

University of Tennessee at Chattanooga

UTC Scholar

Honors Theses

Student Research, Creative Works, and
Publications

8-2023

Fostering a sense of wonder: promoting experiential learning through outdoor discoveries on the coast of Maine

Joslyn Primicias

University of Tennessee at Chattanooga, jff521@mocs.utc.edu

Follow this and additional works at: <https://scholar.utc.edu/honors-theses>



Part of the [Environmental Education Commons](#)

Recommended Citation

Primicias, Joslyn, "Fostering a sense of wonder: promoting experiential learning through outdoor discoveries on the coast of Maine" (2023). *Honors Theses*.

This Theses is brought to you for free and open access by the Student Research, Creative Works, and Publications at UTC Scholar. It has been accepted for inclusion in Honors Theses by an authorized administrator of UTC Scholar. For more information, please contact scholar@utc.edu.

Fostering a Sense of Wonder: Promoting Experiential Learning Through Outdoor Discoveries on the Coast of Maine



Joslyn Primicias
University Honors Thesis
The University of Tennessee at Chattanooga
Biology, Geology, and Environmental Sciences
National Oceanic and Atmospheric Administration (NOAA)

Examination Date: April 3rd, 2023

Ralph W. Hood
Professor of Psychology
Thesis Director

David F. Ross
Professor of Psychology
Thesis Examiner

Sarah E. Farnsley
Associate Lecturer of Biology
Department Examiner

Table of Contents

| | |
|---|-----------|
| <i>Acknowledgments</i> | 3 |
| <i>Abstract</i> | 4 |
| <i>Introduction/Background:</i> | 5 |
| <i>Methodology</i> | 10 |
| <i>Timeline</i> | 14 |
| <i>Results</i> | 14 |
| <i>Discussion</i> | 17 |
| I. Practice Implications | 20 |
| II. Limitations and Future Recommendations | 22 |
| <i>Bibliography</i> | 25 |
| <i>Annex</i> | 28 |
| A. Children's Behavior Questionnaire--Very Short Form | 28 |
| B. Subjective Happiness Scale (SHS) | 33 |
| C. Children's Environmental Perceptions Scale (CEPS) | 34 |
| D. Guiding Principles of the Education Department (February, 2010) | 36 |
| E. Consent Form | 36 |
| F. Supplemental Figures and Tables | 38 |

Acknowledgments

I would like to extend my utmost gratitude to all my friends, family, and colleagues that have supported me along my academic and spiritual journeys.

First, a generous thank you to Suzanne Kahn and her guidance throughout my internship, her unwavering support in my passions, and her undying love for the planet and all its inhabitants.

Thank you to Amanda Bailiff for providing friendship alongside educational guidance in my experiential learning.

Next, a big thank you to Dr. Ralph Hood for being my Thesis Director and helping me through this senior thesis along with Dr. David Ross and Prof. Sarah Farnsley for their professional guidance and academic support throughout my writing process.

Thank you to Stacy Cummings and Danielle Boudreau for their leadership and assistance as well as Chris Fuert and Sarah Nuss for their academic guidance.

Thank you to the NOAA Ernest F. Hollings Undergraduate Scholarship Program for granting me this opportunity and funding my internship.

Last but not least, thank you to the children participating in this study who taught me just as much as I them, and thank you to all the elements of Nature that provided us a space for curiosity and discovery.

Abstract

Recent generations of children have been experiencing a decrease in connection to Nature, causing various negative effects on personal development and well-being. Researchers are studying the impact of environmental education programs as a potential resolution to this issue dubbed “nature deficit disorder.” Studies have shown that while citizen science by youth is rapidly expanding, little research addresses conservation science with environmental education. Recognizing this gap, the summer camps at Wells NERR are designed to ensure children’s environmental stewardship as they learn about estuarine ecology alongside environmental issues. This educational study focuses on how environmental education through estuarine activities at summer camps can promote environmental advocacy and encourage positivity in children’s lives as they develop. The research was conducted in an estuarine ecosystem at the Wells National Estuarine Research Reserve in Wells, ME with hands-on exposure and interaction with the elements of nature. The researcher collected qualitative data by observing experiences in nature and collected quantitative data through distributing pre- and post- surveys that determined the perspectives of participants. Questionnaires measuring Behavior were distributed to parents/guardians and questionnaires measuring Happiness and Environmental Perception were distributed to students both prior to and after the children’s participation in the camps. This data was evaluated by comparing the pre-camp average scores to the post-camp average scores using a t-test in Microsoft Excel. Out of the twelve total surveys, five showed a significant increase in average scores, meaning five surveys were significant and seven were not significant. The researcher recommends that data collected in a typical academic setting, over a longer period, and in a variety of environments would be more beneficial to study the impact of nature exposure throughout their development.

Introduction/Background:

“Those who contemplate the beauty of the Earth find reserves of strength that will endure as long as life lasts” (Carson, 1956).

With an increase in sedentary lifestyles and indoor activities (Preus et al., 2019), parental restrictions and academic pressures, (Cui & Yang, 2021; Mustapa et al., 2015; Larson et al., 2010) and urbanization, (Cui & Yang, 2021; Mustapa et al., 2015; Barnes et al., 2019) recent generations of children have thus experienced an increase in disconnection with Nature, (Derr & Krista, 2012; Mustapa et al., 2015), childhood obesity, (Derr & Krista, 2012; Charles, 2009; Charles & Louv, 2009) vitamin D deficiency, (Derr & Krista, 2012; Charles & Louv, 2009) negative behavioral conduct, (Preus et al., 2019), low self-esteem, (Preus et al., 2019; Charles, 2009) a reduction in cognitive development and attention capabilities, (Derr & Krista, 2012) (Preus et al., 2019; Charles, 2009) and harm to physical and mental health/stress and depression (Derr & Krista, 2012; Preus et al., 2019; Cui & Yang, 2021; Charles, 2009; Barnes et al., 2019; Charles & Louv, 2009). In her lecture addressing the disconnect between Nature and children, Cheryl Charles, co-Founder of the Children & Nature Network (C&NN), shared that “our children have been given a virtual, vicarious, electronic, passive, and cocooned experience of childhood.” She states that along with being the most medicated generation in history, today’s children are the first generation expected to have a shorter lifespan than their parents (Charles, 2009). According to authors working with the Dimensions Educational Research Foundation, the rate of 18 and under children prescribed antidepressants doubled over a five-year period, with the steepest among preschool aged children (Wirth & Rosenow, 2012). Richard Louv, the other co-

Founder of C&NN, explained, “new evidence suggests that the need for such medications is intensified by children’s disconnection from Nature” (Louv, 2005). This disconnection, along with the many aforementioned issues, can be understood as “Nature Deficit Disorder” coined by Louv in which he describes “it is not a medical diagnosis, but a description of the human costs of alienation from nature” (Charles, 2009, p. 469). Nature Deficit Disorder shows that the “phenomenon of the disconnection with the natural world leads to changes in children’s quality of life” (Mustapa et al., 2015, p. 331).

There has been a plethora of worldwide studies conducted that depict a decline in nature exposure in children and examine the negative adverse effects. Some aspects of these consequences include association with self-regulation, (Weeland et al., 2019) physical health (Jimenez et al., 2021) and mental health, (Preus et al., 2019) happiness, (Cui & Yang, 2021) Nature Deficit Disorder, (Mustapa et al., 2015; Charles & Louv, 2009; Collado & Corraliza, 2017; Wirth & Rosenow, 2012) and children’s well-being and environmental orientation (Collado & Corraliza, 2017). Many of these studies refer to the “biophilia hypothesis” which states that “humans have an innate affinity for nature & need nature for aesthetics, intellectual, cognitive & spiritual meaning” (Kellert & Wilson 1993; (Mustapa et al., 2015, p. 333). This concept is represented through the natural benefits of connecting to Nature.

Such positive results that follow nature exposure to children are improved motor skills, alleviation of stresses, (Derr & Krista, 2012) better development of cognitive functioning & attention capacities, (Derr & Krista, 2012; Barnes et al., 2019), increase in positive affect (Barnes et al., 2019) lower depression and nervousness, higher self-regulation, higher pro-

environmental behaviors, (Cui & Yang, 2021), and enhanced cognitive, physical, social, emotional & spiritual development (Mustapa et al., 2015). However, “lacking positive reinforcement, this innate eco-affinity may diminish as time progresses” (Larson et al., 2010, p, 108). according to authors conducting experimental studies on children in Environmental Education (EE) programs. “Environmental Education programs represent a potential antidote to this nature-deficit disorder” (Larson et al., 2010, p. 96). Many articles urge the implementation of environmental programs in schools, suggesting that reconnecting children and Nature will provide a wide array of health benefits and improvement of well-being (Larson et al., 2010; Wirth & Rosenow, 2012; Charles, 2009). A vital aspect of the incorporation of EE is the “No Child Left Inside” Act, an important bill by the No Child Left Inside Coalition that is working to expand and improve Environmental Education in schools. This study focuses on how Environmental Education can encourage these positive effects in children’s lives as they develop.

Despite the abundance of literature regarding the effects of nature exposure to children, co-Founders of C&NN encourage that the relationship between children and Nature be studied further; they shared, “while studies are accumulating ...direct measures are needed of children’s actual time in nature and the quality of their experiences in the natural world” (Charles & Louv, 2009, p. 2). This study aims to fill this research gap by collecting qualitative data through detailed observation of children’s well-being and quantitative data through questionnaires on perspective and positive affect. Additionally, Charles (2009) shared that “descriptions of the elements of nature associated with mental health benefits are understudied and underreported” (p. 4-5). This study was conducted in a particular estuarine ecosystem with hands-on activities

for exposure and interaction so that descriptions of the elements of nature will be controlled in order to fill this research gap.

“Non-formal EE programs may play an important role in the movement to create and evaluate EE curricula that help children reconnect with nature” (Larson et al., 2010, p. 110). The goal of this study is to understand how nature exposure and Environmental Education in estuarine ecosystems influence the well-being of children ages 6 to 13. “The significant effect of the EE treatment on children’s eco-affinity was likely tied to the nature of the summer camp activities” (Larson et al., 2010, p. 110). Through a variety of summer camps at the Wells National Estuarine Research Reserve, children’s well-being and environmental perspectives were studied by me, their summer camp counselor.

In a scientific article examining coastal and water quality citizen science programs, it was identified that following the scientific process (such as through data collection) would contribute to enhancing children’s Environmental Science Agency (Ballard et al., 2017). The researchers of this study added that while citizen science by youth is rapidly expanding, very little research addresses conservation science with environmental education (Larson et al., 2010). Recognizing this research gap, the summer camp programs at Wells NERR are designed to ensure children’s environmental agency as they learn about and conduct experiments with the abiotic and biotic factors of estuarine ecosystems. To look at how children’s connectedness to nature influences Environmental Science Agency, campers will be involved in science inquiry by quantifying different species in restorative versus disturbed salt estuarine habitats, learning about ecology

alongside environmental issues. This will allow me to gain a broader understanding of the impact of the study on biodiversity conservation as a whole.

Furthermore, this study will be conducted in Wells, ME, just outside the Rachel Carson Wildlife Refuge. Rachel Carson and her book The Sense of Wonder (1956) is a large inspiration for this project. The spirit of this study is dedicated to fostering wonder into children through meaningful experiences in contemplating Nature. This research aligns with the Guiding Principles of the Wells NERR which I will quote for you. It reads, “We will foster a sense of wonder and curiosity by providing time for fun, reflection, and a connection to place, while also instilling a love and respect for nature...We will integrate research and stewardship into our programs, teaching that the Earth is an interconnected system.”

Methodology

This study was conducted by developing an evaluation process for discovering the effects that spending time in nature has on a child's well-being. To research qualitative and quantitative data, students and camp instructors participated in the Environmental Education summer camp programs at Wells National Estuarine Research Reserve in Wells, ME. The research took place through a total of four week-long day camps, with a different set of participants each week, creating four groups. This study operated under the UN Convention on the Rights of the Child, specifically Article 2 which states: “The Convention applies to every child without discrimination, whatever their ethnicity, sex, religion, language, abilities or any other status, whatever they think or say, whatever their family background” and Article 29 that states, “Education must develop every child’s personality, talents, and abilities to the full. It must encourage the child’s respect for human rights, as well as respect for their parents, their own and other cultures, and the environment” (*The United Nations Convention on the Rights of the Child*, 1990, p. 4,9).

With approval from IRB and permission from children, parents, and Wells NERR, I conducted pre and post-camp surveys and questionnaires, and obtained detailed primary observations of children’s well-being. In this study I define well-being using the definition provided by Andrews et al. (2002):

“Healthy and successful individual functioning (involving physiological, psychological, and behavioral levels of organization), positive social relationships (with family members, peers, adult caregivers, and community and societal institutions, for instance, school and faith and civic

organizations), and a social ecology that provides safety (e.g., freedom from interpersonal violence, war, and crime), human and civil rights, social justice, and participation in civil society.”

“More research needs to be done, including establishing baselines and defining what constitutes meaningful experiences in nature” (Charles & Louv, 2009, p.2). To collect qualitative data on well-being and behavior, the camp instructor/researcher will take detailed notes and observations of the children’s attitudes and actions throughout the program activities as they interact with their environment and each other. To collect quantitative data on parents’ perceptions of their child’s behavior and children’s perceptions of their environment, questionnaire surveys were distributed both before and after the children’s participation in the camps. Parent participants completed the Children’s Behavior Questionnaire Very Short Form (CBQ-VSF) (Putnam & Rothbart, 2006) which is a 7-item scale consisting of three subscales measuring negative affectivity, effortful control, and surgency (Cui & Yang, 2021). This questionnaire was chosen because authors Cui & Yang suggested that “it is useful for future research to include both children’s and parents’ reports of children’s happiness, exposure to nature, and temperament” (2021, p. 765).

Additionally, child participants completed the Subjective Happiness Scale (SHS) and the Children’s Environmental Perceptions Scale (CEPS) (Larson et al., 2009). The SHS is a 4-item scale of Global Subjective Happiness asking respondents to describe themselves relative to peers and relative to happy and unhappy individuals (Lepper & Lyubomirsky, 1999). This scale was used in this study because of the suggestion by Jimenez et al., (2021) which urged future studies

to focus more on positive health (Happiness flourishing) instead of just the absence of negative health.

The CEPS was initially created to be administered in Environmental Education summer camps and identifies eco-affinity and eco-awareness as indicators of environmental orientations. “This new evaluation tool may help educators and researchers examine the way children perceive the natural world” (Larson et al., 2009, p.1). Consisting of 16 agree/disagree statements that measure a child’s personal interest in nature and attitude towards environmental issues (Salazar et al., 2020). This scale was chosen to provide a more inclusive and intimate study based on children’s perceptions since “studies on the benefits of nature on children have been done on children rather than with children” and “studies on children’s environment from children’s perspective are vital” (Mustapa et al., 2015, p. 337). The CEPS scale will also provide insight on the child’s level of Environmental Science Agency which “combines not only understanding of environmental science and inquiry practices, but also the youth’s identification with those practices and their developing belief that the ecosystem is something on which they act” (Ballard et al., 2017, p.1). Authors of a “Practitioner Guide to Assessing Connection to Nature” suggested analyzing data by comparing pre-program average scores to post-program average scores using a t-test in Microsoft Excel (Salazar et al., 2020). Following the collection of this primary data, a t-test data analysis was calculated and evaluated to test for a relationship between nature exposure and positive affect.

The four-week long day camps included in this study are as follows:

Week 1:

River to the Sea

- a) Ages 8-11
- b) Tues.-Fri. July 5-8
- c) “Spend a week by the water’s edge, from river to salt marsh to beach, spying on creatures great and small.”

Week 2:

Eco Nuts

- a) Ages 12-13
- b) Mon.-Fri. July 11-15
- c) “Become immersed in today’s critical environmental issues while exploring nature.”

Week 3:

Aquatic Adventures

- a) Ages 6-9
- b) Mon.-Fri. July 18-22
- c) “Wade in, turn stones, and discover what stream dwellers can tell us about the health of estuaries.”

Week Four:

Planet Protectors

- a) Ages 9-12
- b) Mon.-Fri. August 9-13
- c) “Discover how you can take positive steps on sustainability, climate change, and plastic pollution.”

Timeline

Data for this research project was collected during the consecutive days of June 5th–August 13th, 2022. Questionnaire surveys were distributed on the first and last days of each week. I participated by instructing, interacting with, and observing children from 9am-3pm Monday-Friday.

Results

The average scores of the three surveys pre and posttest for each week and were calculated along with the mean difference in each score. Table 1 presents the pre/post surveys for each dependent variable by group. The mean and standard deviation are present as well as the mean difference between each pre/post survey. A Composite Mental Health Score was generated by summing the scores for Happiness, Environmental Perception, and Behavior. Higher composite scores indicate better mental health. In addition, a Dependent Sample T-test was conducted on the pre-post mean composite score of each group.

Table 1: Pre-Post Mean Scores by Group and Dependent Variable

| Group | Variable | Pre-test | Post-test | Mean Difference |
|---------------------------|---|--------------------------------|-------------------------------|------------------------|
| River to the Sea | Happiness | M = 4.95, SD= 0.562 | M = 5.41, SD=0.624 | +0.455 |
| | Environment Perception | M = 4.13, SD= 0.411 | M = 4.27, SD=0.433 | +0.140 |
| | Behavior | M = 4.53, SD= 0.237 | M = 4.58, SD=0.197 | +0.0513 |
| | Composite score: Happiness + Environmental Perception + Behavior | M = 13.6, SD= 0.548 | M = 14.3, SD=0.668 | +0.65 |
| Eco Nuts | Happiness | M = 5.08, SD= 1.01 | M = 5.39, SD=0.906 | +0.306 |
| | Environment Perception | M = 4.32, SD= 0.225 | M = 5.39, SD=0.197 | +1.07 |
| | Behavior | M = 4.46, SD= 0.491 | M = 4.42, SD=0.327 | +0.167 |
| | Composite score: Happiness + Environmental Perception + Behavior | M = 13.9, SD= 0.742 | M = 14.3, SD=0.720 | +0.44 |
| Aquatic Adventures | Happiness | M = 5.13, SD= 0.893 | M = 5.5, SD=0.781 | +0.375 |
| | Environment Perception | M = 4.29, SD= 0.401 | M = 4.16, SD=0.523 | -0.130 |
| | Behavior | M = 4.59, SD= 0.458 | M = 4.58, SD=0.357 | -0.0125 |
| | Composite score: Happiness + Environmental Perception + Behavior | M = 14.0, SD= 0.714 | M = 14.2, SD=0.807 | +0.23 |
| Planet Protectors | Happiness | M = 5.32, SD= 0.820 | M = 5.75, SD=0.824 | +0.429 |
| | Environment Perception | M = 4.22, SD= 0.385 | M = 4.66, SD=0.330 | +0.435 |
| | Behavior | M = 4.17, SD= 0.517 | M = 4.41, SD=0.501 | +0.242 |

| | | | | |
|--|---|--------------------------------|-------------------------------|--------------|
| | Composite score: Happiness + Environmental Perception + Behavior | M = 13.7, SD= 0.810 | M = 14.8, SD=0.832 | +1.11 |
|--|---|--------------------------------|-------------------------------|--------------|

Note: Range for each scale: Happiness (1=not happy to 7=very happy), Environmental Perception (1=strongly disagree to 5=strongly agree), Behavior (1=extremely untrue to 7=extremely true). Sample Sizes: River to the Sea n =11, Eco Nuts n =9, Aquatic Adventures n =8, Planet Protectors n =7.

The findings in Table 1 indicate that the mental health scores, as predicted, did increase from pre-test to post test for 14 out of 16 comparisons. Only the Aquatic Adventures group showed a decrease from pre to posttest scores for Environmental Perception and Behavior; all the remaining comparisons within group showed an increase in mental health. Yet, due to a small sample size in the four groups ranging from 7-11 participants, I could only perform a descriptive versus an inferential analysis. However, I was able to conduct an inferential pre-posttest analysis on the mean pre/post Composite Mental Health score collapsed over group. This increased the sample size for this analysis to 35 participants which is acceptable for a Dependent Samples T-test. The results supported the main hypothesis of the study, that exposure to an environmental program would increase mental health. As seen in Table 2, there is a statistically significant increase in the mean versus post Composite Mental Health score (Pre-test: M=4.60 and Post-test: M= 4.80), ($t(34)$, $p < 0.05$).

Table 2: Mean pre-post Composite Mental Health Score collapsing over group.

| | Pre-test | Post-test | Mean Difference |
|--------------------------------|---------------------------------|---------------------------------|------------------------|
| Composite Mental Health | M = 4.60, SD = 0.697 | M = 4.80, SD = 0.753 | +0.200 |

n = 35

Discussion

This intervention research done at the Wells NERR Summer Camp was developed to evaluate pretest vs. posttest scores and designed to improve understanding of children's Nature Deficit Disorder, specifically to see if a week's exposure to environmental education had a significant impact on survey scores. The overarching question is "Does educational exposure to estuarine ecosystems influence the well-being and environmental stewardship in children ages 6-14 years?" My anticipated outcome of this study was that time spent learning in an estuarine reserve would have a positive impact on the student's well-being and attitude towards nature. The prediction that environmental education would result in a positive effect on camper's well-being was supported. However, interpreting these results is challenging because the sample size has a low range of 7-11 participants each week. Because of these too low sample sizes, I collapsed across the four groups to increase the sample size to 35. An acceptable sample size for a Dependent Samples T-test is 30.

Qualitative observations of the student's behavior were taken to supplement those quantitative results of their survey responses. This has given me insight into their perspectives on nature-based learning activities and why students might've averaged the scores they did.

For week one, our "River to the Sea" camp was for ages 8-11 yo consisting of six boys and five girls. We went to the river to find creatures like turtles and eels, to the salt marsh to find fish and crabs, to the mud flats to find clams, and to the beach to tidepool. This week resulted in one out of the three surveys being significant, the scale measuring happiness. At the beginning, most participants were uninterested and preoccupied with other concerns. For example, half of the

students searched for turtles, while the other half focused on retrieving an anchor out of the river, chose to destroy the bark of a fallen tree, or expressed they wanted to go home. Throughout the week, it seemed the majority were eager to learn while some just wanted to have recreational time. They all were excited when learning was the same as playing, such as swimming or playing an educational game like “Oh Clam!”. By day three it was evident the importance of environmental learning in an academic setting and a recreational environment. Although the campers were enjoying themselves, they were distracted during lessons and not much learning occurred when they were focused on playtime. However, by the last day, the students were more engaged in activities and well-behaved which shows that exposure to learning in an estuarine setting is an important catalyst in cooperation with environmental learning.

In week two, “Eco Nuts” camp consisted of students ages 12-13 yo with eight girls and only one boy. We hiked the reserve’s trails to learn about flora and fauna, learned about pollinators such as birds, bees, and butterflies, went to the salt marsh to find creatures like fish and clams, and went kayaking. This week resulted in two out of the three surveys being significant, the scales measuring Happiness and Environmental Perception. When this week started, the group was inquisitive and invested in learning, but relatively quiet and reserved as we went on plant walks in the reserve’s trails. Mid-week, friendships among the campers were formed which made them more comfortable and actively engaged in activities, helping them participate throughout the week happily and excitedly. Giving them responsibility and trust when going on a kayaking adventure seemed to unite them with each other and with the instructors, creating bonds that strengthened their learning experiences. On the final day, campers were very focused on and proud of their projects to show how much they learned at camp.

For week three, “Aquatic Adventures” was a camp for children ages 6-9 yo consisting of four boys and four girls. Similar to week one, we went to the river, salt marsh, and the beach to find fish, eel, crabs, clams, turtles, and eels. This week resulted in none of the surveys being significant. With this being the camp with the youngest students, right off the bat, those that showed interest in learning were engaged while those that didn’t seem eager to participate were defiant. This carried on into day two which consisted of poor listening and with troublemakers who inhibited the engagement of the group in learning activities such as us being unable to locate and learn about fish or eels due to poor cooperation. With more exposure however, the group was generally more playful and inquisitive in days three and four. By the last day, campers were comfortable but still not excited nor interactive.

In week four, “Planet Protectors”, camp consisted of students ages 9-12 yo with six girls and only one boy. Campers learned about the history and sustainability of the reserve, waste and microplastics, birds, NOAA research, bees, compost and solar energy, and about climate change. This week resulted in two out of the three surveys being significant, the scales measuring Happiness and Environmental Perception. This group started off mostly quiet but still participatory in touring the reserve and orchards. The next day there were inquisitive and interested in learning about waste, but on day three they seemed bored and were not active in lessons. On day four they were excited to learn but not as participatory with guest speakers. When day five rolled around however, the group was very determined to succeed in their projects and engaged in their presentations.

Overall, the results of this intervention research proved insignificant. After evaluation of the experiment process, I have come to the following conclusions about why this study didn't come to fruition and how studies can reach better success in the future.

I. Practice Implications

Being an amateur researcher, this study reflected my untrained experience in the field. Although I was over-ambitious in developing this study, I grew as a researcher and gained insight for similar research moving forward, in my studies or outside my work.

Among the four weeks of summer camps, there is a pattern that emerges in the correlation of significance in surveys and characteristics of the camp demographics. In weeks two and four, students were more engaged and inquisitive, perhaps because the age of the students was older and was dominantly girls; whereas across weeks one and three, students were less participatory and less invested, perhaps because the age of students was younger and primarily boys. What's more, each age group participated in different environmental experiences, making any comparison by age incongruent. Future research would benefit from camps consisting of identical demographics, structure, and curriculum, with corresponding questionnaires/surveys written specifically to align with experience of the camp.

Additionally, assigning end-of-week projects to weeks two and four showed a greater increase in engagement and excitedness to participate while the absence of this structure in weeks one and three resulted in less-interested campers. Therefore, older children with more construction in lessons seemed to perform better. This shows while environmentally oriented games for younger

children is still beneficial, it is important to define the boundaries more clearly between learning and free time to ensure excited engagement.

Throughout this study, I gained insight on which parts contributed to insignificant results. One part that didn't work is the time of exposure in the educational summer camp. These students' scores were monitored and examined after only one week, which is not enough time to develop significant results. For future studies, I recommend multiple weeks of education taught in nature in between each survey or evaluation period. Another part that didn't work was the inconsistent length of each campers' exposure. For example, some campers had been returners of many years, some were first-years, and for others it was in between this range. I recommend in future studies that each student is brand new to environmental education for a more consistent baseline of pre-study data. Moreover, I realized that this type of study would see better and more significant results in an actual school setting. In my study, I saw that the campers came from families already passionate about the environment, therefore the intention and encouragement to connect to nature was already instilled in them; whereas in academic school, the norm is that children go to learn different curriculum and the disconnect between human and non-human is emphasized.

Moving forward, future people can implicate my findings by studying Nature Deficit Disorder in school children and what effect implementing environmental educations programs in their daily learning has on their well-being and connection to nature. Conducting this study in a school with students from low-income households over a longer period of time would be more beneficial to study the impact of nature exposure throughout their development.

II. Limitations and Future Recommendations

A major limitation I recognized throughout this study was my personal bias. For example, although I was cognizant of it, I found myself evaluating the campers in a more harsh and negative way in the beginning of the weeks and in a lighter, more positive way by the end to create a more defined improvement in their behavior throughout their camp. To prevent this intervention bias, more standard protocols should be included to make qualitative data easier to quantify and harder to manipulate. This could be accomplished by instead of merely taking notes, future researchers would observe the students by rating behavior on a scale as well as in descriptive words. For example, “engagement 4/5, inquisivity 3/5” and so on. This would equate the measurement and analysis of both the qualitative and quantitative data and take away some researcher bias.

I understand I was very ambitious to reevaluate children’s behavior and attitudes after only 5 days. Another limitation surrounds the truth that Happiness and Behavior cannot be accurately observed nor changed in the span of one week; and they also don’t correlate enough with nature connection. The surveys measuring Happiness and Behavior were not accurate representations of how these camps affected the students’ well-being. Because neither of these surveys had any queries about connection to nature or relate to camp specifically, the scores measured could not have been directly correlated to their Happiness or behavior at camp. The parents/guardian’s questionnaire solely focused on the children’s reactions to various situations, mainly consisting of concepts that couldn’t be changed in one week. Because of this, the consistent insignificant results pertaining to the scale measuring Behavior is to be expected. More discrepancies I found with the Children’s Behavior Questionnaire is that firstly, the parents felt it was too long and

secondly, since it was a take-home survey for guardians, sometimes a different guardian would fill out the pre survey than the guardian that would fill out the post survey, resulting in incongruities. I used this questionnaire because I wanted to incorporate the parents/guardians perspectives of the children into the study and because I wanted to use a survey that measured children's individual functioning and positive social relationships. Additionally, one of the reasons for these insignificant findings is the small sample size for each of the weeks. Each week ranged from only 7-11 campers participating in the study and looking at each week individually, therefore did not support the results with the statistical power needed to detect a significance even if it existed.

Through using these surveys and incorporating multiple subjects I was still able to grow as a researcher by developing this evaluation process on my own. Moving forward, I think the most effective way to improve this aspect of the study is for the researcher to develop a more specific questionnaire based on existing NOAA summer camp curriculum. By framing the surveys around what precisely the children will be learning about and exposed to at camp, the scores will be a more accurate representation of both the camps and their effect on children and predictably yield more significant results.

In addition to the recommendations that I have already mentioned regarding exposure at camp and measuring nature connection, I would like to bring to light the necessity of making more room in future research for studying the campers' perspective beyond their survey scores. Being the prime variable in this study and in this phenomenon of Nature Deficit Disorder, I think the most important part is that the children are given a voice. To answer the questions of "What

happens from the campers' perspective?" or "What did the experience mean to them?", researchers need to hear directly from the participants. I recommend a component is added for students to write a letter to future students about what they learned throughout the study. In their camps, they can take notes on what they liked and disliked, what they appreciated, and what surprised them, etc. These letters could be used as primary source documents to supplement quantitative data and to provide feedback for the researchers to see what worked for the campers and what could be improved upon.

Bibliography

- Andrews, A., Ben-Arieh, A., Carlson, M., Damon, W., Dweck, C., Earls, F., Garcia-Coll, C., Gold, R., Halfon, N., Hart, R., Lerner, R. M., McEwen, B., Meaney, M., Offord, D., Patrick, D., Peck, M., Trickett, B., Weisner, T., & Z, Be. (2002). *Ecology of Child Well being: Advancing the Science and the Science-practice*.
- Ballard, H. L., Dixon, C. G. H., & Harris, E. H. (2017). Youth-focused citizen science: Examining the role of environmental science learning and agency for conservation. *ELSEVIER*, 208, 65–75.
- Barnes, M. R., Donahue, M. L., Keeler, B. L., Shorb, C. M., Mohtadi, T. Z., & Shelby, L. J. (2019). Characterizing Nature and Participant Experience in Studies of Nature Exposure for Positive Mental Health: An Integrative Review. *Frontiers in Psychology*, 09(2617), 01–08. <https://doi.org/doi: 10.3389/fpsyg.2018.02617>
- Carson, R. (1956). *The Sense of Wonder*. Harper & Row.
- Charles, C. (2009). The Ecology of Hope: Natural Guides to Building a Children and Nature Movement. *Springer*, 18(6), 467–475.
- Charles, C., & Louv, R. (2009). Children’s Nature Deficit: What We Know – and Don’t Know. *Children & Nature Network*.
- Collado, S., & Corraliza, J. A. (2017). Children’s Perceived Restoration and Pro-Environmental Beliefs. *AMER ABRA*, 01–12. <https://doi.org/10.21834/jabs.v2i2.176>
- Cui, W., & Yang, Z. (2021). The Association between Exposure to Nature and Children’s Happiness: The Diathesis-Stress or Differential Susceptibility Models? *Routledge Taylor & Francis Group*, 155(8), 755–768. <https://doi.org/10.1080/00223980.2021.1972919>

- Derr, V., & Krista, L. (2012). Biophilic Boulder: Children's Environments That Foster Connections to Nature. *University of Cincinnati*, 22(2), 112–143.
- Hanafin, S., Brooks, A.-M., Carroll, E., Fitzgerald, E., Gabhainn, S. N., & Sixsmith, J. (2007). Achieving Consensus in Developing a National Set of Child Well-Being Indicators. *Springer*, 80(1), 79–104.
- Jimenez, M. P., Deville, N. V., Elliott, E. G., Schiff, J. E., Wilt, G. E., Hart, J. E., & James, P. (2021). Associations between Nature Exposure and Health: A Review of the Evidence. *MPDI*, 18(4790), 01–19. <https://doi.org/10.3390/ijerph18094790>
- Larson, L. R., Castleberry, S. B., & Green, G. T. (n.d.). "I'M TOO OLD TO GO OUTSIDE!" EXAMINING AGE-RELATED DIFFERENCES IN CHILDREN'S ENVIRONMENTAL ORIENTATIONS. 01–05.
- Larson, L. R., Castleberry, S. B., & Green, G. T. (2009). Construction and Validation of an Instrument to Measure Environmental Orientations in a Diverse Group of Children. *SAGE*, 43(1), 72–89. <https://doi.org/DOI:10.1177/0013916509345212>
- Larson, L. R., Castleberry, S. B., & Green, G. T. (2010). Effects of an Environmental Education Program on the Environmental Orientations of Children from Different Gender, Age, and Ethnic Groups. *Academia*, 28(3), 95–113.
- Lepper, H. S., & Lyubomirsky, S. (1999). The Subjective Happiness Scale: A measure of subjective happiness: Preliminary reliability and construct validation. *Social Indicators Research*, 46, 137–155.
- Mustapa, N. D., Maliki, N. Z., & Hamzah, A. (2015). Repositioning Children's Developmental Needs in Space Planning: A review of connection to nature. *ELSEVIER*, 170, 330–339.

The No Child Left Inside Act of 2009, (testimony of No Child Left Inside Coalition).

www.nclicoalition.org

Preus, M., Nieuwenhuijsen, M., Marquez, S., Cirach, M., Dadvand, P., Triguero-Mas, M., Gidlow, C., Grazuleviciene, R., Kruize, H., & Zijlema, W. (2019). Low Childhood Nature Exposure is Associated with Worse Mental Health in Adulthood. *MDPI*, *16*(1809), 01–18. <https://doi.org/doi:10.3390/ijerph16101809>

Putnam, S. P., & Rothbart, M. K. (2006). *Children's Behavior Questionnaire—Very Short Form*. PsychTESTS. doi: 10.1037/t07623-000

Salazar, G., Kunkle, K., & Monroe, M. C. (2020). Practitioner guide to assessing connection to nature. *North American Association for Environmental Education*, 01–63.

The United Nations Convention on the Rights of the Child, (1990) (testimony of UNICEF).

Weeland, J., Moens, M. A., Beaute, F., Assink, M., Staaks, J. P. C., & Overbeek, G. (2019). A dose of nature: Two three-level meta-analyses of the beneficial effects of exposure to nature on children's self-regulation. *ELSEVIER*, *65*, 01–25.

Wirth, S., & Rosenow, N. (2012). Supporting Whole-Child Learning in Nature-Filled Outdoor Classrooms. *National Association for the Education of Young Children*, *67*(1), 42–48.

Annex

A. Children's Behavior Questionnaire--Very Short Form

Test Format:

In the CBQ-Very Short, parents are asked to rate their child on a 7-point scale ranging from 1 (extremely untrue of your child) to 7 (extremely true of your child).

Subject No. _____

Date of Child's Birth:

Today's

Date

_____/_____/_____
Month Day Year

Sex of

Child

Age of Child _____

Years month

Instructions: Please read carefully before starting:

On the next pages you will see a set of statements that describe children's reactions to a number of situations. We would like you to tell us what your child's reaction is likely to be in those situations. There are of course no "correct" ways of reacting; children differ widely in their reactions, and it is these differences we are trying to learn about. Please read each statement and decide whether it is a "true" or "untrue" description of your child's reaction within the past six months. Use the following scale to indicate how well a statement describes your child:

- Circle # If the statement is:
- 1 extremely untrue of your child
 - 2 quite untrue of your child
 - 3 slightly untrue of your child
 - 4 neither true nor false of your child
 - 5 slightly true of your child
 - 6 quite true of your child
 - 7 extremely true of your child

If you cannot answer one of the items because you have never seen the child in that situation, for example, if the statement is about the child's reaction to your singing and you have never sung to your child, then circle NA (not applicable).

Please be sure to circle a number or NA for every item.

| <u>My child:</u> | Extremely untrue 1 | Quite untrue 2 | Slightly untrue 3 | Neither true nor untrue 4 | Slightly true 5 | Quite true 6 | Extremely true 7 | N/A |
|---|-----------------------|-------------------|----------------------|------------------------------|--------------------|-----------------|---------------------|-----|
| 1. Seems always in a big hurry to get from one place to another. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 2. Gets quite frustrated when prevented from doing something s/he wants to do. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 3. When drawing or coloring in a book, shows strong concentration. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 4. Likes going down high slides or other adventurous activities. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 5. Is quite upset by a little cut or bruise. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 6. Prepares for trips and outings by planning things s/he will need. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 7. Often rushes into new situations. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 8. Tends to become sad if the family's plans don't work out. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 9. Likes being sung to. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 10. Seems to be at ease with almost any person. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 11. Is afraid of burglars or the "boogie man." | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 12. Notices it when parents are wearing new clothing. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 13. Prefers quiet activities to active games. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 14. When angry about something, s/he tends to stay upset for ten minutes or longer. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 15. When building or putting something together, becomes very involved in what s/he is doing, and works for long periods. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 16. Likes to go high and fast when pushed on a swing. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 17. Seems to feel depressed when unable to accomplish some task. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 18. Is good at following instructions. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 19. Takes a long time in approaching new situations. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 20. Hardly ever complains when ill with a cold. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 21. Likes the sound of words, such as nursery rhymes. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |

| <u>My child:</u> | Extremely untrue 1 | Quite untrue 2 | Slightly untrue 3 | Neither true nor untrue 4 | Slightly true 5 | Quite true 6 | Extremely true 7 | N/A |
|---|-----------------------|-------------------|----------------------|------------------------------|--------------------|-----------------|---------------------|-----|
| 22. Is sometimes shy even around people s/he has known a long time. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 23. Is very difficult to soothe when s/he has become upset. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 24. Is quickly aware of some new item in the living room. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 25. Is full of energy, even in the evening. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 26. Is not afraid of the dark. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 27. Sometimes becomes absorbed in a picture book and looks at it for a long time. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 28. Likes rough and rowdy games. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 29. Is not very upset at minor cuts or bruises. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 30. Approaches places s/he has been told are dangerous slowly and cautiously. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 31. Is slow and unhurried in deciding what to do next. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 32. Gets angry when s/he can't find something s/he wants to play with. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 33. Enjoys gentle rhythmic activities such as rocking or swaying. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 34. Sometimes turns away shyly from new acquaintances. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 35. Becomes upset when loved relatives or friends are getting ready to leave following a visit. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
| 36. Comments when a parent has changed his/her appearance. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |

Please check back to make sure you have completed all items by marking a number or "NA".

B. Subjective Happiness Scale (SHS)

The SHS is a 4-item scale of global subjective happiness. Two items ask respondents to characterize themselves using both absolute ratings and ratings relative to peers, whereas the other two items offer brief descriptions of happy and unhappy individuals and ask respondents the extent to which each characterization describes them.

For each of the following statements and/or questions, please circle the point on the scale that you feel is most appropriate in describing you.

1. In general, I consider myself:

| | | | | | | |
|-------------------------------|---|---|---|---|---|---------------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| not a very happy person | | | | | | a very happy person |

2. Compared to most of my peers, I consider myself:

| | | | | | | |
|------------|---|---|---|---|---|---------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| less happy | | | | | | more happy |

3. Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you?

| | | | | | | |
|------------|---|---|---|---|---|-----------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| not at all | | | | | | a great deal |

4. Some people are generally not very happy. Although they are not depressed, they never seem as happy as they might be. To what extent does this characterization describe you?

| | | | | | | |
|------------|---|---|---|---|---|-----------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| not at all | | | | | | a great deal |

Scoring: Compute the mean across responses to all four questions; item #4 is reverse coded.

C. Children’s Environmental Perceptions Scale (CEPS)

My name is _____.

I am _____ years old.

My preferred pronouns are _____.

Instructions:

We want to know what you think about some things. There are no right or wrong answers. Just be honest about the way you feel. After I read each sentence, you will see five choices: Strongly Disagree (Two thumbs down), Disagree (One thumb down), Not sure (Question mark), Agree (One thumb up), and Strongly Agree (Two thumbs up). Circle the one that best describes how you feel about each statement.

Let’s try an example:

Example Statement:

| | | | | | |
|----------------------------|---|--|----------------------|---|--|
| 1. Ice cream tastes great. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
|----------------------------|---|--|----------------------|---|--|

Are there any questions? Read one sentence at a time and you decide how you feel about each one. Raise your hand if you need help.

| | | | | | |
|---|--|---|---------------|--|---|
| 1. I like to learn about plants and animals. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 2. Plants and animals are important to people. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 3. I like to read about plants and animals. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 4. Plants and animals are easily harmed or hurt by people. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 5. I am interested in learning new ways to help protect plants and animals. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 6. People need plants to live. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 7. My life would change if there were no trees. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 8. I would give some of my own money to help save wild plants and animals. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 9. I would spend time after school working to fix problems in nature. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 10. We need to take better care of plants and animals. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 11. I like to spend time in places that have plants and animals. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 12. It makes me sad to see homes built where plants and animals used to be. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 13. I like to learn about nature. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 14. I would help to clean up green areas in my neighborhood. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 15. Nature is easily harmed or hurt by people. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |
| 16. My life would change if there were no plants and animals. | Strongly Disagree  | Disagree  | Not Sure ? | Agree  | Strongly Agree  |

D. Guiding Principles of the Education Department (February, 2010)
Wells Estuarine Research Reserve

We will foster a sense of wonder and curiosity by providing time for fun, reflection, and a connection to place, while also instilling a love and respect of Nature.

We will integrate research and stewardship into our programs, teaching that the Earth is an interconnected system.

We will be aware of the needs of our audience, creating inclusive experiences where participants feel encouraged and respected.

We will be enthusiastic, flexible, and open with one another to create a positive and cooperative working environment, where growth and adaptability are cultivated among our community of lifelong learners.

E. Consent Form

Wells Reserve Summer Camp 2022 Consent Form for Research Participation

Dear Student, Parent, and/or Guardian,

Hello! My name is Joslyn Primicias, I am the Summer Camp Assistant this year at Wells Reserve. As an Environmental Science major, I am conducting research this summer titled, "Fostering a Sense of Wonder: Promoting Experiential Learning Through Outdoor Discoveries on the Coast of Maine." The goal of this study is to understand how nature exposure and environmental education in estuarine ecosystems influence the well-being of children. This study will focus on how environmental education can encourage positive effects in children as they develop.

If you allow your child to participate in the study, data will be collected through pre-surveys at the beginning of each camp and post surveys at the end. To collect qualitative data on well-being and behavior, the camp instructor/researcher will also take notes and observations on the children's attitudes and actions throughout the program activities as they interact with their environment and with each other. To collect quantitative data on parents' perceptions of their child's behavior and children's perceptions of their environment, questionnaire surveys will be distributed to the parents or guardians both prior to and after the children's participation in the camps.

I ask that you give permission through this signed consent form for me to collect and analyze pre and post survey response data from your child, as well as collect and analyze survey data from you, the parent or guardian. All information and responses will be kept confidential. The confidentiality of you and the child's name and other personally identifying information will be known only to me, the researcher, and will be protected. No identifying information, including yours or the child's name will be used in any publication or presentation of research without prior consent. You and the child may refuse to answer any portion of the pre/post survey assessments should you choose to do so, as all participation in this study is voluntary. You may also resign from participation in the study at any time by notifying the researcher of your preference. Neither of these decisions will result in any penalties or endanger your relationship with Wells Reserve.

This study will be operating under the UN Convention on the Rights of the Child, specifically Article 2 that states: "The Convention applies to every child without discrimination, whatever their ethnicity, sex, religion,

language, abilities or any other status, whatever they think or say, whatever their family background” and Article 29 that states, “Education must develop every child’s personality, talents, and abilities to the full. It must encourage the child’s respect for human rights, as well as respect for their parents, their own and other cultures, and the environment” (*The United Nations Convention on the Rights of the Child*, 1990).

By participating in this research, we can learn more about how estuarine activities and environmental education through summer camps at Wells Reserve enhances a child’s well-being and promotes environmental advocacy. Thank you for your time and consideration.

Best regards,
Joslyn Primicias

Any questions or concerns can be sent to my email: jprimicias@wellsnerr.org

We have read and reviewed this consent form and understand that the results from the pre- and post- surveys along with corresponding qualitative data observations will be used in publication and presentation of research.

Please check one:

YES – I agree to let the researcher use the following for research and publication:

Child pre/post surveys

Parent questionnaire

Observational notes

NO – I do not want the researcher to use me or my child’s data for research purposes.

Student’s Name (Please Print): _____

Parent/Guardian Name (Please Print): _____

Parent/Guardian Signature: _____

Date: _____

F. Supplemental Figures and Tables

Figure 1: *T*-test difference scores from River to the Sea ($n=11$)

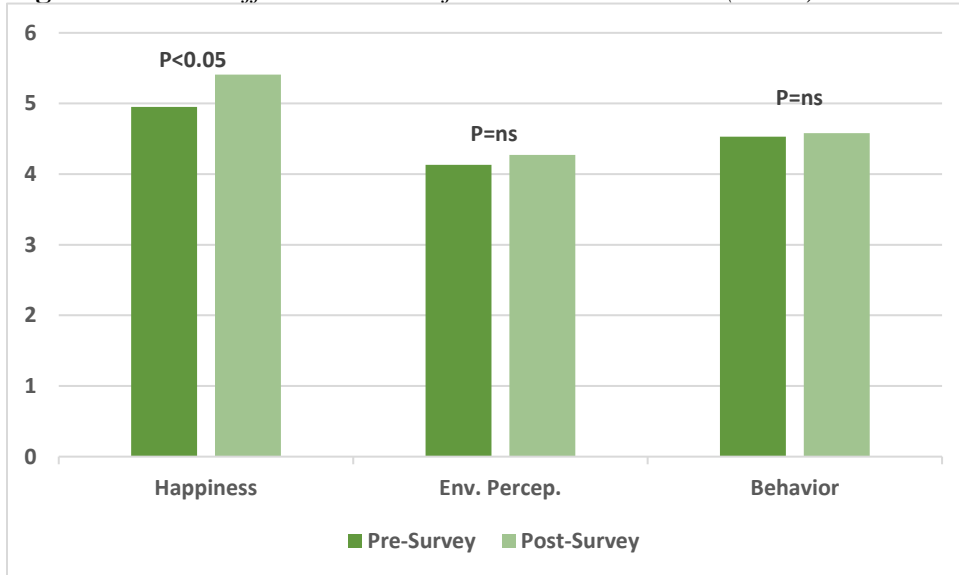


Figure 2: *T*-test difference scores from Eco Nuts ($n=9$)

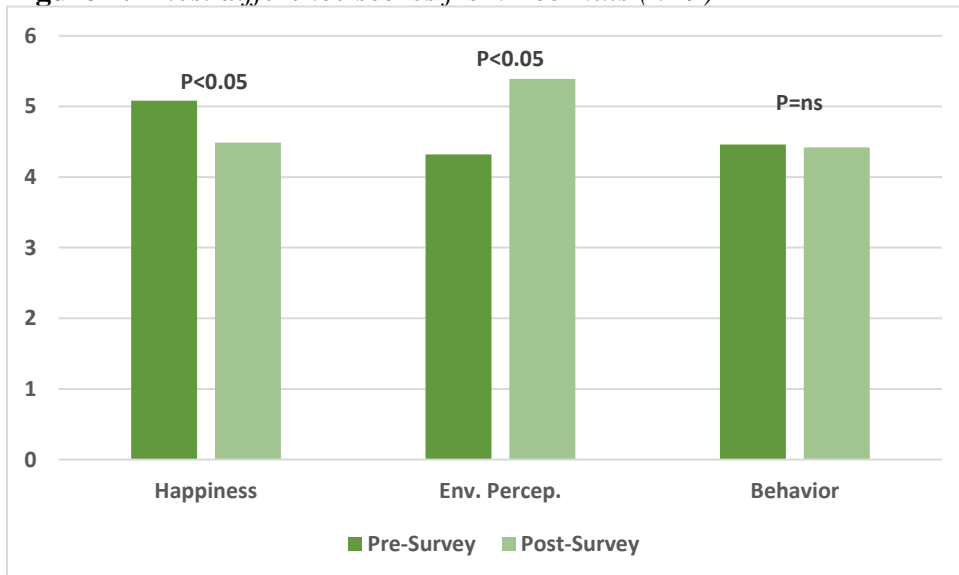


Figure 3: T-test difference scores from Aquatic Adventures (n=8)

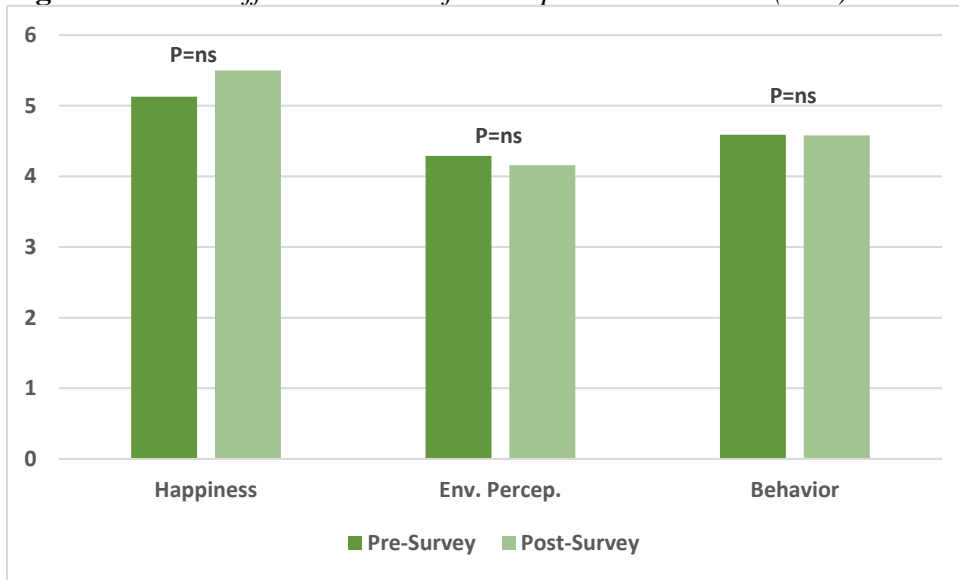


Figure 4: T-test difference scores from Planet Protectors (n=7)

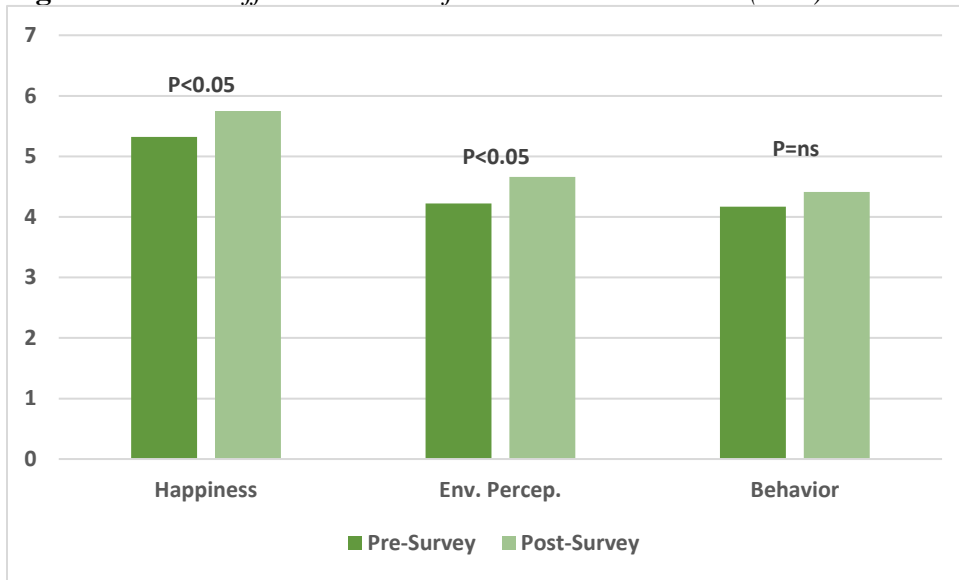


Table 3: Skewness & Kurtosis for Subjective Happiness Scale pre-camp average scores (n=35)

| | |
|--------------------|------------|
| Mean | 5.1 |
| Standard Error | 0.14319288 |
| Median | 5 |
| Mode | 4.5 |
| Standard Deviation | 0.84714052 |
| Sample Variance | 0.71764706 |
| Kurtosis | -0.1743588 |

| | |
|-------------------------|------------|
| Skewness | 0.33133952 |
| Range | 3.5 |
| Minimum | 3.5 |
| Maximum | 7 |
| Sum | 178.5 |
| Count | 35 |
| Confidence Level(95.0%) | 0.29100295 |

Table 4: *Skewness & Kurtosis for Subjective Happiness Scale post-camp average scores (n=35)*

| | |
|-------------------------|------------|
| Mean | 5.49285714 |
| Standard Error | 0.13576956 |
| Median | 5.5 |
| Mode | 5.5 |
| Standard Deviation | 0.80322355 |
| Sample Variance | 0.64516807 |
| Kurtosis | 0.00813461 |
| Skewness | -0.0065048 |
| Range | 3.5 |
| Minimum | 3.5 |
| Maximum | 7 |
| Sum | 192.25 |
| Count | 35 |
| Confidence Level(95.0%) | 0.27591694 |

Table 5: *Skewness & Kurtosis for Children's Environmental Perceptions Scale pre-camp average scores (n=35)*

| | |
|--------------------|------------|
| Mean | 4.23514286 |
| Standard Error | 0.0638951 |
| Median | 4.25 |
| Mode | 4.25 |
| Standard Deviation | 0.37800849 |
| Sample Variance | 0.14289042 |
| Kurtosis | 1.57602897 |
| Skewness | -0.6113543 |
| Range | 1.94 |
| Minimum | 3.06 |

| | |
|-------------------------|------------|
| Maximum | 5 |
| Sum | 148.23 |
| Count | 35 |
| Confidence Level(95.0%) | 0.12985046 |

Table 6: *Skewness & Kurtosis for Children’s Environmental Perceptions Scale post-camp average scores (n=35)*

| | |
|-------------------------|------------|
| Mean | 4.37857143 |
| Standard Error | 0.07416215 |
| Median | 4.5 |
| Mode | 4.75 |
| Standard Deviation | 0.43874918 |
| Sample Variance | 0.19250084 |
| Kurtosis | -0.609803 |
| Skewness | -0.6231853 |
| Range | 1.62 |
| Minimum | 3.38 |
| Maximum | 5 |
| Sum | 153.25 |
| Count | 35 |
| Confidence Level(95.0%) | 0.15071562 |

Table 7: *Skewness & Kurtosis for Children’s Behavior Questionnaire pre-camp average scores (n=35)*

| | |
|--------------------|------------|
| Mean | 4.45969697 |
| Standard Error | 0.07985603 |
| Median | 4.47 |
| Mode | 4.11 |
| Standard Deviation | 0.45873798 |
| Sample Variance | 0.21044053 |
| Kurtosis | 0.75052751 |
| Skewness | -0.8663017 |
| Range | 1.84 |
| Minimum | 3.22 |
| Maximum | 5.06 |
| Sum | 147.17 |
| Count | 33 |

| | |
|-------------------------|------------|
| Confidence Level(95.0%) | 0.16266141 |
|-------------------------|------------|

Table 8: *Skewness & Kurtosis for Children’s Behavior Questionnaire post-camp average scores (n=35)*

| | |
|-------------------------|------------|
| Mean | 4.50575758 |
| Standard Error | 0.06248035 |
| Median | 4.49 |
| Mode | 4.81 |
| Standard Deviation | 0.35892226 |
| Sample Variance | 0.12882519 |
| Kurtosis | -0.0249392 |
| Skewness | -0.2861346 |
| Range | 1.59 |
| Minimum | 3.58 |
| Maximum | 5.17 |
| Sum | 148.69 |
| Count | 33 |
| Confidence Level(95.0%) | 0.1272683 |