did not allow the children to clarify their choices or to make suggestions on how to improve the program experience. This was problematic when attempting to interpret why a slight majority (65%) of the respondents disagreed that the program was just what they expected. The statement's phrasing made it difficult to determine whether participants thought that the program exceeded or fell below their expectations. Unfortunately, it was not possible to conduct interviews with the children, so any attempts to tease out what the

majority of *no* responses indicated would be purely speculative. As such, this brought home the need to utilize open-ended questions whenever possible, or to include a comments section when personal interviews are not available. Unlike the questionnaire the program participants completed, Americorps teachers and the program administrator completed online open-ended questionnaires that allowed them to not only share their perceptions, but to expand upon their rationale. This approach simplified interpretation and provided greater insight into what the program is doing well and where it needs improvement.

The findings of this dissertation demonstrate that participants perceive the NJSOC EE program as a positive experience. The majority of participating children were in agreement that the program did not have too many rules, made them feel closer to nature, and gave the enough free time, and the majority agreed that they would come back to the program if given the opportunity to do so. Participants' responses suggest that they believed the program connected them to the natural world. That the program indeed creates connection between participants and nature was further emphasized when gender and ethnicity were taken into account. Although the findings suggest that program perceptions did not differ based on participants' ethnicities, gender arose as a significant factor in terms of the statement: *The program I just completed makes me feel closer to nature.* The data demonstrate that a significantly greater percentage of female respondents thought that the program made them feel closer to nature. This, once again, suggests that the NJSOC program had a differential impact on female participants. Although purely speculative, it is possible that the NJSOC EE experience gave female

participants the opportunity to spend more time in nature than they would typically be permitted at home. This is likely, because studies on children's home ranges have shown that females' home ranges are smaller, and that parents and caretakers place greater restrictions on girls' daily travels (Brown, Mackett, Gong, Kitazawa, & Paskins, 2008; Matthews, 1986; O'Brien, Jones, Sloan, & Rustin, 2000; Spilsbury, 2005; Villanueva et al., 2012). By participating in the NJSOC program, it is possible that female respondents were able to develop a closeness to nature that they were unable to cultivate in the past due to home range restrictions. This suggests that EE programs like the NJSOC may provide females with an opportunity to connect to nature that is unavailable to them in their daily lives. This finding is important because it suggests that EE programs may be a critical tool for connecting females to nature, particularly when nature is unavailable where they live or when parents restrict their movement at home.

The findings of this dissertation demonstrate that Americorps teachers and a program administrator were in agreement that the immersive and novel nature of the NJSOC program allows children from urban areas to learn about and connect to nature in ways that are not available to them in the city. Americorps teachers suggested areas for improvement that include improved training for chaperones so that they do not frighten participants or provide them with misinformation, improvement of lodging facilities so that they meet the needs of modern EE participants, and linking lessons learned at the NJSOC with those the participants are learning at school. The program administrator who participated in this research was in agreement that housing could be improved and updated, and also suggested improving the sustainability of food options by decreasing

the amount of meat served at the NJSOC. Americorps teachers noted that the NJSOC experience is beneficial to participants from urban areas, because although they were initially afraid of nature, they became more interested in caring for the natural world and the environment as a result of what they learned and experienced while in attendance. Their comments suggest that the NJSOC program successfully elicits change in participants' perceptions that results in an accumulation of knowledge, and a greater connection to the natural world that is noticeable even to novice teachers. Furthermore, Americorps teachers were in agreement that the structure of the program in which children of different cultural backgrounds interact with and complete the program together provides a range of benefits that include personal development and growth that creates community. Finally, Americorps teachers agreed that participating in the program was an enriching personal and professional experience that allowed them to improve their teaching skills.

Implications for Environmental Education and Management

This dissertation generated implications that are of interest to environmental educators and managers. The implications are discussed below and are by no means exhaustive. However, they are presented here in order to stimulate thinking and discourse on how the insights from this dissertation may impact environmental education and management in the future.

The widespread belief that urban children are less likely to espouse pro-ecological worldviews than their suburban or rural counterparts may not be true.

The findings of this dissertation demonstrate that the widespread belief that urban children, because they have less access to nature, are less likely espouse pro-ecological worldviews, is not always true. As such, environmental educators and managers must take note that urban children may be more aware of and concerned about nature and the environment than previously thought. This has implications for both environmental educators and managers who must impart knowledge and communicate information in ways that are appropriate to the audience at hand. As such, it may be necessary to scope educational programming to reflect a population of individuals who care about nature, but who may not have had much direct contact with it. This may also necessitate the inclusion of urban ecology and nature classes that teach children how to identify and connect to nature in cities. Environmental managers should consider the need for natural areas and environmentally and ecologically-friendly management practices, particularly in urban areas, in order to make up for historically disproportionate levels of environmental ills. Furthermore, both environmental educators and managers should allow urban children (and their caretakers) to be included in the decision-making process to ensure that any changes or management plans address the populations' specific concerns and needs.

Urban children's pro-ecological worldviews may be a reflection of an overall societal paradigm shift and not necessarily indicate direct experience or comfort with nature.

Although today's urban children appear to espouse pro-ecological worldviews, these worldviews could be a product of what the children have learned in school, from

television, or the internet, and not necessarily indicate direct experience or comfort with nature. As a result, urban children may harbor misconceptions, fears, and misinformation that need to be addressed by environmental education programming and management plans. Environmental educators and managers may wish to devise curriculum and management plans with input from urban children, teachers, and parents or caretakers. Simply presuming that pro-ecological worldviews indicate comfort in and experience with nature and natural environments could have the adverse effect of alienating children from nature if pre-existing perceptions are not taken into consideration and addressed. This suggests that both environmental educators and managers must clarify with their stakeholders what their nature and environmental knowledge and experiences are, what fears or misinformation they have, and identify their environmental preferences so that both educators and managers can improve stakeholder knowledge while creating educational programming and management plans that meet the needs of the population in question.

Environmental educators must be aware that curriculum and program activities may differentially impact female participants' ecological worldviews and environmental perceptions and preferences.

The findings of this dissertation suggest that female participants were differentially impacted by the environmental education program they attended. Although it is not possible to generalize these findings to the broader population, these findings warrant attention and further investigation. As such, it may be necessary for environmental educators to consider females' unique social position and take into

consideration their unique needs. As previously discussed, many females, particularly those living in urban environments, have truncated home ranges when compared to their male counterparts. This could affect their exposure to and comfort levels with nature which, in turn, could impact their ecological worldviews and environmental perceptions, and preferences, and as such, their preferred outdoor activities. Additionally, environmental education program directors may wish to consider expanding program offerings to include activities female participants are likely to enjoy. This would necessitate investigations that determine female participants' preferred activities, and may require an expansion of curriculum and additional instructor training. It was not possible to explore these preferences in this dissertation; however, the findings suggest that environmental educators should consider pre-existing gender differences in regards to environmental education programming and curriculum.

Future Research

As with many studies, this dissertation raised questions that warrant future investigation and research. The questions and other avenues for follow-up research are discussed and presented in the following paragraphs.

Question 1: What other factors could explain differences in children's nature conceptions, ecological worldviews, and environmental perceptions and preferences? Do these factors act individually or synergistically?

This dissertation focused on a group of urban children to determine their nature conceptions, ecological worldviews, and environmental perceptions and preferences and considered the factors gender and ethnicity as potential variables explaining any

differences. As a result of the research, and the limited statistically significant differences that arose by gender or ethnicity, it is likely that other factors may be influencing children's nature conceptions, ecological worldviews, and environmental perceptions and preferences. These factors could include age, socialization, social upbringing, lessons learned in school, parents' political leanings and educational background, and spiritual or religious affiliations. Additionally, it is likely that no single factor explains differences in nature conceptions, ecological worldviews, environmental perceptions and preferences. As such, it is recommended that future studies take into consideration a wider range of factors and take into account the effects of these factors individually and synergistically.

Question 2: Do environmental education programs differentially impact female participants?

The findings of this dissertation suggest that environmental education programs may differentially impact female participants. Both negative and positive differential effects arose that could be related to the NJSOC experience, although it is not possible to attribute causality to the program alone. Unfortunately, because personal interviews with participants were not granted by the Board of Education, it was difficult to determine why the program differentially impacted female participants. It is possible that negative changes in females' ecological worldviews are related to a lack of fit between female respondents and the activities included in the program, and that positive changes in environmental perceptions are related to increased opportunities to directly interact with nature while under less parental supervision and with greater freedom to explore on their own. In order to improve understanding and to determine whether the differential impacts

detected in this dissertation are generalizable to the broader population and other EE programs, it is recommended that future studies focus on the potential that EE programs could differentially impact female participants.

Question 3: Should both the unidimensional and three-dimensional model of the NEP Scale for Children be utilized in studies assessing children's ecological worldviews?

This dissertation utilized the unidimensional and three-dimensional models of the NEP Scale for Children to assess the ecological worldviews of urban children. Although both models provided insight into the children's worldviews, the three-dimensional version added nuance and gave deeper insight into what facet of ecological worldviews was impacted. In this dissertation, significant differences were limited to a decrease in female respondents' ecological worldviews. Although both models demonstrated this decrease, only the three-dimensional model elucidated that the decrease occurred in the Human Exemptionalism facet of the model. Knowing this information can assist in examining curriculum in order to address any areas that require reinforcing, updating, or retooling, so that EE programs and interventions positively impact students' ecological worldviews. As such, researchers could utilize both versions of the NEP Scale for Children in their studies or opt for the three-dimensional model in order to gain a more nuanced understanding of the areas of a program that are most impactful or that require examination. Further research on the two versions of the NEP Children Scale is recommended in order to determine if both models are necessary or if this determination is to be made on a case-by-case basis.

Question 4: How can the use of photo-elicitation techniques be adapted for widespread use in EE research?

This dissertation utilized photo-elicitation techniques in combination with written-response open-ended questions to understand the environmental perceptions and preferences of a group of urban children. Photo-elicitation was chosen because the vast majority of the EE literature is representative of research studies that utilize mostly questionnaires or surveys in order to gain insight into respondents' perceptions and preferences, despite photo-elicitation's widespread use in other disciplines. Additionally, because this study's population is children, the use of photos to elicit perceptual and preference responses seemed like an appropriate approach, since viewing images is likely more enthralling than responding to a questionnaire. As such, photos of diverse environments were presented to respondents as a way to elicit responses that would give insight into their perceptions of so-called *natural* and *urban* environments. Because there is no established protocol with which to conduct EE research using photo-elicitation, nor are there images or environments that are accepted as representative of *nature* or *urban*, per se, the research process was one of exploration and trial and error. However, this proved to make the process interesting, challenging, and rewarding. Although the researcher and dissertation advisor took care to select images that they agreed represent *natural* and *urban* environments, a protocol or standard set of images would have streamlined the process, and improved the changes for comparison studies. Improving the process of conducting research using photo-elicitation techniques seems necessary when

taking into consideration that the children responded to the images with excitement, and appeared to enjoy viewing the images, particularly those that included animals.

Question 5: How can Draw Nature tests be incorporated into the EE research to gain deeper insight into children's environmental conceptions?

Although the Draw Nature test used in this dissertation did not yield complete or generalizable results, previous researchers have utilized similar approaches successfully. This raises the question of how drawing tests could be modified or standardized to improve study outcomes and elicit valuable EE insight. Developing a standard research protocol could not only yield novel information, it could expand whose voices are heard in the EE research. For example, younger children's conceptions of nature could be studied with greater accuracy and children with developmental disabilities who may express themselves more clearly by drawing could share their unique nature conceptions, ecological worldviews, and environmental perceptions and preferences. As such, it is recommended that future EE research focuses on designing drawing instruments that will allow children to effectively express their conceptions of nature.

Question 6: When interviews are not granted, how can researchers clarify questions that arise during the research process?

Although it is ideal to include personal interviews when conducting research on anyone's conceptions, worldviews, perceptions, or preferences; interviews may not always be granted. What can researchers do to clarify questions that arise during the research process when they cannot directly interview respondents? Throughout this dissertation, lack of one-on-one access to participants proved to be a challenge. In order

to circumvent this limitation, participants were asked to provide adjective lists with which to detail their nature conceptions and environmental perceptions. Yet, in many cases, instead of yielding greater clarity, the adjective lists raised more questions. One potential solution to the problem that was considered in hindsight, is to include a comments section where respondents can explain their rationale. Furthermore, questions could be phrased to include "please explain your answers". However, this approach may be problematic when access to respondents is limited to 15 minutes at a time as was the case in this dissertation. Although all researchers hope for the best of study conditions in order to glean the most valuable information, limitations and restrictions may create conditions that do not lead to the greatest access to information. As such, it is recommended that alternate forms of information gathering are tested to determine if another research approach can be utilized in place of personal or group interviews.

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Appendices

Appendix A

New Ecological Paradigm Scale for Children Survey

****Please write your full first name and last name's initial _____****

Please answer the following questions:

A: What is your schools name? _____
B: Are you a **boy** or a **girl**? _____
C: What is your race/ethnicity? (circle the choices that apply)
Hispanic/Latino
African American
White
Asian
Other (please explain): _____

On a scale from 1 (strongly disagree) to 5 (strongly agree), please indicate how much you agree or disagree with the following statements:

1	2	3	4	5
Strongly Disagree				Strongly Agree

_____1. Plants and animals have as much right as people to live.

_____2. There are too many (or almost too many) people on earth.

_____3. People are clever enough to keep from ruining earth.

_____4. People must obey the laws of nature.

_____5. When people mess with nature it has bad results.

_____6. Nature is strong enough to handle the bad effects of our modern lifestyles.

_____7. People are supposed to rule over the rest of nature.

_____8. People are treating nature badly.

_____9. People will someday know enough about how nature works to be able to control it.

_____10. If things don't change, we will have a big disaster in the environment soon.

Appendix B

Photo-elicitation Survey for Environmental Perceptions and Preferences

****Please write your full first name and last name's initial
_____****

Please answer the following questions:

A: What is your school's name: _____

B: Are you a **boy** or a **girl**? _____

C: What is your race/ethnicity? (circle the choices that apply):
Hispanic/Latino
African American
White
Asian
Other (please explain): _____

Please circle one word for each of the pairs of choices:
Image 1A:
The image in this picture is?

Good or Bad

Pleasant or Unpleasant

Safe or Unsafe

What other words would you use to describe the scene?

Image 1B:

The image in this picture is?

Good or Bad

Pleasant or Unpleasant

Safe or Unsafe

What other words would you use to describe the scene?

Image 2A:
The image in this picture is?

Good or Bad

Pleasant or Unpleasant

Safe or Unsafe

What other words would you use to describe the scene?

Image 2B:
The image in this picture is?

Good or Bad

Pleasant or Unpleasant

Safe or Unsafe

What other words would you use to describe the scene?

Image 3A:
The image in this picture is?

Good or Bad

Pleasant or Unpleasant

Safe or Unsafe

What other words would you use to describe the scene?

Image 3B:
The image in this picture is?

Good or Bad

Pleasant or Unpleasant

Safe or Unsafe

What other words would you use to describe the scene?

Appendix C

Wilcoxon Signed-Rank Test Results

Environmental Perceptions

Pre- and Posttest differences (Post-Pre) in environmental perceptions, results of non-significant Wilcoxon signed-rank tests. Significant findings are in the text.

Environment	**Perceptual Pair**	**Z**	***p***
Natural Stream	Good/Bad	38.5	.13
	Pleasant/Unpleasant	-27.5	.29
Urban Waterfront	Good/Bad	-7.5	.51
	Pleasant/Unpleasant	0	1.0
	Safe/Unsafe	-42.0	.14
House in the Woods	Good/Bad	-10.5	.58
	Pleasant/Unpleasant	54.0	.06
Urban Houses	Good/Bad	-29.0	.46
	Pleasant/Unpleasant	13.5	.63
	Safe/Unsafe	-10.5	.82
Wild Animals	Safe/Unsafe	45.0	.06
Domesticated Animals	Good/Bad	46.0	.09
	Pleasant/Unpleasant	18.0	.54

Within group pre- and posttest differences by gender (Fpost-Fpre; Mpost-Mpre) in environmental perceptions, results of non-significant Wilcoxon signed-rank tests. Significant findings are in the text.

Environment	**Perceptual Pair**	**Gender**	**Z**	***p***
Natural Stream	Good/Bad	F	6.0	.45
	Pleasant/ Unpleasant	F	7.5	.51
	Safe/Unsafe	F	10.0	.12
	Good/Bad	M	-15.0	.23
	Pleasant/ Unpleasant	M	9.0	.29
	Safe/Unsafe	M	12.5	.18
Urban Waterfront	Good/Bad	F	-2.5	.63
	Pleasant/ Unpleasant	F	-.50	1.0
	Safe/Unsafe	F	-21.0	.07
	Good/Bad	M	-2.5	.63
	Pleasant/ Unpleasant	M	1.5	.50
	Safe/Unsafe	M	0	1.0
House in the Woods	Good/Bad	F	-2.5	1.0
	Pleasant/ Unpleasant	F	10.5	.58
	Safe/Unsafe	F	-13.5	.07
	Good/Bad	M	-2.5	.63
	Pleasant/ Unpleasant	M	7.5	.51
	Safe/Unsafe	M	17.0	.45
Urban Houses	Good/Bad	F	0	1.0
	Pleasant/ Unpleasant	F	-1.5	1.0
	Safe/Unsafe	F	-5.5	.75
	Good/Bad	M	9.0	.55
	Pleasant/ Unpleasant	M	11.0	.34
	Safe/Unsafe	M	4.5	.73
Wild Animals	Pleasant/ Unpleasant	F	-17.5	.27
	Good/Bad	M	24.5	.09
	Pleasant/ Unpleasant	M	25.5	.21

	Safe/Unsafe	M	11.0	.34
Domesticated Animals	Good/Bad	F	3.5	1.0
	Pleasant/ Unpleasant	F	-12.5	.18
	Safe/Unsafe	F	7.5	.51
	Good/Bad	M	4.5	.38
	Pleasant/ Unpleasant	M	7.5	.51

Across group pre- and posttest differences by gender (Mpre – Fpre; Mpost-Fpost) in environmental perceptions, results of non-significant Wilcoxon signed-rank tests. Significant findings are in the text.

Environment	**Perceptual Pair**	**Pre-test Z**	**Pre-test *p***	**Posttest Z**	**Posttest *p***
Natural Stream	Good/Bad	4.5	1.0	9.0	.55
	Pleasant/ Unpleasant	0	1.0	3.0	1.0
	Safe/Unsafe	16.5	.11	22.5	.18
Urban Waterfront	Good/Bad	-2.0	1.0	-2.5	1.0
	Pleasant/ Unpleasant	13.5	.07	-7.5	.51
	Safe/Unsafe	-9.0	.55	15.0	.42
House in the Woods	Good/Bad	13.0	.39	9.0	.55
	Pleasant/ Unpleasant	4.5	1.0	2.5	1.0
	Safe/Unsafe	0	1.0	10.5	.82
Urban Houses	Good/Bad	7.5	.51	25.5	.21
	Pleasant/ Unpleasant	21.0	.07	In text	In text
	Safe/Unsafe	0	1.0	15	.42
Wild Animals	Good/Bad	-13.5	.70	-15.0	.42
	Pleasant/ Unpleasant	35.0	.35	31.5	.26
	Safe/Unsafe	0	1.0	-10.5	.82
Domesticated Animals	Good/Bad	15.0	.42	25.5	.21
	Pleasant/ Unpleasant	-8.5	.80	25.5	.21
	Safe/Unsafe	-16.5	.53	19.5	.56

Within group pre- and posttest differences by ethnicity (AApost-AApre; Apost-Apre; Hpost-Hpre; Wpost-Wpre) in environmental perceptions, results of non-significant Wilcoxon signed-rank tests. Significant findings are in the text.

Environment	**Perceptual Pair**	**Ethnicity**	**Z**	***p***
Natural Stream	Good/Bad	AA	.50	1.0
	Pleasant/ Unpleasant	AA	0	1.0
	Safe/Unsafe	AA	0	1.0
	Good/Bad	A	-.50	1.0
	Pleasant/ Unpleasant	A	-.50	1.0
	Safe/Unsafe	A	0	1.0
	Good/Bad	H	-.50	1.0
	Pleasant/ Unpleasant	H	-.50	1.0
	Safe/Unsafe	H	1.5	.50
	Good/Bad	W	0	1.0
	Pleasant/ Unpleasant	W	.50	1.0
	Safe/Unsafe	W	.50	1.0
Urban Waterfront	Good/Bad	AA	-.50	1.0
	Pleasant/ Unpleasant	AA	0	1.0
	Safe/Unsafe	AA	0	1.0
	Good/Bad	A	0	1.0
	Pleasant/ Unpleasant	A	0	1.0
	Safe/Unsafe	A	0	1.0
	Good/Bad	H	0	1.0
	Pleasant/ Unpleasant	H	0	1.0
	Safe/Unsafe	H	0	1.0
	Good/Bad	W	0	1.0
	Pleasant/ Unpleasant	W	0	1.0
	Safe/Unsafe	W	-3.0	.25
House in the Woods	Good/Bad	AA	0	1.0
	Pleasant/ Unpleasant	AA	0	1.0
	Safe/Unsafe	AA	.50	1.0
	Good/Bad	A	-1.5	.50

	Pleasant/ Unpleasant	A	0	1.0
	Safe/Unsafe	A	-3.0	.25
	Good/Bad	H	0	1.0
	Pleasant/ Unpleasant	H	0	1.0
	Safe/Unsafe	H	-.50	1.0
	Good/Bad	W	.50	1.0
	Pleasant/ Unpleasant	W	0	1.0
	Safe/Unsafe	W	0	1.0
Urban Houses	Good/Bad	AA	-.50	1.0
	Pleasant/ Unpleasant	AA	0	1.0
	Safe/Unsafe	AA	0	1.0
	Good/Bad	A	-.50	1.0
	Pleasant/ Unpleasant	A	0	1.0
	Safe/Unsafe	A	0	1.0
	Good/Bad	H	0	1.0
	Pleasant/ Unpleasant	H	.50	1.0
	Safe/Unsafe	H	.50	1.0
	Good/Bad	W	-.50	1.0
	Pleasant/ Unpleasant	W	0	1.0
	Safe/Unsafe	W	0	1.0
Wild Animals	Good/Bad	AA	0	1.0
	Pleasant/ Unpleasant	AA	0	1.0
	Safe/Unsafe	AA	0	1.0
	Good/Bad	A	0	1.0
	Pleasant/ Unpleasant	A	0	1.0
	Safe/Unsafe	A	0	1.0
	Good/Bad	H	.50	1.0
	Pleasant/ Unpleasant	H	0	1.0
	Safe/Unsafe	H	0	1.0
	Good/Bad	W	.50	1.0
	Pleasant/ Unpleasant	W	0	1.0

	Safe/Unsafe	W	0	1.0
Domesticated Animals	Good/Bad	AA	1.5	.50
	Pleasant/ Unpleasant	AA	0	1.0
	Safe/Unsafe	AA	.50	1.0
	Good/Bad	A	.50	1.0
	Pleasant/ Unpleasant	A	-.50	1.0
	Safe/Unsafe	A	0	1.0
	Good/Bad	H	1.5	.50
	Pleasant/ Unpleasant	H	.50	1.0
	Safe/Unsafe	H	-.50	1.0
	Good/Bad	W	-.50	1.0
	Pleasant/ Unpleasant	W	0	1.0
	Safe/Unsafe	W	.50	1.0

Across group pre-test and posttest differences by ethnicity (pre –pre; post-post) in environmental perceptions, results of non-significant Wilcoxon signed-rank tests. Significant findings are in the text.

Environment	**Perceptual Pair**	**Ethnicities**	**Pre-test Z**	**Pre-test *p***	**Posttest Z**	**Posttest *p***
Natural Stream	Good/Bad	A – AA	1.5	.50	0	1.0
	Pleasant/ Unpleasant	A – AA	0	1.0	-.50	1.0
	Safe/Unsafe	A – AA	-.50	1.0	-.50	1.0
	Good/Bad	H – AA	1.5	.50	0	1.0
	Pleasant/ Unpleasant	H – AA	.50	1.0	0	1.0
	Safe/Unsafe	H – AA	-.50	1.0	0	1.0
	Good/Bad	H – A	0	1.0	0	1.0
	Pleasant/ Unpleasant	H – A	.50	1.0	1.0	1.0
	Safe/Unsafe	H - A	.50	1.0	1.5	.50
	Good/Bad	W – AA	-.50	1.0	-1.5	.50
	Pleasant/ Unpleasant	W – AA	-1.5	.5	-.50	1.0
	Safe/Unsafe	W – AA	-.50	1.0	0	1.0
	Good/Bad	W – A	-3.0	.25	-1.5	.50
	Pleasant/ Unpleasant	W – A	-1.5	.5	0	1.0
	Safe/Unsafe	W - A	0	1.0	.50	1.0
	Good/Bad	W– H	-3.0	.25	-1.5	.50
	Pleasant/ Unpleasant	W – H	-3.0	.25	-.50	1.0
	Safe/Unsafe	W – H	0	1.0	-.50	1.0
Urban Waterfront	Good/Bad	A – AA	0	1.0	.50	1.0
	Pleasant/ Unpleasant	A – AA	.50	1.0	.50	1.0
	Safe/Unsafe	A – AA	0	1.0	0	1.0
	Good/Bad	H – AA	0	1.0	.50	1.0
	Pleasant/ Unpleasant	H – AA	0	1.0	0	1.0
	Safe/Unsafe	H – AA	-.50	1.0	-.50	1.0
	Good/Bad	H – A	0	1.0	0	1.0
	Pleasant/ Unpleasant	H – A	.50	1.0	-.50	1.0
	Safe/Unsafe	H - A	-.50	1.0	-.50	1.0
	Good/Bad	W – AA	0	1.0	.50	1.0
	Pleasant/ Unpleasant	W – AA	.50	1.0	.50	1.0
	Safe/Unsafe	W – AA	0	1.0	-3.0	.25
	Good/Bad	W – A	0	1.0	0	1.0
	Pleasant/ Unpleasant	W – A	0	1.0	0	1.0

	Safe/Unsafe	W - A	0	1.0	-3.0	.25
	Good/Bad	W – H	0	1.0	0	1.0
	Pleasant/ Unpleasant	W – H	.50	1.0	.50	1.0
	Safe/Unsafe	W – H	.50	1.0	-2.5	.63
House in the Woods	Good/Bad	A – AA	-.50	1.0	-3.0	.25
	Pleasant/ Unpleasant	A – AA	-1.5	.5	-.50	1.0
	Safe/Unsafe	A – AA	0	1.0	In text	In text
	Good/Bad	H – AA	0	1.0	0	1.0
	Pleasant/ Unpleasant	H – AA	-.50	1.0	-.50	1.0
	Safe/Unsafe	H – AA	.50	1.0	-5.0	.13
	Good/Bad	H – A	.50	1.0	3.0	.25
	Pleasant/ Unpleasant	H – A	.50	1.0	0	1.0
	Safe/Unsafe	H - A	.50	1.0	3.0	.25
	Good/Bad	W – AA	-.50	1.0	-.50	1.0
	Pleasant/ Unpleasant	W – AA	-1.5	.50	0	1.0
	Safe/Unsafe	W – AA	0	1.0	-.50	1.0
	Good/Bad	W – A	0	1.0	0	1.0
	Pleasant/ Unpleasant	W – A	0	1.0	.50	1.0
	Safe/Unsafe	W - A	0	1.0	3.0	.25
	Good/Bad	W – H	-.50	1.0	-.50	1.0
	Pleasant/ Unpleasant	W – H	.50	1.0	.50	1.0
	Safe/Unsafe	W – H	-.50	1.0	0	1.0
Urban Houses	Good/Bad	A – AA	-.50	1.0	-.50	1.0
	Pleasant/ Unpleasant	A – AA	-.50	1.0	-.50	1.0
	Safe/Unsafe	A – AA	.50	1.0	1.0	1.0
	Good/Bad	H – AA	-.50	1.0	0	1.0
	Pleasant/ Unpleasant	H – AA	-.50	1.0	0	1.0
	Safe/Unsafe	H – AA	-.50	1.0	0	1.0
	Good/Bad	H – A	0	1.0	.50	1.0
	Pleasant/ Unpleasant	H – A	0	1.0	.50	1.0
	Safe/Unsafe	H - A	-1.5	.50	-1.0	1.0
	Good/Bad	W – AA	-1.0	1.0	-.50	1.0
	Pleasant/ Unpleasant	W – AA	-.50	1.0	-.50	1.0
	Safe/Unsafe	W – AA	1.0	1.0	1.0	1.0
	Good/Bad	W – A	0	1.0	0	1.0
	Pleasant/ Unpleasant	W – A	0	1.0	0	1.0
	Safe/Unsafe	W - A	0	1.0	0	1.0
	Good/Bad	W – H	0	1.0	-.50	1.0

	Pleasant/ Unpleasant	W – H	0	1.0	-.50	1.0
	Safe/Unsafe	W – H	1.5	.50	.50	1.0
Wild Animals	Good/Bad	A – AA	.50	1.0	.50	1.0
	Pleasant/ Unpleasant	A – AA	.50	1.0	.50	1.0
	Safe/Unsafe	A – AA	-.50	1.0	In text	In text
	Good/Bad	H – AA	.50	1.0	1.5	.50
	Pleasant/ Unpleasant	H – AA	1.5	1.0	1.5	.50
	Safe/Unsafe	H – AA	-.50	1.0	0	1.0
	Good/Bad	H – A	0	1.0	.50	1.0
	Pleasant/ Unpleasant	H – A	.50	1.0	.50	1.0
	Safe/Unsafe	H - A	0	1.0	.50	1.0
	Good/Bad	W – AA	0	1.0	-.50	1.0
	Pleasant/ Unpleasant	W – AA	0	1.0	.50	1.0
	Safe/Unsafe	W – AA	-1.5	.50	-1.5	.50
	Good/Bad	W – A	-.50	1.0	-1.5	.50
	Pleasant/ Unpleasant	W – A	-.50	1.0	0	1.0
	Safe/Unsafe	W - A	-.50	1.0	-1.5	.50
	Good/Bad	W – H	-1.0	1.0	-3.0	.25
	Pleasant/ Unpleasant	W – H	-1.5	.50	-.50	1.0
	Safe/Unsafe	W – H	-.50	1.0	3.0	.25
Domesticated Animals	Good/Bad	A – AA	2.5	.63	-1.5	.50
	Pleasant/ Unpleasant	A – AA	-.50	1.0	0	1.0
	Safe/Unsafe	A – AA	1.0	1.0	.50	1.0
	Good/Bad	H – AA	1.0	1.0	.50	1.0
	Pleasant/ Unpleasant	H – AA	0	1.0	-.50	1.0
	Safe/Unsafe	H – AA	.50	1.0	1.5	.50
	Good/Bad	H – A	-.50	1.0	3.0	.25
	Pleasant/ Unpleasant	H – A	.50	1.0	-.50	1.0
	Safe/Unsafe	H - A	0	1.0	.50	1.0
	Good/Bad	W – AA	1.5	.50	-.50	1.0
	Pleasant/ Unpleasant	W – AA	-.50	1.0	0	1.0
	Safe/Unsafe	W – AA	0	1.0	-.50	1.0
	Good/Bad	W – A	0	1.0	.50	1.0
	Pleasant/ Unpleasant	W – A	0	1.0	0	1.0
	Safe/Unsafe	W - A	-1.0	1.0	-1.5	.50
	Good/Bad	W – H	.50	1.0	-1.5	.50
	Pleasant/ Unpleasant	W – H	-.50	1.0	0	1.0

	Safe/Unsafe	W – H	-.50	1.0	-3.0	.25

Environmental Preferences

Pre- and Posttest differences (Post-Pre) in environmental preferences, results of non-significant Wilcoxon signed-rank tests. Significant findings are in the text.

Preferred Environment	**Z**	***p***
Urban Waterfront	-19.0	.48
House in the Woods	15.0	.42
Domesticated Animals	-7.0	.85

Within group pre- and posttest differences by gender (Fpost-Fpre; Mpost-Mpre) in environmental preferences, results of non-significant Wilcoxon signed-rank tests. Significant findings are in the text.

Preferred Environment	**Gender**	**Z**	***p***
Urban Waterfront	F	9.0	.29
	M	-2.0	1.0
House in the Woods	F	0	1.0
	M	12.5	.18
Domesticated Animals	F	5.5	.75
	M	-13.0	.39

Across group pre- and posttest differences by gender (Mpre – Fpre; Mpost-Fpost) in environmental preferences, results of non-significant Wilcoxon signed-rank tests. Significant findings are in the text.

Preferred Environment	**Pre-test Z**	**Pre-test *p***	**Posttest Z**	**Posttest *p***
Urban Waterfront	3.5	.69	15.0	.23
House in the Woods	7.5	.06	In text	In text
Domesticated Animals	19.0	.49	-9.5	.81

Within group pre- and posttest differences by ethnicity (AApost–AApre; A post-Apre; Hpost-Hpre; Wpost-Wpre) in environmental preferences, results of non-significant Wilcoxon signed-rank tests. Significant findings are in the text.

Preferred Environment	**Ethnicity**	**Z**	***p***
Urban Waterfront	AA	0	1.0
Natural Stream	A	0	1.0
Urban Waterfront	H	0	1.0
	W	0	1.0
House in the Woods	AA	0	1.0
	A	0	1.0
	H	0	1.0
	W	0	1.0
Domesticated Animals	AA	-1.5	.50
Wild Animals	A	0	1.0
Domesticated Animals	H	.5	1.0
	W	0	1.0

Across group pre-test differences by ethnicity (pre –pre) in environmental perceptions, results of non-significant Wilcoxon signed-rank tests. Significant findings are in the text.

Preferred Environment	**Ethnicities**	**Pre-test Z**	**Pre-test *p***	**Posttest Z**	**Posttest *p***
Urban Waterfront/Natural Stream	AA-A	0	1.0	0	1.0
	H-A	0	1.0	0	1.0
	H-AF	0	1.0	0	1.0
	W-A	3.0	.25	3.0	.25
	W-AF	3.0	.25	3.0	.25
	W-H	3.0	.25	3.0	.25
House in the Woods	AA-A	0	1.0	0	1.0
	H-A	0	1.0	0	1.0
	H-AF	0	1.0	0	1.0
	W-A	.50	1.0	.50	1.0
	W-AF	.50	1.0	.50	1.0
	W-H	.50	1.0	.50	1.0
Wild/Domesticated Animals	AA-A	2.5	.63	0	1.0
	H-A	-.50	1.0	0	1.0
	H-AF	-3.0	.25	0	1.0
	W-A	0	1.0	0	1.0
	W-AF	-1.5	.50	-1.5	.50
	W-H	.50	1.0	0	1.0

Appendix D

Links to Photo-elicitation Images

Natural Stream is an open commons image.

Urban Waterfront:

http://imgarcade.com/1/vice-city-skyline/

House in the Woods:

http://foreverwallpapers.wordpress.com/2011/12/25/house-in-the-woods/

Urban Houses: Daniel Traub Photography

http://www.photoeye.com/gallery/forms/Pages_MaxEnglarge/image1.cfm?imageposition=6&id=204439&Portfolio=Portfolio

Wild Animals: Carl Sam's In the Woods Blog, April 9, 2012 entry.

http://www.carlsams.com/inthewoods/wp-content/uploads/2012/04/bear-sow-with-cubs.jpg

Domesticated Animals:

http://fantasystock.deviantart.com/art/Playful-Dog-Park-Action-15-86395872

Appendix E

Draw Nature Survey

****Please write your full first name and last name's initial
_____****

Please answer the following questions:

A: What is your school's name: _____

B: Are you a **boy** or a **girl**? _____

C: What is your race/ethnicity? (circle the choices that apply):
Hispanic/Latino
African American
White
Asian
Other (please explain): _____

NATURE

Do you think you have enough nature where you live? Yes _____ No _____

Would you like to spend more time in nature? Yes _____ No _____

Appendix F

Draw Nature Test drawn items by category

Living Things drawn items with frequencies and percent of total

Living Things	**Frequencies (% of total)**
Trees	71 (95)
Sun	43 (57)
Grass	36 (48)
Birds	31 (41)
Animals	26 (35)
Flowers	15 (20)
Insects	15 (20)
Bear	13 (17)
Bushes/Shrubs	11 (15)
Fish	10 (13)
People	6 (8)
Squirrel	5 (6)
Snake	2 (3)
Spider	2 (3)
Worms	2 (3)
Cactus	1 (1)
Cow	1 (1)
Deer	1 (1)
Fungus	1 (1)
Rabbit	1 (1)

Non-living Things drawn items with frequencies and percent of total

Non-living Things	Frequencies (% of total)
Bird/Squirrel Hole in Tree	33 (44)
Clouds	26 (35)
Body of Water	22 (29)
Tree Branch	8 (11)
Fruit	7 (10)
Leaves	6 (8)
Bird's Nest	4 (5)
Bee Hive	1 (1)
Mountains	1 (1)
Rain	1 (1)
Scat	1 (1)
Spider Web	1 (1)
Stars	1 (1)
Trail	1 (1)

Human-made Objects drawn items with frequencies and percent of total

Human-made Objects	Frequencies (% of total)
Cabin	5 (6)
House	3 (4)
Camp Fire	2 (3)
Tent	2 (3)
Water Sprinkler	1 (1)

Activities drawn items with frequencies and percent of total

Activities	Frequencies (% of total)
Fishing	3 (4)
Chopping wood	1 (1)

Draw Nature Test adjectives

Living Things adjective list with frequencies and percent of total.

Living Things	**Frequencies (% of total)**
Trees	61 (81)
Animals	55 (73)
Grass	26 (35)
Plants	25 (33)
Bears	23 (31)
Insects	23 (31)
Leaves	23 (31)
Birds	12 (16)
Flowers	11 (15)
Deer	9 (12)
Wildlife	9 (12)
Fish	7 (9)
People	6 (8)
Squirrels	6 (8)
Bushes	5 (7)
Chipmunks	3 (4)
Ducks	3 (4)
Reptiles	3 (4)
Spiders	3 (4)
Amphibians	2 (3)
Bacteria	2 (3)
Bunnies	2 (3)
Cows	2 (3)
Eagles	2 (3)
Geese	2 (3)
Mammals	2 (3)
Moose	2 (3)
Owls	2 (3)
Boars	1 (1)
Cat	1 (1)
Dogs	1 (1)
Fox	1 (1)
Fungi	1 (1)
Kramer Fly	1 (1)
Lady Bugs	1 (1)

Lion	1 (1)
Mice	1 (1)
Panda	1 (1)
Peasants	1 (1)
Pigeons	1 (1)
Pigs	1 (1)
Pine Tree	1 (1)
Queens	1 (1)
Raccoons	1 (1)
Rodents	1 (1)
Roses	1 (1)
Salamander	1 (1)
Sapling	1 (1)
Tiger	1 (1)
Tulips	1 (1)
Turtles	1 (1)
Wheat	1 (1)

Non-living Things adjective list with frequencies and percent of total.

Non-living Things	Frequencies (% of total)
Lakes	30 (40)
Water	20 (27)
Rocks	18 (24)
Environment	15 (20)
Rivers	13 (17)
Forest	11 (15)
Dirt	9 (12)
Soil	8 (11)
Wood	8 (11)
Air	7 (9)
Woods	7 (9)
Mud	6 (8)
Weather	6 (8)
Fruit	5 (7)
Mountains	5 (7)
Earth	4 (5)
Food	4 (5)
Ice	4 (5)
Rain	4 (5)
Sticks	4 (5)
Stream	4 (5)
Weather	4 (5)
Branches	3 (4)
Logs	3 (4)
Outdoors	3 (4)
Resources	3 (4)
Sky	3 (4)
Stars	3 (4)
Sun	3 (4)
Sunshine	3 (4)
Twigs	3 (4)
Wilderness	3 (4)
Cloud	2 (3)
Fire	2 (3)
Hills	2 (3)
Lair	2 (3)

Oceans	2 (3)
Pineapples	2 (3)
Scat	2 (3)
Snow	2 (3)
Stone	2 (3)
Tents	2 (3)
Vegetables	2 (3)
Wind	2 (3)
Bladder	1 (1)
Boulder	1 (1)
Caves	1 (1)
Climate	1 (1)
Constellations	1 (1)
Creeks	1 (1)
Crust	1 (1)
Dead	1 (1)
Dirty	1 (1)
Earthquakes	1 (1)
Eggs	1 (1)
Fall	1 (1)
Fields	1 (1)
Gas	1 (1)
Hail	1 (1)
Harvest	1 (1)
Help	1 (1)
History	1 (1)
Howl	1 (1)
Island	1 (1)
Jungle	1 (1)
Lemons	1 (1)
Lightning bolts	1 (1)
Liquid	1 (1)
Marshes	1 (1)
Natural Disasters	1 (1)
Not Man-made	1 (1)
Open land	1 (1)
Organisms	1 (1)
Pebble	1 (1)
Pine cones	1 (1)

Poison	1 (1)
Puberty	1 (1)
Sediment	1 (1)
Seasons	1 (1)
Shelter	1 (1)
Space	1 (1)
Spring	1 (1)
Stool	1 (1)
Tsunamis	1 (1)
Urine	1 (1)
Vomit	1 (1)
Waterfalls	1 (1)

Biological/Environmental Concepts adjective list with frequencies and percent of total.

Biological/Environmental Concepts	**Frequencies (% of total)**
Survival	11 (15)
Habitat	7 (9)
Biomes	3(4)
The Circle of Life	2(3)
Biology	1 (1)
Black bear ecology	1 (1)
Conservation	1 (1)
Conservation Photography	1 (1)
Darwin's Theory of Evolution	1 (1)
Ecosystems	1 (1)
Food chain	1 (1)
Niches	1(1)
Predators	1 (1)
Recycle	1 (1)
Reuse	1 (1)
Science	1 (1)
Survival of the Fittest	1 (1)
Technology-free	1 (1)
Water ecology	1 (1)

Human-made Objects adjective list with frequencies and percent of total.

Human-made Objects	Frequencies (% of total)
Cabins	4 (5)
Camp	4 (5)
Minecraft	3 (4)
Electricity	2 (3)
Farms	2 (3)
Wood stock	2 (3)
Barn	1 (1)
Boat	1 (1)
Bridges	1 (1)
Buses	1 (1)
Communication	1 (1)
Fishing pole	1 (1)
Map	1 (1)
Pet park	1 (1)
Pokemon	1 (1)
Pollution	1 (1)
Sleeping bag	1 (1)
Smores	1 (1)
Trolley	1 (1)
Videogames	1 (1)
Wood houses	1(1)

Emotional/Affective Responses adjective list with frequencies and percent of total.

Emotional/Affective Responses	Frequencies (% of total)
Amazing	2(3)
Fun	2 (3)
Healthy	2 (3)
Love	2 (3)
Peace	2 (3)
Quiet	2 (3)
Wild	2 (3)
Alive	1 (1)
Awesome	1 (1)
Beauty	1 (1)
Caution	1 (1)
Cold	1 (1)
Danger	1 (1)
Disgusting smells	1 (1)
Free	1 (1)
Friendship	1 (1)
Friendship with animals	1 (1)
Full	1(1)
Ill	1(1)
Loveliness	1(1)
Nice environment	1 (1)
Nice sights	1 (1)
Peaceful	1 (1)
Sick	1 (1)
Starve	1 (1)
Warm	1 (1)

Colors adjective list with frequencies and percent of total.

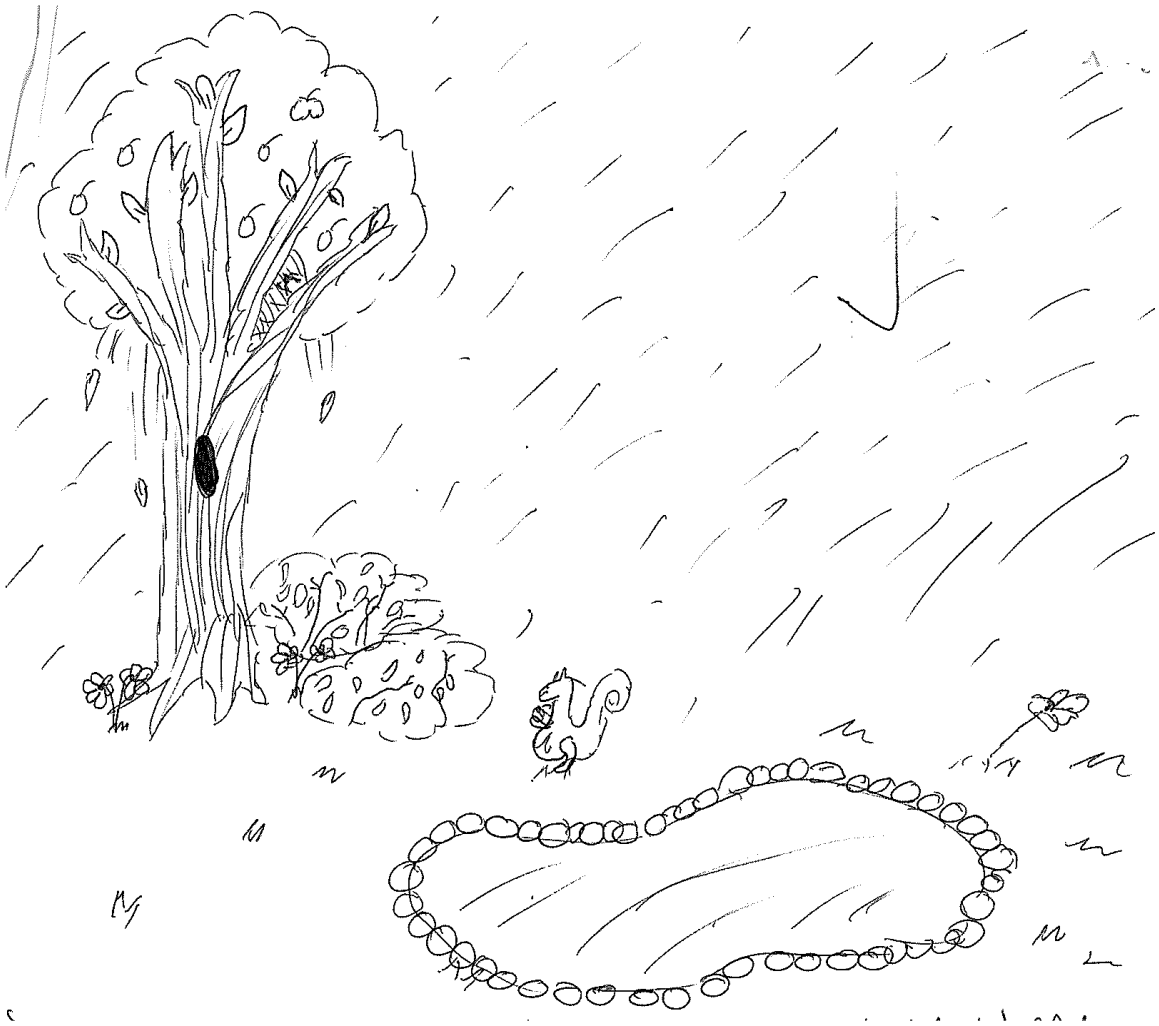
Colors	Frequencies (% of total)
Green	6 (8)
Blue	1 (1)
Brown	1 (1)
White	1 (1)

Activities adjective list with frequencies and percent of total.

Activities	**Frequency (% of total)**
Hiking	3 (4)
Camping	2(3)
Activities	1(1)
Fishing	1(1)
Hard work	1 (1)

Appendix G

Sample Draw Nature test drawings



Appendix H

Post-program Questionnaire

Please circle your answers:

1. The program I just completed had too many rules. True or False
2. The program I just completed was just what I expected. True or False
3. The program I just completed makes me feel closer to nature. True or False
4. The program I just completed gave me enough free time in nature. True or False
5. I would come back to do this program again. True or False