International Journal of Early Childhood Environmental Education

Addressing Policy, Practice, and Research That Matters

Yash Bhagwanji, Editor

ISSN 2331-0464 (online) | Volume 8, Number 1 | Winter 2020

naaee
North American Association
for Environmental Education

International Journal of Early Childhood Environmental Education

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EDITORIAL NOTE

About Our Ancestral Connections to Early Bacteria and All Life In Between: Exceptional Topics and Exciting Possibilities for Teaching Children

Yash Bhagwanji, Editor

I had first read Neil Shubin's *Your Inner Fish: A Journey into the 3.5-Billion-Year History of the Human Body* during my early scholarship years as I was trying to understand the construct of, and possibilities within, early childhood environmental education. Now, about ten years later, I have reread the book with greater appreciation for its content and the many implications for guiding and teaching children in their journeys of environmental literacy development.

Reprinted with permission from Pantheon Books, the following is an epilogue in the book written in the words of a father (Neil Shubin himself, whose children were young at the time). The epilogue fittingly describes his experiences with his young children and then implies, at least for me, possible compelling areas of study in early childhood education, both of which are significant parts of the intersections addressed in this journal.

As a parent of two young children, I find myself spending a lot of time lately in zoos, museums, and aquaria. Being a visitor is a strange experience, because I've been involved with these places for decades, working in museum collections and even helping to prepare exhibits on occasion. During family trips, I've come to realize how much my vocation can make me numb to the beauty and sublime complexity of our world and our bodies. I teach and write about millions of years of history and about bizarre ancient worlds, and usually my interest is detached and analytic. Now I'm experiencing science with my children - in the kinds of places where I discovered my love for it in the first place.

One special moment happened recently with my son at the Museum of Science and Industry in Chicago. We've gone there regularly over the past three years because of his love of trains and the fact that there is a huge model railroad smack in the center of the place. I've spent countless

hours at that one exhibit tracing model locomotives on their little trek from Chicago to Seattle. After a number of weekly visits to this shrine for the train-obsessed, Nathaniel and I walked to corners of the museum we had failed to visit during our train-watching ventures or occasional forays to the full-size tractors and planes. In the back of the museum, in the Henry Crown Space Center, model planets hang from the ceiling and space suits lie in cases together with other memorabilia of the space program of the 1960s and 1970s. I was under the presumption that in the back of the museum I would see the trivia that didn't make it to the major exhibits up front. One display consisted of a battered space capsule that you could walk around and look inside. It didn't look significant; it seemed way too small and jury-rigged to be anything really important. The placard was strangely formal, and I had to read it several times before it dawned on me: here was the original Command Module from Apollo 8, the actual vessel that carried James Lovell, Frank Borman, and William Anders on humanity's first trip to the moon and back. This was the spacecraft whose path I followed during Christmas break in third grade, and here I was thirty-eight years later with my own son, looking at the real thing. Of course it was battered. I could see the scars of its journey and subsequent return to earth. Nathaniel was completely disinterested, so I grabbed him and tried to explain what it was. But I couldn't speak; my voice became so choked with emotion that I could barely utter a single word. After a few minutes, I regained my composure and told him the story of man's trip to the moon.

But the story I can't tell him until he is older is why I became speechless and emotional. The real story is that Apollo 8 is a symbol for the power of science to explain and make our universe knowable. People can quibble over the extent to which the space program was about science or politics, but the central fact remains as clear today as it was in 1968: Apollo 8 was a product of the essential optimism that fuels the best science. It exemplifies how the unknown should not be a source of suspicion, fear, or retreat to superstition, but motivation to continue asking questions and seeking answers.

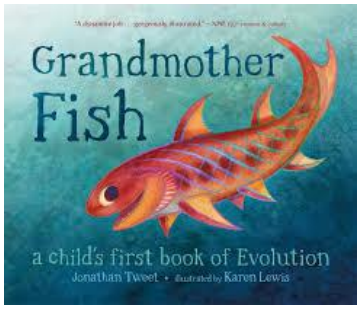
Just as the space program changed the way we look at the moon, paleontology and genetics are changing the way we view ourselves. As we learn more, what once seemed distant and unattainable comes within our comprehension and our grasp. We live in an age of discovery, when science is revealing the inner workings of creatures as different as jellyfish, worms, and mice. We are now seeing the glimmer of a solution to one of the greatest mysteries of science - the genetic differences that make humans distinct from other living creatures. Couple these powerful new insights with the fact that some of the most important discoveries in paleontology - new fossils and new tools to analyze them - have come to light in the past twenty years, and we are seeing the truths of our history with ever-increasing precision. Looking back through billions of years of change, everything innovative or apparently unique in the history of life is really just old stuff that has been recycled, recombined, repurposed, or otherwise modified for new uses. This is the story of every part of us, from our sense organs to our heads, indeed our entire body plan.

What do billions of years of history mean for our lives today? Answers to fundamental questions we face - about the inner workings of our organs and our place in nature - will come from understanding how our bodies and minds have emerged from parts common to other living creatures. I can imagine few things more beautiful or intellectually profound than finding the basis

for our humanity, and remedies for many of the ills we suffer, nestled inside some of the most humble creatures that have ever lived on our planet.

The following children's picture and story books may be helpful as you introduce and discuss with children about the basis for our humanity. As children inquire further, it would be helpful then to engage them in more in-depth studies or projects. Our interconnectedness and interdependence with all natural systems are obviously difficult subjects and challenging to fully understand given the immensity of it all (for example, see https://naturalstart.org/research/ijecee/volume-7-number-1) - start we must, though, given that, in the words of Shubin (2008), we "live in an age of discovery" (p. 200) and that "what once seemed distant and unattainable comes within our comprehension and our grasp" (p. 200). While appropriately and respectfully engaging children, perhaps we too can guide children in finding the "basis for our humanity... inside [and alongside] some of the most humble creatures that have ever lived on our planet" (p. 201).

Grandmother Fish: A Child's First Book of Evolution by Jonathan Tweet (2016)
Illustrated by Karen Lewis

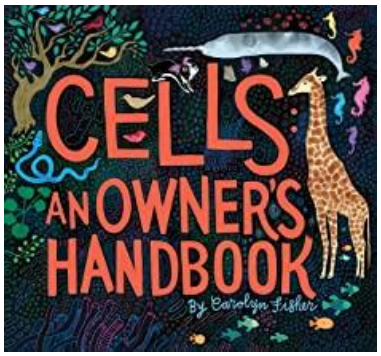


This picture book can serve as an impetus for conversations with preschool-aged children about ideas of "family" beyond human relatives. Conversations related to raising awareness that people are part of nature and that all life forms are connected and related to each other can, and should ideally, occur on an ongoing basis.

Who Will It Be? How Evolution Connects Us All by Paola Vitale (2020)
Illustrated by Rossana Bossù

Suitable for preschoolers and early elementary aged children, this picture book illustrates a growing human embryo and that it contains parts of amphibian, bird, fish, and reptile. The book explains that all life forms started from single cells that lived in the earth's oceans about four billion years ago.

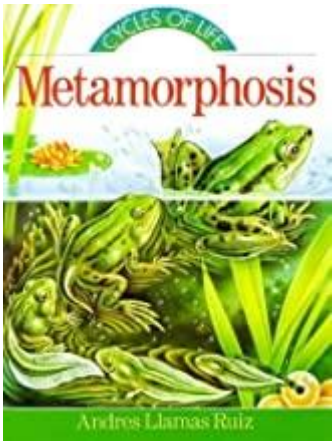
Cells: An Owner's Handbook by Carolyn Fisher (2019)
Illustrated by Carolyn Fisher



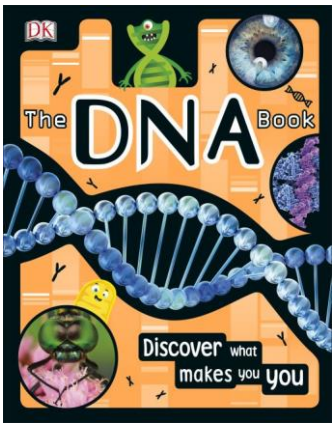
This picture book extends conversations about cells and is suitable for children in kindergarten and onwards. The book describes and illustrates what cells are, where they can be found, and what cells do. The book highlights that each of us "are the lucky owners of 37 trillion high-performance cells (give or take a few trillion)" and introduces vocabulary such as mitochondria.

Metamorphosis by Andres Llamas Ruiz (1996)
Illustrated by Francisco Arredondo

This picture book is better suited for listeners or readers of early elementary age and later. The book explains "what" metamorphosis means as well as both "how" different animals transform themselves from one form to another and "why" animals change forms. The book also introduces vocabulary related to animal adaptations, functions, and life cycles, particularly of pond animals such as dragonflies and frogs.



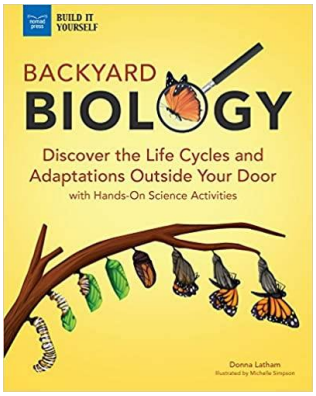
The DNA Book: Discover What Makes You You by Allison Woollard and Sophie Gilbert (2020)
Illustrated by Mark Clifton and Bettina Myklebust Stovne



This book is also better suited for children in the latter range of the early childhood years and onwards. The book is filled with pictures and explanations about what DNA is (molecule containing code for life) and what it can do (guide how each living thing grows, survives, and reproduces). The book introduces the idea of "mutations" in DNA as basis for why living things evolve and how living things may live and look.

Backyard Biology: Discover the Life Cycles and Adaptations Outside Your Door with Hands-On Science Activities by Donna Latham (2020)
Illustrated by Michelle Simpson

Better suited for later elementary aged children and onwards, the book provides many suggestions and illustrations for studying life forms. From watching the locomotion of single-celled amoebas to planting pollinator gardens, the book provides ideas for a varied range of learning activities related to understanding the many ways life is interconnected and interdependent.



And as Shubin has implied, learning experiences and studies in paleontology, too, are significant components in understanding life's development and processes for both children and adults alike. With these types of topics of study, many exceptional investigations and exciting variety of learning opportunities await children, everyone, and everything involved in guiding and teaching children. For examples how children may be engaged in such in-depth studies, access the following articles illustrating the study of human body (https://ecrp.illinois.edu/v10n2/brouette.html), human bones (https://ecrp.illinois.edu/v5n1/kogan.html), and study of insects and organisms that depend on trees (https://ecrp.illinois.edu/v17n1/griebling.html) by young children.

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International Journal of Early Childhood Environmental Education

ISSN: 2331-0464 (online)

Refining a Games Testing Tool for Various Cultural, Social, and Geographic Situations to Evaluate Preschool Children's Bioaffinity

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Submitted June 11, 2020; accepted October 20, 2020

ABSTRACT

Studies have used psychological games testing to measure children's bioaffinity (a child's love of/for or connection to nature) as a result of time spent in nature enriching children's well-being. Discrepancies found between two studies in different countries (Sweden and Canada) informed this research. Both studies used the same bioaffinity testing tool with children who had more than average nature-exposure and were enrolled in preschools using the same nature-based philosophy (Reggio-Emilia approach). While the Swedish study found positive bioaffinity amongst the children (aged 5), the Canadian children's (aged 3-5) affinity with nature was weak. The inconsistencies between the Swedish and Canadian studies led to recommendations for further research and testing to determine the following: 1) the appropriateness of the measure for younger children, 2) the need to modify the test to be more culturally and geographically relevant for the participants, and 3) whether such revisions would increase participant understanding and completion of the test while producing more accurate results. As such, this study sought to modify the testing tool to be more culturally, geographically and developmentally appropriate for young Canadian children and then test it with a cohort of 3-5-year-old Canadian preschoolers. Interviews with early childhood education experts and current child development psychology literature informed the modification of the games testing tool. Reduction in the time needed to complete the testing and an increase in child engagement indicate that the new tool's revisions effectively enhanced the children's understanding of the game's testing.

***Keywords**:* Early childhood environmental education, early childhood education, environmental education, early childhood development, bioaffinity, games testing, psychological testing, Reggio-Emilia, connection to nature

Nature is undoubtedly necessary for the survival of the human race. In particular, nature is a crucial component for the appropriate physical and psychological development of children. The balance of scholarly evidence demonstrates that direct contact with nature enhances children's cognitive, emotional, attitudinal, and physical development (Driessnack, 2009; Giusti et al., 2014; Bratman et al., 2015; Kardan et al., 2015; McClain and Vandermaas-Peeler, 2016; Broom, 2017). However, human interaction with nature, especially for young children, is continuously diminishing (Driessnack, 2009; Soga and Gaston, 2016). For example, in Canada, 70% of children spend one hour or less per day outdoors (David Suzuki Foundation, 2012). Additionally, Canadian children (aged 7-14) spend more than 8.3 hours per day engaging in sedentary activities (Statistics Canada, 2016). In addition, according to research, an increase in the use of technology is a primary barrier to a child's ability to connect and interact with nature (Driessnack, 2009; Louv, 2005; Soga and Gaston, 2016). Kabali *et al*. (2015) showed that 72% of children surveyed in the United States between the ages of 0-to-8 years used a mobile device regularly, and 38% of children aged two years or less have used a mobile device. These and many other studies are beginning to paint a picture of children spending less time outdoors, and increasingly staying indoors and using electronics.

As a consequence, children lack the many health benefits associated with spending time in nature including lower infant mortality (Dzhambov, Dimitrova and Dimitrakova, 2014), a lower rate of asthma and allergies (Lovasi et al.,

2008; Hanski et al., 2012; Ruokolainen et al., 2015), reduced chance of anxiety and depression (Maas et al., 2009), better concentration (Faber Taylor and Kuo, 2009), and better development of imagination, creativity and problem-solving skills (Malone and Tranter, 2003; Chawla, 2015).

A lack of nature exposure can also have long-term consequences for environmental sustainability on a societal level. Nature exposure in childhood positively correlates with developing pro-environmental attitudes, knowledge and beliefs as an adult (Chipeniuk, 1995; Ewert, Place & Sibthorp, 2005; Rickinson, 2001), influencing education, recreation and work preferences (Bixler, Floyd & Hammitt, 2002), as well as increasing the probability of conservation behaviours and attitudes later in life (Zhang, Goodale & Chen, 2014). Therefore, a strong relationship with nature is beneficial not only for the individual but also of great benefit for society.

Psychological Analyses

Several psychological testing tools developed seek to document the impacts of nature exposure concerning children's relationships with nature. In 1984, Edward Wilson aided in pioneering the exploration of the relationship between the environment and biophilia or bioaffinity (a child's love of/for or connection to nature). More recently, Lincoln et al. (2009), Mayer and Frantz (2004), and Nisbet et al. (2009) utilized a self-reporting itemized Likert scale to measure children's affinity with nature, such as Mayer and Frantz' Connectedness to Nature Scale that measures a child's emotional connection to nature. Pell and Jarvis (2001) went on to integrate pictures into the Likert scale method, using smiley faces instead of numbers. Other studies by Giusti et al. (2014), Omidvar (2018), and Omidvar et al. (2019) use games testing (involving pictures and games) to measure children's bioaffinity and to analyze a child's relationship with nature within the context of nature-based curriculum and schooling. Giusti et al. (2014) avoided the use of self-reporting questionnaires due to the explanation that young children are "incapable of deep self-exploration and have very limited capacity to express the complexity of their emotions and beliefs" (p. 21). The study found that 5-year old children in Reggio-Emilia schools (which have a pro-nature curriculum and educational philosophy associated with the curriculum) in Sweden had increased bioaffinity over those in less nature-based schools (Giusti et al., 2014).

However, results from both Omidvar (2018) and Omidvar et al. (2019) concluded that while the 3-5-year-old children at Reggio-Emilia Inspired preschools were exposed to nature more than the average Canadian child, the children's cognitive, emotional, and attitudinal affinity with nature was much weaker than hypothesized. The outcomes of Omidvar (2018) and Omidvar *et al*. (2019) led to two questions: (1) did the Reggio-Emilia curriculum have no impact on the participant children's bioaffinity, or (2) was the Giusti *et al.* (2014) tool unable to measure the children's bioaffinity? Omidvar et al*.* (2019) recommended that further research is needed using the Giusti *et al*. (2014) games testing to determine whether the tool can become more culturally, geographically, and developmentally appropriate for a 3-5-year-old Canadian audience (Omidvar *et al*., 2019). With significant differences (cultural and geographic) between Sweden and Canada, such as locational difference and linguistic (phenomes, syntax, and pragmatics) exposure, modifications made to the tool sought to address these gaps. Additionally, this study investigates whether refining the tool to account for an earlier psychological developmental stage could facilitate more accurate bioaffinity results based on an increase in participant understanding and ability to complete the test due to cultural and geographic modifications (Omidvar et al., 2019).

METHODS

To achieve the above goals, the game's testing tool was first critically examined and subsequently modified after a thorough examination of childhood developmental literature used to gain an understanding of how to modify the tool culturally and geographically based on the developmental characteristics of 3-5-year-olds and interviews with Early Childhood Education (ECE) experts. Secondly, the modified bioaffinity tool was then pilot tested with a cohort (n=9) of 3-5-year-old preschoolers to assess its appropriateness for this group.

Step 1: Modification of the Game's Testing Tool

This portion of the research focused on modifying the Giusti et al. (2014) games testing tool in order for it to be more culturally and geographically appropriate for a Canadian context, based on the developmental characteristics of 3-5-year-old preschool participants. The modification of the tool took place in two stages, as described below:
Stage One involved a thorough review of recent ECE literature, including environmental psychology (testing and analysis) and preschool (3-5-year-old) children's developmental psychology (cognitive, emotional, attitudinal) to inform critical analysis of the Giusti et al. (2014) tool. Appropriate literature to review was identified through consultation with subject experts and information management specialists. Literature was then reviewed, and significant supporting information was noted (i.e. typical attention span of 3-5-year-olds, use of cartoons versus real images of nature, etc.). This information was used to critically analyze the original Giusti et al. (2014) tool, and suggested modifications were noted in table-format.

Stage Two included key interviews with four ECE experts (including scholars and practitioners). The recruitment for interviewees was carried out through a non-probabilistic and purposive sampling technique, specifically focusing on a combination of stakeholder and criterion sampling to allow for identification and interviewing of significant stakeholders who are intimately involved in the matter at hand; ECE experts and educators involved in child psychology or early childhood education (Payls and Atchison, 2014). The interview structure was face-to-face, and the questions were semi-structured due to the advantages and flexibility of this type of interview. Additionally, all four of the interviewees provided consent to have the session recorded, allowing the interviewer to pay increased attention to the discussion in real-time and to allow for data accuracy (Payls and Atchison, 2014). The interview results were analyzed using *a posteriori* coding to determine major themes and concerns that emerged in the interview process.

Once Stage One and Stage Two were complete, a master list of suggested modifications was developed and recorded in a table format, and the original Giusti et al. (2014) games testing tool was modified to be used in our Canadian pilot study (see results section for more detailed information on the outcomes of the interview and literature review stages).

Step 2: Pilot Test the Modified Game's Testing Tool

As outlined above, the modified test was created based on a review of the literature and interviews with ECE experts. The new tool was then pilot tested at a small nature-based preschool in Halifax, Canada, with 3-5-year-old's to allow for comparison between the Omidvar studies and this study.

The focus of the pilot testing was to determine whether the modified tool could be effective in allowing younger Canadian (culturally and geographically different) participants to understand better and complete the test (major issues identified in the Omidvar (2018) and Omidvar et al. (2019) studies). Recruitment of the students used a non-probabilistic and purposive sampling technique, focusing on criterion sampling, allowing the researcher to find a group of individuals who meet a specific criterion; preschool children attending a Reggio-Emilia Inspired school (Payls and Atchison, 2014). Though demographic information was not collected, the participants attend a culturally diverse Reggio-Emilia Inspired school in Halifax, NS, Canada, founded on pillars, such as environmental stewardship and a commitment to culture and community. A recruitment email was sent out by the Director and Head Teacher of the school to the parent(s)/guardian(s) of children aged 3-5 enrolled in the preschool program. The newly modified tool was tested with the recruited students (n=9).

The testing tool included six different games that tested the children's emotional affinity with nature, the children's environmental awareness, and the children's attitudinal affinity with the biosphere. All six games had to be played in order for the testing to be considered complete. All answers were audio-recorded upon the parent(s)/guardian(s) consent and transcribed for further analysis. Due to it being beyond the scope of this paper to discuss the results of the pilot testing itself (i.e. the bioaffinity results of each participating child), the purpose of the pilot test focused on determining whether the modified tool was more effective when used with a younger and culturally and geographically different audience than that used in the Giusti et al. (2014) study. As such, the research team took

extensive observational notes to determine how well the test was received, such as, did the children understand the question, were there children who dropped out and did the children recognize the nature items presented.

RESULTS OF THE MODIFICATIONS

The following section presents the significant findings from the literature review, interviews with ECE experts, and then goes on to describe general observations regarding the efficacy of the modified tool during pilot testing.

Literature Review and Interview Results

When analyzing the results from the literature review and interviews with ECE experts, four significant themes emerged concerning the original test: (1) game design, (2) the use of cartoons versus real pictures, (3) the use of appropriate language, and (4) the length of time it takes for participants to complete the test. Each theme aided in modifying the tool to become more culturally (in regards to Canadian and Halifax, Nova Scotia cultural norms), geographically (concerning a Canadian setting), and developmentally appropriate for the 3-5-year-old participants in the study. These themes were then considered within the context of the six individual games that make up the tool as a whole. Tables created for each of the six games highlighted: (1) the areas that needed to be added or that required changes; (2) justifications for the change (i.e. a reference to the literature or ECE expert interviews); and (3) the modifications suggested for a modified tool. For example, Table 1 showcases the modifications made to Game 1A, which is concerned with emphatic (emotional affinity with the biosphere) behaviour (note: access to all of the tables can be provided by writing the authors directly).

Table 1
Condensed table portraying the literature review and interview data results (justification) that constitute the modifications for game 1A

Areas Added or Requiring Change	Justification	Modifications
Game Design (Identified during expert interviews, 2019)	• Tasks keep participants' attention; • Tactile games, the incorporation of various kinds of movement throughout the testing and hands-on tests are more appropriate during the preoperational developmental stage.	• Change to a 'sorting game'; • Use 'yes' and 'no' bins that are placed on opposite ends of the testing space in order to facilitate the sorting.
Cartoon vs. Real Pictures (Identified in Omidvar, 2018 and Omidvar et al., 2019; Identified in developmental psychology literature Kail and Barnfield, 2015; Hughes, 1975; Dasen, 1994; Identified during expert interviews, 2019)	• Due to preschool children's egocentrism, they are inclined to have difficulty viewing the world from another's point of view (Kail and Barnfield, 2015); • Cultural context is crucial to ensure the child has an increased chance of knowing and understanding the images they see and are expected to use (Dasen, 1994); • Some children may not be exposed to cartoons, whereas all children have likely been exposed	• A picture of a green check mark was added to the game to place on one of the sorting bins; • A picture of a red 'x' was added to the game to place on the other sorting bin; • All cartoons replaced with real images (i.e. the cartoon tree image replaced with a common local tree).

	to the real objects portrayed in the tool in some capacity (ECE Interviews).	
Use of Language (Identified in developmental psychology literature (Kail and Barnfield, 2015; Bloom, 1998; Smith, 2000)	• Original language used with 5-year-old children in Sweden may be too developmentally complex and/or not commonly used in a Canadian context (Giusti et al., 2014, ECE interviews); • Vast difference between the vocabulary of a two-year-old (roughly a few hundred words) to that of a six-year-old (over 10, 000 words) (Kail and Barnfield, 2015).	• Original question about pain replaced with developmentally appropriate terms (i.e. from "does a tree feel pain?" to "can a tree feel an owie? Can a tree get hurt?"; • The term "hens" modified to "chickens"; • The term "bicycle" modified to "bike"; • The term "plane" modified to "airplane"; • The term "birds" changed to the singular form.
Length of Time (Identified in previous studies Omidvar, 2018; Omidvar et al., 2019; Identified in developmental psychology literature Kail and Barnfield, 2015; Identified during expert interviews, 2019)	• Omidvar (2018) noted that the amount of time needed to complete the game's testing was roughly between 30-40 minutes and that many participants lost interest; • Kail and Barnfield (2015) state that three-year-olds will have a decreased attention span compared to that of a five-year-old and need strategies to stay focused (Kail and Barnfield, 2015; ECE Expert 2).	• Develop active game boards with game pieces; • Have students move during the games to enhance focus; • Ensure games are culturally appropriate, and linguistically specific (in relation to Halifax, NS, Canada norms) to maintain attention (see changes made above).

Modifications Made to the Delivery of the Game's Testing Tool

In addition to the recommendations for modification of each of the six individual games, the analyses of the literature review and interviews with ECE experts revealed a set of recommended changes for the games testing tool as a whole due to limited instruction provided in the original Giusti et al. (2014) testing tool. Table 2 demonstrates the five recommended modifications that were informed by the overall analyses.

The first idea, 'general recommendations for how to prepare and conduct the testing,' (Item 1), equips future researchers with an understanding of how to execute the testing similar to the testing conducted with this cohort and to add to the validity, reliability and trustworthiness of the tool.

The ECE experts encouraged the section 'overview of water pollution, ground pollution, and air pollution' (Item 2) before starting the game's testing and during a 'debrief' (Item 5) upon completion. These explanations were incorporated to include a learning experience for the children concerning the three pollutants they would encounter during the testing period and may not have heard of or seen before. The modifications suggested to describe the images shown in the testing rather than discuss the impacts, for example, air pollution causing health risks to humans and animals. The experts agreed that this would minimize bias due to not iterating the consequences the three pollutants have on people, animals, and objects asked about during the testing.

The 'overall game design' (Item 3) reiterates and solidifies the justification for the subsequent game design modifications. Both the scholarly literature and the experts advocated that children's responses and engagement would increase if they were mentally and physically stimulated during the testing because children enjoy being "hands-on," and their developmental strategies are driven by sight and touch (ECE expert 3; Kail and Barnfield, 2015).

Item 4, 'colour vs. greyscale,' addresses the need to minimize colour bias (discussed further in the section 'Tool Modification'). The literature shows that children between the ages of 3-5-years begin to develop categories for colours that rely mainly on primary colours, and more specifically, they tend to gravitate towards their "favourite" colours when partaking in daily tasks (Pitchford and Mullen, 2003; Bonnardel and Pitchford, 2006; Regier and Kay, 2009).

As mentioned above and in Table 2, the debrief (Item 5) section required the researcher to now elaborate on the explanations provided concerning the three pollutants and adds the corresponding consequences associated with each. Therefore, providing the participants with an opportunity to complete the testing with more knowledge of water pollution, ground pollution, and air pollution.

Table 2
Condensed table portraying the literature review and interview data results (justification) for the overarching modifications added to the overall tool

Areas Added or Requiring Change	Justification	Modifications
General Recommendations for How to Prepare and Conduct the Testing (Identified in previous study Omidvar, 2018; Identified during expert interviews, 2019)	• Omidvar (2018) recommended numerous revisions to both individual games and overall structures of the tool; • Audio recording instead of writing answers will save time and help with accurate collection of data.	• A list of initial recommendations was added at the beginning of the tool to guide future researchers on how to utilize it, as well as additional suggestions made for each individual game throughout the rest of the tool (please contact authors for full list).
Overview of Water Pollution, Ground Pollution, and Air Pollution Before Starting the game's testing (Identified during expert interviews, 2019)	• This section was recommended to facilitate a learning experience for the children about the three pollutants seen throughout the tool.	• Upon starting the game's testing, the researcher is now required to go over the concepts/ideas of water pollution (dirty water), air pollution (dirty/smoky air), and ground pollution (dirty ground), without discussing the consequences associated with the form of pollution.
Overall Game Design (Identified during expert interviews, 2019)	• Developmentally appropriate to make games more interactive; • Transformation of the games to "active" will reduce the time needed to complete the testing.	• All six of the games were turned into real 'board' games. The original four tables used throughout the testing tool (games 1B, 2A, 2B, 3A and B) were enlarged and printed to become the size of a board game, and pictures enlarged to complement the size of board.

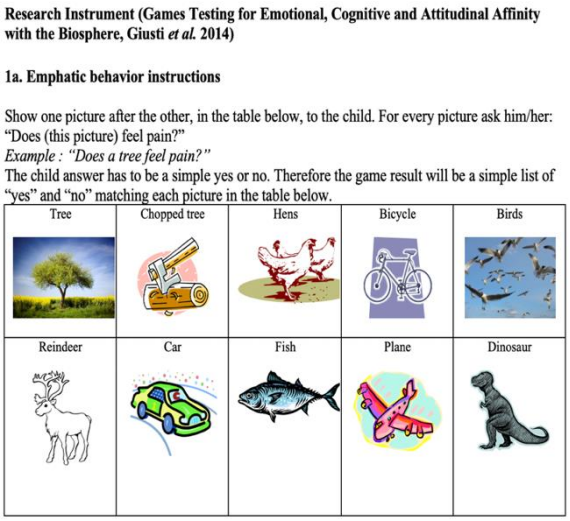
		When possible, tasking was embedded into games (e.g. sorting).
Colour vs. Greyscale (Identified during expert interviews, 2019; Identified in developmental psychology literature Pitchford and Mullen, 2003; Bonnardel and Pitchford, 2006, Regier and Kay, 2009)	• Between the ages of three-to-five-years, children begin to develop preferences for colours (Pitchford and Mullen, 2003); • Preschool children rely on primary colours more than complex colours (Bonnardel and Pitchford, 2006); • Children tend to gravitate toward their 'favourite' colour when partaking in daily tasks and activities (Regier and Kay, 2009).	• All pictures throughout the testing tool modified to greyscale.
Debrief (Identified during expert interviews, 2019)	• Participants need an opportunity to better understand the concepts discussed during the game's testing, and the opportunity to ask questions; • Debrief may stimulate children to ask more questions about pollution that they see in their daily routines.	• The researcher is now required to review the concepts/ideas presented at the beginning and throughout the testing, including the consequences associated with each form of pollution.

Principal Modifications

Informed by the results of the literature review and interviews offered above, the Giusti et al. (2014) tool was modified, using the themes and concerns identified above, in order to make it more culturally, geographically and developmentally appropriate for a younger audience. The revisions of the original tool and the presentation of the new tool are described below and organized according to the four major themes identified earlier (game design, the use of cartoons versus real pictures, the use of appropriate language, and the length of time it takes for participants to complete the test).

Game Design. The original Giusti et al. (2014) games testing tool was played on standard printer paper, with small images and varying types and colours of pictures (see Figure 1). As seen in Figure 2, the opening page of the newly modified tool now includes descriptive instructions and suggestions for how to use the game's testing tool.

Table 3 offers an abbreviated version of the different game design modifications made to the Giusti et al. (2014) tool. As demonstrated in both Table 3 and Figure 3, the original games testing tool was revised so that all games are now tangible (i.e. they now involve game boards with game pieces that the child can manipulate and/or game pieces paired with tasks). Figure 3 illustrates the outcome of the revised game design for Game 1B. This part of the test shows participants a game board (in poster form) and game pieces (happy and sad faces) and asks the participants to place them on the board according to the questions (i.e. "does this image make you sad or happy?").



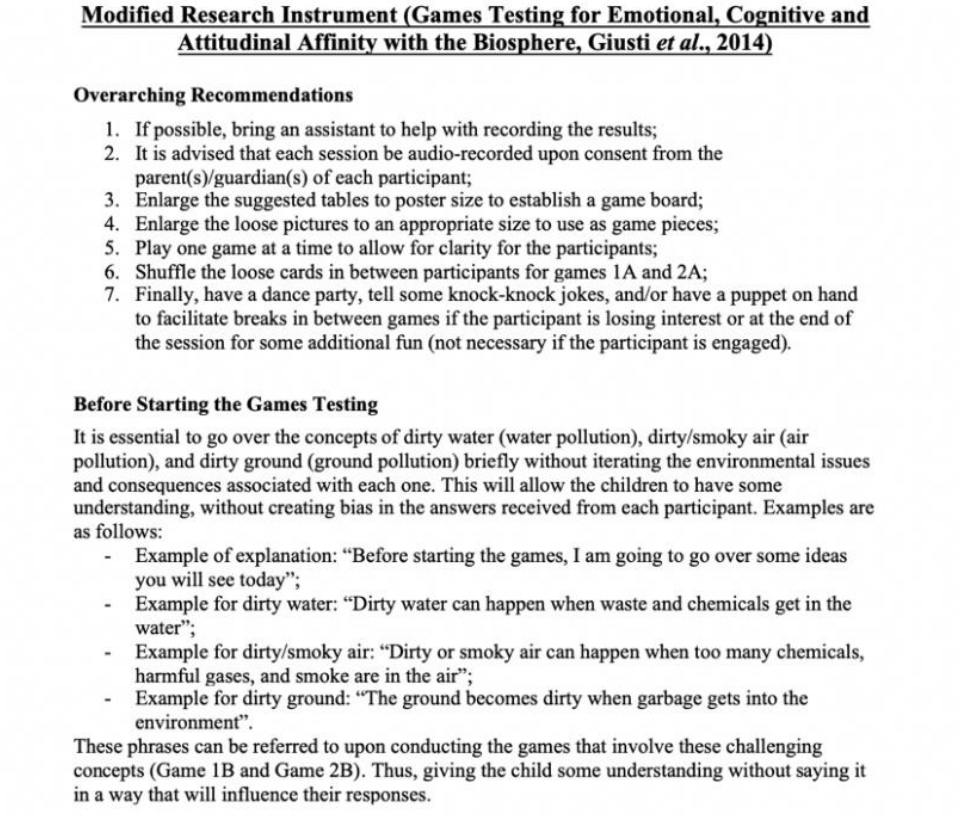
Research Instrument (Games Testing for Emotional, Cognitive and Attitudinal Affinity with the Biosphere, Giusti *et al.* 2014)

1a. Emphatic behavior instructions

Show one picture after the other, in the table below, to the child. For every picture ask him/her: "Does (this picture) feel pain?"
Example : "Does a tree feel pain?"
The child answer has to be a simple yes or no. Therefore the game result will be a simple list of "yes" and "no" matching each picture in the table below.

Tree	Chopped tree	Hens	Bicycle	Birds
Reindeer	Car	Fish	Plane	Dinosaur

Figure 1. Snapshot of the first page in the Giusti et al*. (2014) games testing tool*



Modified Research Instrument (Games Testing for Emotional, Cognitive and Attitudinal Affinity with the Biosphere, Giusti *et al.*, 2014)

Overarching Recommendations

1. If possible, bring an assistant to help with recording the results;
2. It is advised that each session be audio-recorded upon consent from the parent(s)/guardian(s) of each participant;
3. Enlarge the suggested tables to poster size to establish a game board;
4. Enlarge the loose pictures to an appropriate size to use as game pieces;
5. Play one game at a time to allow for clarity for the participants;
6. Shuffle the loose cards in between participants for games 1A and 2A;
7. Finally, have a dance party, tell some knock-knock jokes, and/or have a puppet on hand to facilitate breaks in between games if the participant is losing interest or at the end of the session for some additional fun (not necessary if the participant is engaged).

Before Starting the Games Testing

It is essential to go over the concepts of dirty water (water pollution), dirty/smoky air (air pollution), and dirty ground (ground pollution) briefly without iterating the environmental issues and consequences associated with each one. This will allow the children to have some understanding, without creating bias in the answers received from each participant. Examples are as follows:

- Example of explanation: "Before starting the games, I am going to go over some ideas you will see today";
- Example for dirty water: "Dirty water can happen when waste and chemicals get in the water";
- Example for dirty/smoky air: "Dirty or smoky air can happen when too many chemicals, harmful gases, and smoke are in the air";
- Example for dirty ground: "The ground becomes dirty when garbage gets into the environment".

These phrases can be referred to upon conducting the games that involve these challenging concepts (Game 1B and Game 2B). Thus, giving the child some understanding without saying it in a way that will influence their responses.

Figure 2 *Snapshot of the first page in the newly modified version of the game's testing tool*

Table 3
Abbreviated table of game design revisions pulled from the Modification Chart

Game 1A	Game 1B	Game 2A
This section is now a 'sorting game'. This involves 'yes' and 'no' bins that are placed on opposite ends of the testing space in order to facilitate the sorting.	Modified to be called "a game of happy and sad smiles". The table of images provided was enlarged and printed as a game board and eight of the happy and sad smiles (total = 16) were enlarged and printed in colour.	The game has been modified to facilitate a 'matching game'. Therefore, the table for list 2 was enlarged and printed to create a game board, and the pictures in list 1 were individually enlarged and printed to use as matching pieces.
Game 2B	Game 3A and 3B	
The game has been modified into two parts. Part 1 asks the child to explain the concepts of air pollution/dirty or smoky air, ground pollution/dirty ground, and water pollution/dirty water. Part 2 includes questions asking the child whether the type of pollution (found in list 1) can hurt the things found in list 2 (animal, car, and people). This part is now set up as a sorting game, with three of each item found in list 2 made into cut outs, so the participant can sort their answer into the 'yes' or 'no' bin utilized for game 1A.	The table of images provided was enlarged, and printed as a game board, with the question portion remaining similar to the original testing tool.	

ECE Input on Game Design. Both the ECE experts and the literature supported the revised game designs. Kail and Barnfield (2015) explained that during the preoperational stage (2-7-years-old), a child's memory strategies are developed and driven by sight and touch. Moreover, Smith (2000; 2009) strengthened their point by highlighting that the shape of things creates a connection to specific objects and words. Similarly, the ECE experts interviewed were unanimous in supporting the transformation to hands-on games, with responses such as:

> *"Cards games are good things to do with kids. You can get kids to sort cards into two bins"; "You have to vary, going from a card game, to a computer… they do much better" – ECE Expert 2*

> *"Kids are hands on… Kids because of that age still have an egocentric nature, so they will want to tell you or show you." – ECE Expert 3*

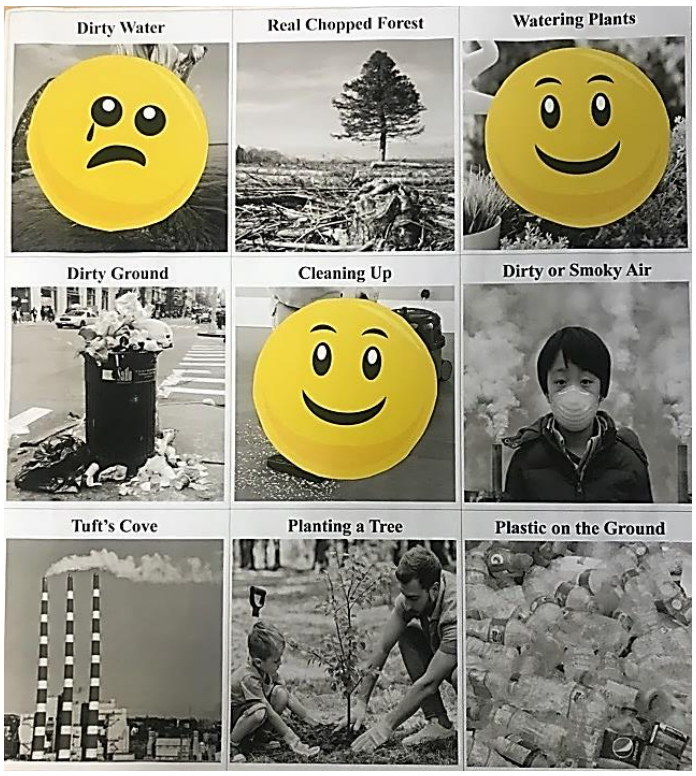


Figure 3. Picture of modified game 1B: concern and sensitivity instructions with the game board and game pieces

Cartoon vs. Real Pictures. Based on the analyses of the literature review and interviews, four main revisions were made to the pictures in the original Giusti et al. (2014) test: (1) grey scaling all of the pictures, (2) replacing all cartoon pictures with real images, (3) determining which images are culturally and geographically appropriate and replacing those that are not, and (4) ensuring that all images are developmentally appropriate pictures (understandable and straightforward).

Using colourful and complex pictures was considered a significant issue for the modified tool. As ECE Expert 2 stressed, "what you have to be careful of is to not make ugly looking images all be related to pollution," and that "some kids really like certain colours, everything red is perfect, doesn't matter what it represents." As seen in Table 2, preoperational (preschool) children are just beginning to develop the cognitive skills used to categorize colours, which means young children rely on primary colours or their favourite colours when partaking in daily tasks and activities (Pitchford and Mullen, 2003; Bonnardel and Pitchford, 2006; Regier and Kay, 2009). Thus, all of the pictures were greyscaled.

As seen in Figures 1 and 4, a variety of different pictures were utilized throughout the initial Giusti et al. (2014) games testing tool. Omidvar (2018) recommended that in any future use of the tool, the researcher should "choose more meaningful and easily understandable pictures and using the images of local locations may help children in better comprehending and relating to the question" (Omidvar, p. 108, 2018). This recommendation was supported by ECE Expert 3, who said: "if you are looking for answers to a realistic question about the environment, a realistic photo is good." Additionally, by choosing real pictures, it seeks to minimize a child's egocentrism (i.e. difficulty viewing the world from another's point of view) and minimize cultural variance by providing a local context (Kail and Barnfield, 2015). It is important to note that real pictures were chosen over that of material items due to the complications material items may have caused, such as distraction and the inability to have specific items brought to the testing (i.e. it would be problematic to have a tangible item for a 'river').

Finally, based on the feedback, it was essential to reduce the confusion caused by using a wide variety of different photos (Figure 4) by providing simple and straightforward images. As such, revisions made focused on using only one picture for each category throughout the test, including the image used of a bird in Game 1 would be the same image of a bird used in Game 4. Examples of specific picture modifications include: changing a cartoon picture of a "plane" to a real picture of an Air Canada airplane, revising the picture of the "birds" flying in the sky to a real picture of a single pigeon, and the three pictures of "animals" have been modified to a single picture of a domestic house dog, specifically a golden retriever, which are very common in Canada (Giusti et al. (2014) images seen in Figure 1 and Figure 4).

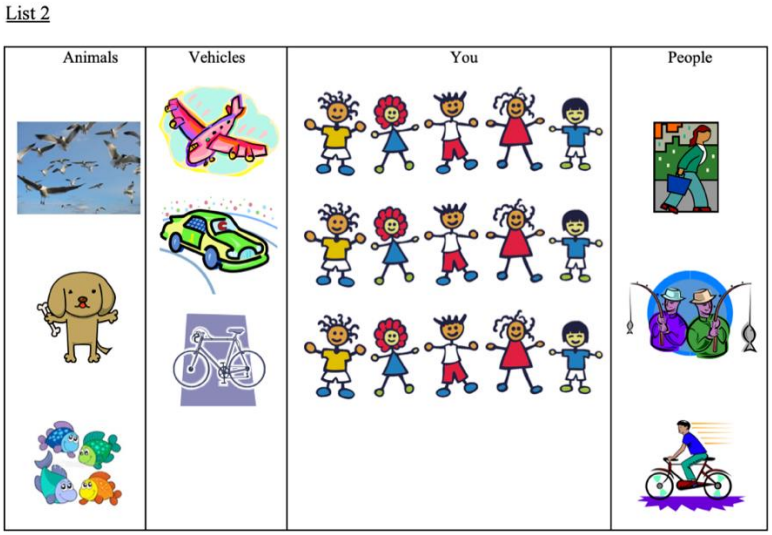


Figure 4. Snapshot of game 2B: pollution awareness instructions from the original Giusti et al. (2014) games testing tool

Use of Language. The use of culturally and developmentally appropriate language is critical during the preoperational stage, largely due to children's egocentrism and the impact of language exposure (Kail and Barnfield, 2015). Egocentrism causes children to find it difficult to see the world from another's point of view. Therefore, it is important that the literature used in the modified tool adheres to Canadian linguistic norms. Due to all languages using different phenomes (i.e. different sounds are used in different languages), syntax (i.e. specific rules that specify how to combine words in a sentence) and pragmatics (i.e. rules that lead to effective communication), the language used in the modified tool needed to reflect the Canadian background of the participants and the language they encounter in their daily lives (Kail and Barnfield, 2015).

Additionally, literature shows that the vocabulary of an English speaking 2-year-old includes only a few hundred words, while an average 6-year-old knows over 10,000 words (Kail and Barnfield, 2015; Smith, 2000). The language in the tool was therefore modified to cater to the younger Canadian participants (3-5-year-olds as opposed to the older Swedish students in the Giusti et al. (2014) study) to ensure the highest level of understanding (Kail and Barnfield, 2015; Bloom 1998 For example, the language was modified to words that are often used in Canada and simplified for clarity (i.e. the term "hens" changed to "chickens," and the use of the word "pain" switched to an "owie"). Other changes were concerning the three pollutants (original test language and pictures seen in Figure 5), which changed to dirty water (water pollution), dirty or smoky air (air pollution), and dirty ground (ground pollution), as seen in Figure 6. In each case, the modifications made concentrated on enhancing the language to be both culturally and developmentally appropriate.

Figure 5. Snapshot of the three pollutants air pollution, ground pollution, and water pollution as found in the original Giusti et al. (2014) games testing tool

Figure 6. The three pollutants (air pollution, ground pollution, and water pollution) with their corresponding modified and greyscaled pictures found in game 2B: pollution awareness instructions

Length of Time. An issue with the amount of time it took the children to complete the game's testing was first identified during the Omidvar (2018) and Omidvar et al. (2019) studies, where they found that participants took approximately 30-40 minutes to complete the game's testing which was too long for the children and made them lose focus and interest in the tests. Additionally, the results of the interviews with ECE experts indicated that 30 minutes of testing with young children in a seated capacity (i.e. no activities) is inappropriate for their developmental stage:

> *"They will be bored out of their minds. After a couple minutes they will not be on board" – ECE Expert 3*
>
> *"It's a lot. You will need to break it up… you could get up and dance party or sing a song" – ECE Expert 4*
>
> *"You have to change activities frequently. You have to vary because they will get bored" – ECE Expert 2*

Therefore, various strategies were employed to reduce the time needed to complete the study, including bringing the games to life (incorporating movement and task), reducing some of the questions asked and pictures used, and greyscaling the images (e.g., greyscaling Table 1). One ECE expert explained that children could be distracted and gravitate towards vibrant colours, thus diverting the participants from making a non-colour-biased decision and making a timely answer.

RESULTS OF THE PILOT TEST

The pilot test explored the context of the original research question of whether a modified tool would be more effective with a younger, culturally and geographically different audience than the participants in the Giusti et al. (2014) study. The observations and analyses of the research team regarding the pilot test in this respect are discussed below. Ultimately, improvements throughout the pilot test results are in the form of the reduction in the amount of time necessary for testing, and more children being able to respond to the questions.

Length of Time

While the average time to complete the study for Omidvar (2018) was 30-40 minutes, children's average time to complete games testing with the modified tool was 15.25 minutes. The longest session during the pilot testing took 23 minutes, and the shortest session was 10 minutes. This reduction in average time suggests that the revisions worked to keep children more engaged and interested in the game's testing, which resulted in significantly reduced participation time.

Response Rate

In terms of the children's ability to understand questions, the research team observed an increase in comprehension. For example, in Game 1A, Omidvar (2018) reported that only 55% of the cohort were able to respond to the exercise, whereas 100% of the participants using the modified tool in our study were able to respond. Additionally, children completed the game quickly and seemed excited to run or dance the pictures to either the "yes" or "no" sorting bins on opposite sides of the room. Our observations suggest that the children showed increased engagement due to the sorting task given to them and that the increase in the children's understanding of the questions and eagerness to participate were beneficial results based on modifications to the original test.

Game 1B also showed signs of an enhanced outcome, with the game again being very quick in delivery and the children showing delight for the cut-out happy and sad faces. There was no hesitation in this game, and children were eager to place the happy or sad face on the game board. For example, one child exclaimed, "I like those happy faces" (C9) and started jumping up and down before beginning the game. Game 2A showed signs of enhancement primarily because children were better able to match the items with the associated nature source, and children were again engaged and eager to try and match the cut-out photos.

Game 2B, part one, was implemented in the new tool to showcase the children's understanding of the three pollutants and to gauge the understanding of the new pictures used for the pollutants (Figure 6). Results showed that all nine children were able to provide some description in response to the question "what is dirty or smoky air…what is dirty ground…and what is dirty water." Some examples of responses included:

> *"if there is something going on in a factory or a smokestack then it might make smoky air" (C1);*
>
> *"makes people sneeze" (C6);*
>
> *"it's polluting, people just throw stuff on the ground or a garbage can overflows" (C1);*
>
> *"if people pollute the water then you have to take animals out" (C1).*

These responses suggest either there was an increase in the children's understanding of the pollution concepts, or they could better understand and describe what they saw in the pictures. This indicates that the modified pictures and language used for water pollution, ground pollution, and air pollution are more culturally and developmentally appropriate for Canadian 3-5-year-olds.

The final two games (Game 3A and 3B) showed signs of enhanced understanding primarily because the cohort was quick to pick a picture on the game board as their answer. This seems to indicate that the pictures and language

used for the modified tool increased clarity for participants. Additionally, in Game 3B, the uncompleted responses were reduced from 15% in the Omidvar 2018 study to 11% in our study for Question 1, and from 35% in the Omidvar 2018 study to 11% in our study for Question 3.

CONCLUSIONS

This study is a direct response to the recommendations made by Omidvar (2018) and Omidvar et al. (2019), examining whether the psychological games testing tool developed by Giusti (2012) and used in the Omidvar studies can be more culturally, geographically and developmentally appropriate for a younger audience. Further, this study sought to examine whether the newly modified bioaffinity tool would be more effective in allowing younger participants to understand and complete the test. Our results show that the Giusti et al. (2014) test could be altered to address the issues experienced by Omidvar (2018) to better align with current research and practice in developmental psychology and early childhood education scholarship. Further, the pilot test outcomes and observations suggest that the modifications successfully enhanced the children's understanding of the games, primarily because there was a significant reduction of time needed to complete the testing and an increase in engagement.

In addition, this study has contributed to the field by documenting the modification and testing of a tool to measure preschoolers' bioaffinity. While psychological evaluation concerning environmental education is commonly conducted by scholars (Dunlap et al., 2000; Pell and Jarvis, 2001; Mayer and Frantz, 2004; Nisbet et al., 2009; Coster et al., 2011), there is a lack of transparent literature instructing researchers of ways to transform psychological testing tools to be more appropriate for different cultural, geographical and developmental situations. This study adds to the literature by offering guidance, first outlining how the original Giusti et al. (2014) tool was revised and then justifying the revisions by referring to the scholarly literature and interview results with experts. We suggest that any future studies that wish to use the Giusti et al. (2014) tool should use the modified version that we have presented in this paper (please note that a full copy of the test is available by contacting the authors) as it is more developmentally appropriate than the original test, and modified according to the current literature on childhood development and psychological testing techniques.

However, there are two caveats to any use of our newly modified tool. First, it needs to be adapted by future researchers to be appropriate with the cultural norms (i.e. make sure the language used is appropriately in relation to the linguistic norms of the study location) and geographical location (i.e. modifying images to items commonly seen in the participant's location) of the new study. Second, its use should be informed by the evolving body of knowledge regarding children's (age of the participants) biological and developmental growth, and the tool should continue to be modified as needed. As such, we do not offer our modified tool as a stand-alone tool that can be used in perpetuity, but rather as a starting point for bioaffinity researchers who wish to use an established tool, but one that can be modified so that it is both culturally and geographically appropriate. Further, we offer our process of modification as a template or guide to any future modifications.

Limitations

The first limitation of this study is the sample size of n=9 participants used for the pilot test; therefore, the results are not generalizable to all Reggio-Emilia Inspired schools in Halifax, Nova Scotia, Canada. However, the small sample size is justifiable due to the non-probabilistic and exploratory nature of this study. A second limitation is the participant's different socio-cultural backgrounds, which may influence their outlook and relationship with nature (Omidvar, 2018; Omidvar et al., 2019). The final limitation is the timing of the pilot testing. Similar to Omidvar (2018) and Omidvar et al. (2019), due to the testing taking place during winter in Canada, seasonal depression or negative notions about nature may influence the child's point of view and emotions during the time of testing.

Future Research

Finally, this study represents the beginning of what we anticipate to be a longer journey with our newly modified test. While this study was valuable in demonstrating how to modify the Giusti et al. (2014) bioaffinity tool in order

to be more culturally, geographically and developmentally appropriate for our purposes, this particular study was not able to address a number of issues that we are excited to pursue in the future. First, we intend to formally test the reliability and validity of the new test in several locations to add to the trustworthiness of the results presented here. Further, we intend to conduct more studies in our geographic area to measure the bioaffinity of preschoolers who attend environmental education-oriented schools as well as students who attend more traditional (i.e. not-environmentally-oriented) schools. Finally, we intend to use the process suggested in the methods section for this study to modify the test for various geographical locations globally and invite other researchers to do so in collaboration with us. We believe that reliability and validity testing should occur in these various cultural and geographical locations to ensure the continual revision of the tool for different settings and appropriate bioaffinity testing of preschool children in the future.

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International Journal of Early Childhood Environmental Education

ISSN: 2331-0464 (online)

Early Childhood Educators' Perspectives on Tree Climbing

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Submitted April 20, 2020; accepted November 30, 2020

ABSTRACT

Tree climbing is one aspect of nature play; however, it is limited in many areas due to fear of liability, heightened safety awareness, unclear policies, accessibility, and restrictive outdoor play time. This study investigated current practices concerning tree climbing in early childhood settings with the objective of creating recommendations, best practices, and a tool kit for incorporating tree climbing in a safe way in early childhood settings in the United States. The study used a convenience sampling technique to investigate practices and concerns around tree climbing in early childhood settings, ages two years through eight years of age. An online survey instrument was disseminated via social media platforms examining background and demographic information, tree climbing policies, rules, injuries, safety, and guidelines within early education settings with 415 qualifying respondents. The data concluded that 41.7% of early childhood educators in the United States responding to the study do not allow tree climbing due to perceptions surrounding accessibility, fear, liability, licensing, and danger. The data from 58.3% of respondents who do allow tree climbing concluded that tree climbing in early childhood settings can be safely and effectively implemented. The results suggested low injury rates, high percentage of rules surrounding tree climbing, parental concerns, and issues surrounding accessibility, liability, and licensing.

***Keywords**:* childhood tree climbing, early childhood education, play and safety policies, managing risks in outdoor play

Tree climbing is one aspect of nature play; however, it is limited in many areas due to fears of liability, heightened safety awareness, unclear policies, accessibility, and restrictive outdoor play time. The purpose of this study was to investigate current practices and concerns around tree climbing in early childhood settings that care for children aged two through eight years. Early childhood settings provide a vital role in outdoor play as physical activity patterns and a range of skills are established (Little & Sweller, 2015; Ortega, Ruiz, Castillo, & Sjostrom, 2008; Strong et al., 2005) and may impact tree climbing availability. As a result of this research study, recommendations and best practices for incorporating tree climbing in a safe way in early childhood settings in the United States were created.

Literature Review

Since increasing numbers of children spend time in formal childcare settings (Little & Sweller, 2015), investigating tree climbing within early childhood settings is prudential in understanding the complexities of this topic. The literature review explored managing risks in outdoor play, tree climbing in early childhood settings, and policies and restrictions specific to tree climbing. In this context early childhood settings include a formal setting providing care for children aged two to eight-year-olds, including, but not limited to, family childcare, public school settings, nature preschools, and other settings.

Managing Risks in Outdoor Play

Children's outdoor play provides a positive experience of excitement, fun, and joy (Sutton-Smith, 2001). Outdoor play promotes creativity, environmental understanding, and critical skills for navigation (Brussoni, Olsen, Pike, & Sleet, 2012). Early childhood educators have noted the many benefits of risky play activities (Aldis, 1975; Brussoni et al., 2012; Byrnes, Miller, & Schafer, 1999; Kleppe, 2018; Sandseter, 2010). Outdoor risky play is an important aspect of child development and learning. Outdoor play activities, such as tree climbing, provide children the opportunity to learn new skills and interact with their environment.

Outdoor risky play can provide opportunities for exploration, meaningful moments, and positive experiences (Sandseter & Sando, 2016). Appropriate risk-taking allows children to obtain knowledge about their own abilities and limitations (Aldis, 1975; Byrnes, Miller, & Schafer, 1999; Kleppe, 2018; Sandseter, 2010). According to Coster and Gleeve (2008) risk- taking play also provides enjoyment, pride, sense of achievement, and self-esteem. However, early childhood educators must balance keeping children safe and managing risk. Brussoni et al. (2012) stated "it is appropriate to consider how to optimize play opportunities to support children's developmental needs while considering safety" (p. 3139).

There are growing concerns and debate about risk-taking play from early childhood educators. According to New, Mardell, and Robinson (2005), educators in the United States often feel restricted to exposing children to risk-taking activities like tree climbing. In contrast, Norwegian, Danish, Swedish, and Italian preschool teachers have fewer worries about children taking risks under their care than American preschool teachers (New et al., 2005). Policies, facility licensing, parental concerns, and fear of injury are just a few of the growing concerns of Western society's attitude on risky play activities. Despite low injury rates, Sandseter, Sando, Pareliussen, and Egset (2013) asserted the focus on safety has gone too far and has a negative impact on children's risk-managing competence.

Additionally, Sandseter and Sando (2016) looked at risky play, including tree climbing, in Norwegian early childhood settings. In Norway, where unsupervised outdoor play by children is a cultural tradition, many early childhood settings have been influenced by a more Western view on safety and need for close supervision as many injuries reported on playground equipment occur because of lack of supervision. McFarland and Laird (2018) looked at educators' perspectives in both Australia and the United States regarding risky play with three themes emerging: opportunities that supported large motor skills, free exploration of the environment, and assessment of risk. Australian educators embraced more risky play and included it as part of the national curriculum. They also noticed Australia has a lower litigious society compared to the United States.

Tree Climbing in Early Childhood Settings

Little research is available on tree climbing in early childhood settings; however, Gull, Levenson Goldstein, and Rosengarten (2018) examined parents' perceptions on tree climbing, noting no major safety organizations specifically collecting information on tree climbing related injuries. Additionally, the authors reported many states adopted a Children's Outdoor Bill of Rights with many having a variation on tree climbing as a right for all children. Parents self-reported few tree climbing injuries beyond typical scrapes and bruises and shared family rules and expectations for safe tree climbing. The researchers noted current bans on tree climbing in some major cities, illustrating that regulations around tree climbing may protect the organization from lawsuits as confusion and questions around liability of the property owner exist. Additionally, they noted benefits of tree climbing, such as critical thinking, imagination and creativity, problem solving, self-confidence, social interaction, dexterity and physical strength, cognitive and emotional strength, resiliency, and risk negotiation.

Sandseter and Sando (2016) specifically investigated how managing risky play impacted tree climbing in early childhood settings, noting the following responses:

> *"Fear of accidents from falling leads to no organizing or permission for climbing."*
>
> *"We don't allow children to climb trees."*

> *"Tree climbing is one example. Several parents were concerned that their children could climb our apple trees. After a chat with the local authority, we were advised to prohibit climbing; this was an activity for the children to do outside the institution with their parents. Today children are not allowed to climb those trees."* (p. 186)

However, others in Sandseter and Sando's study (2016) took a different tree climbing approach, restricting the height of climbing, having close supervision, putting regulations around the type of climbing surface, using a risk assessment, or having children demonstrate their ability to climb.

Policies, Procedures, and Expectations on Outdoor Play

Risk management practices and policies for outdoor play can be challenging for early education leaders to create and enforce. Outdoor learning and play policies may play a role in keeping children safe; however, the same policies may not allow for child development and learning through risky play. In addition, childhood educators often have difficulty in locating, interpreting, and implementing these policies specific to tree climbing. Access to nature play areas, outdoor play policies, leader expectations, teaching procedures, and many other factors may dictate the management of risk-taking play.

Outdoor play is an important part of the young child's day. This play is supervised by educators, many of whom plan time and space for creative play within the classroom day. Teachers have differing opinions about supervising children and feel that part of their supervision duty is to interact with the children, while other teachers feel that their main job is to observe and watch the children to avoid any safety hazards (Coleman & Dyment, 2013). Coleman and Dyment (2013) revealed that many educators have not been trained and do not have the knowledge about the importance of physical activity for children. Therefore, many are inclined to allow the children free, unstructured play time because the educators did not have confidence in leading physical activities with the children (Coleman & Dyment, 2013). Little and Sweller (2015) also mentioned that since teachers had to supervise the playground, they did not actively create additional play options for students. Due to the teacher/student ratio, the ability to facilitate developmentally appropriate play such as tree climbing may be limited.

Coleman and Dyment (2013) noted that educators do not often allow rough play due to unacceptable risk. Teachers regularly scanned "the playground for safety hazards, keeping children off broken or unsuitable play equipment and maintaining climbing frame height restrictions" (Coleman & Dyment, 2013, p. 213). In addition, the authors mentioned trees as a safety concern along with other natural environmental elements. Some teachers did not use the natural elements on the playground because they can potentially be too risky for the children. Coleman and Dyment (2013) recognized the risks of tree climbing, the need for increased physical activity, and suggested that policies can help promote safety.

One area that can be confusing relating to risk-taking play is the amount of mandated time outdoors for children. There are many conflicting statistics regarding the number of required minutes for physical activity, which may impact children's accessibility to climb trees. Pate et al. (2013) reported the lack of states with standards regulating student physical activity. However, the National Association for Sport and Physical Education recommended that "preschool-aged children participate daily in 60 minutes of structured moderate to vigorous physical activity and a further 60 minutes or more of unstructured free play" (Coleman & Dyment, 2013, p. 204). Dowda, Pate, Trost, Almeida and Sirard (2004) also recommended 60 minutes of daily physical activity. Pfeiffer et al. (2013) recommended that preschool-aged children should accumulate 15 minutes of physical activity every hour they are in care.

O'Neill, Dowda, Neelon, Neelon, and Pate (2017) recommended that staff should interact with the children, while encouraging physical activity and providing appropriate equipment for all children during the outdoor time. They created an outdoor policy for children ages three to five that included encouraging physical activity, yearly staff training, and allowing for 90 to 120 minutes of daily outdoor play. Additionally, they advocated for providing various play materials and not using physical activity as punishment (O'Neill et al., 2017).

The Washington State Department of Early Learning (n.d.) created a pilot program to license outdoor early learning, adapting policies and needs that are more relevant to an outdoor setting, including licensing regulations and logistics of operation. Policies from the pilot that address tree climbing include weekly visual inspections, removing broken tree limbs, and conducting a benefit-risk assessment for risky play (Washington State Department of Early Learning, n.d.). This assessment should include additional supervision, talking children through risk mitigation through questioning, limiting staff from putting children in risky situations (such as in a tree), and having educators help children own their individual level of ability.

The literature review focused on exploring concerns and issues surrounding tree climbing in early childhood settings and investigating policies and other factors that may impact tree climbing in early childhood settings. Managing risks in outdoor play settings and understanding why early childhood professionals allow/do not allow tree climbing warrants further investigation. As a result, the researchers investigated early childhood educators' perspectives and practices regarding tree climbing as risky play. Research questions for this study were:

1. What are early childhood educators' perspectives around tree climbing?

2. What best practices do early childhood settings use to allow for tree climbing?

METHODOLOGY

Research Design

The study used a convenience sampling technique. An online survey instrument was disseminated via social media platforms examining background and demographic information, tree climbing policies, rules, and safety guidelines within early education settings. Early education providers, working with two to eight-year-old children, in the United States, anonymously answered a 29 questionnaire/survey. The survey was designed with specific questions targeted to educators who allowed tree climbing and others who did not. Based on projected sample size of the social media sites that have granted permission to post, the study required a minimum sample size of 270 total participants to have an adequate confidence level for the study.

Selection of Participants

Participants for the study were recruited from diverse online social media groups that focus on early childhood education. An announcement and invitation to participate in the study was shared with six education and/or play related Facebook groups that spanned the targeted age ranges. The study link was posted in Preschool/Childcare Directors & Owners Networking, Play Empowers, Nature Preschool Community and Ideas, The Muddy Puddle Teacher, Early Childhood Directors Group, and Fabulous Firsties Facebook groups. The invitation was shared in the Facebook groups again after two weeks. To qualify for the study, participants needed to work in the United States in an early childhood setting with two to eight-year-old children. Participants had an opportunity to reflect on policies and viewpoints on tree climbing in early childhood settings.

Instrumentation

After receiving Institutional Review Board approval of research, the survey was posted on social media platforms. In addition, a snowball recruitment technique was utilized. The online flyer included a request for study participants, parameters of the study, a request to share with other early childhood educators, and a link to the online survey. The flyer was distributed to the online groups that gave permission in Spring of 2019.

The survey consisted of 29 questions. Question one through four were qualifying questions to confirm respondents fit the parameters and give consent to the study. Study parameters included employment in the United States, being at least 21 years old, and working with two to eight-year-old children. Questions five through 12 asked for

demographic information, such as gender, location within the United States, level of education completed, role in early childhood education, ages of children in care, time children spend outside regularly, and type of setting. Questions 13 and 14 looked at tree climbing specifically, inquiring about accessible trees in the setting and whether the children have permission to climb trees.

Questions 15 to 19 were directed at educators who do not allow tree climbing in their spaces. Specific questions asked why tree climbing is not allowed, facility rules against tree climbing, and policies from insurance and licensing which may impact tree climbing, and open-ended questions allowing participants to share issues, concerns, and comments around tree climbing. Questions 20-29 were geared toward educators allowing tree climbing, including open-ended questions allowing participants to share issues, concerns, and comments around tree climbing. Participants were asked why they allow tree climbing, whether the benefits outweigh the risks, how tree climbing impacts the children, personal and facility rules, and guidelines around tree climbing, whether there are policies through licensing and insurance that impact tree climbing, how safe tree climbing is promoted, and injuries reported from tree climbing.

Data, Results, and Findings

Responses were compiled using an online survey tool, applying the tool's online analytical tools to aggregate and dissect information. SurveyMonkey was the survey tool utilized, which stored and compiled the information in a secure way and collected no personally identifiable information. A mixed-method approach to the study was used through collecting open-ended responses and quantitative data. Descriptive analytical tools within SurveyMonkey were used to calculate numbers, percentages, and charts using the quantitative data. The open-ended questions allowed educators additional opportunities to reflect on their perspectives of tree climbing in early childhood settings. The educators' open-ended responses were coded and analyzed using a narrative analysis approach to form the findings with reflections on early educators' perspectives on managing risks concerning tree climbing and to evaluate emerging themes.

Demographics

Four hundred and ninety-four respondents attempted to complete the survey; however, 415 qualified to complete the survey, due to the study's parameters of being 21 years of age and working in early childhood with children ages two to eight in the United States. Of the survey respondents, 401 (96.6%) were female, 11 (2.6%) were male, and one chose not to disclose gender. Participants from 46 states were represented and there were a wide variety of ages that responded to the survey, ranging from ages 21 to over 55. Four hundred nine (98.6%) of the respondents had completed at least some college (see Table 1).

Table 1
Respondents' Level of Education

Years of School	**Number (Percentage)**
At least some college	55 (13.3%)
Attending some college	169 (40.7%)
Graduating from college	55 (13.3%)
Completing post graduate school	130 (31.3%)

Diverse perspectives of educators were essential to the study. Participants had various roles in the early childhood settings as noted in Table 2.

Table 2
Role of Educators Responding to Questionnaire

Role of Educator	**Number (Percentage)**
Teacher	288 (69.4%)
Early Childhood Administrator	92 (22.2%)
Family Childcare Provider	66 (15.9%)
Trainer/Consultant	39 (9.4%)
Teacher Educator	39 (9.4%)
Professional Development Instructor	29 (7%)
Assistant Teacher	17 (4.1%)
Other	48 (11.6%)
Note: Respondents could choose more than one role.	

Additionally, a variety of settings were represented, as shown in Table 3.

Table 3
Type of Setting

Setting	**Number (Percentage)**
Non-profit Settings	120 (28.9%)
Public Schools	82 (19.8%)
Childcare Facilities	81 (19.5%)
For-profit	74 (17.8%)
Family Childcare	64 (15.4%)
Faith-based	43 (10.4%)
In-home	24 (5.7%)
Head Start or State-funded pre-K	17 (4.1%)
University Setting	9 (2%)
Other	78 (18.8%)
Note: Respondents could choose more than one setting.	

Participants were asked the ages of the children in their care (see Table 4).

Table 4
Number of Participants Caring for Children by Age of Children

Ages of Children	**Number (Percentage)**
Two-year-old children	204 (49.2%)
Three-year-old children	290 (69.9%)
Four-year-old children	304 (73.3%)
Five-year-old children	301 (72.5%)
Six-year-old children	208 (50.1%)
Seven-year-old children	147 (35.4%)
Eight-year-old children	112 (27.0%)
Note: Respondents could choose more than one age group.	

In addition, 188 (38.1%) of the respondents answered that the children spend 10 or more hours playing outside while in their care when the temperature is between 50-85 degrees Fahrenheit. In similar circumstances, 87 (21.0%) reported spending zero to three hours outside per week, 97 (23.4%) spend four to six hours, and 73 (17.6%) spend seven to nine hours outside.

Question 13 asked respondents about access to climbable trees in their care (see Figure 1). Two hundred thirty (55.4%) reported that climbable trees are accessible while 152 (36.6%) do not have climbable trees accessible.

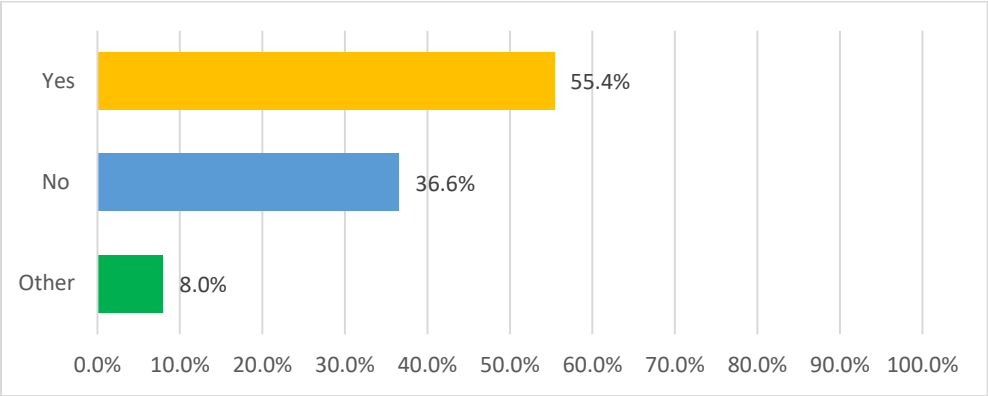

Figure 1. Tree accessibility. This figure shows the accessibility of trees in the respondents' childcare settings. Two hundred forty-two (58.3%) allow tree climbing at their facility while 173 (41.7%) do not allow tree climbing at their facility (see Figure 2).

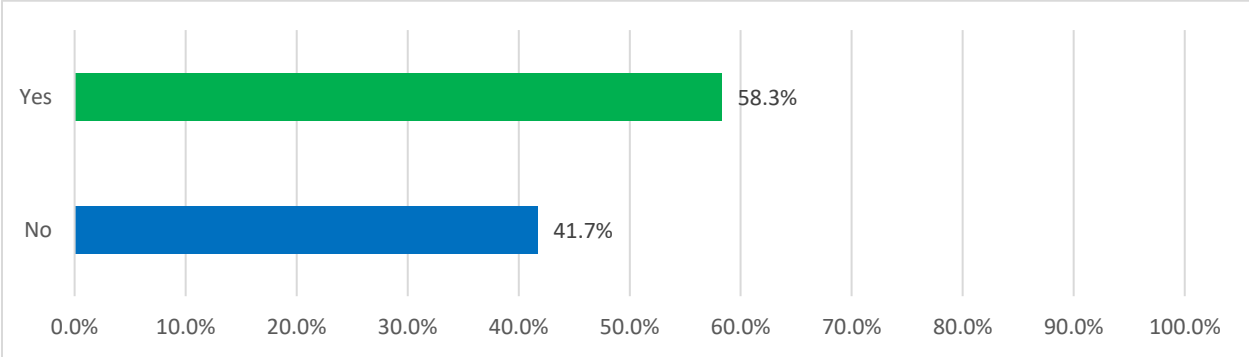

Figure 2. Allowing children to climb trees. This graph depicts the number of childcare facilities that allow tree climbing.

Of the 41.7% of participants that did not allow tree climbing, many expressed fears around tree climbing, licensing restriction, liability, and safety concerns. One respondent mentioned that children, "Don't touch nature basically." Others do not allow risk taking play in their spaces in general. One mentioned that "Licensing and insurance both have me sign off that I won't have the children participate in risky behavior." Some are worried they will be sued if a child gets hurt tree climbing. One mentioned that tree climbing is "not in the approved curriculum hence we cannot instruct on it." Many who do not allow tree climbing in an early childhood setting still shared pro tree climbing expressions and phrases, such as "Would love to let the kids have a more natural setting to explore but state is all over you looking for any reason to blame you for accidents" or "I personally think it's great, but in general I feel like it isn't commonly accepted in the childcare field." Another mentioned, "While I believe that tree climbing is a fun, valuable and memorable experience for children I think the liability issues in today's litigious society suggest that this activity is best left to parents providing this on their own properties."

In Question 20, participants that allow tree climbing indicated the following reasons:

- Part of childhood 212 (95.9%)
- Fun 212 (95.9%)
- Connects to nature 213 (96.4%)
- Develops skills 218 (98.6%)
- Helps to negotiate risks 213 (96.4%)

Additional comments from the respondents indicated that tree climbing helps to build confidence, resiliency, body awareness, trust, problem solving, exploration, perseverance, and grit.

In Question 29, 62 (50%) respondents out of the 123 respondents wrote comments to the open-ended questions about the benefits of tree climbing outweighing the risks. For some, it is building resilience, "The realization that they can get past obstacles and endure a few scratches for the sake of facing a challenge and enjoying nature, is truly liberating for them." Others see tree climbing as a rite of passage, seeing the world from a unique perspective, or as developing needed "soft skills." Tree climbing can also build confidence and pride, as well as expand sensory skills. One educator wrote, "One little girl in particular was extremely concerned the first time and refused to touch the tree. After the third visit to the tree, she became confident so that she ran with excitement to climb up on the lowest branch." Tree climbing can help with positive risk assessment, hand eye coordination, independently navigating risks, gross motor skills, body awareness, balancing skills, greater concentration, perseverance, spatial awareness, problem solving, coordination, strength and endurance, sense of accomplishment, self-regulation, critical thinking, and spatial reasoning. Tree climbing can help all learners, as one wrote, "The children who are most shy in the classroom are often the most adventurous in the woods." One wrote, tree climbing is "Extremely important and far more beneficial to encounter risk than ban it all together." Environmental benefits might also include "real connection with a living environment" and the ability to "develop meaningful relations with and understanding of trees, becoming present and future protectors."

Finding 1: Conflicting Perspectives Regarding Outdoor Risky Play

Perspectives regarding outdoor risky play came up in many responses. Question 15 inquired about the reasons why tree climbing was not allowed and 79 (51%) of the respondents answered about the risk factor. Question 18 (for those who do not allow tree climbing) explored issues or concerns with tree climbing and 71 (59.1%) responded that injury risk was one of the concerns. Some responses from those that do not allow tree climbing, included, "Climbing trees seems extremely dangerous." One participant wrote, "I'm not against kids climbing trees; however, I just don't think it is worth the risk of children climbing trees at schools falling and getting injured, followed by getting sued by the parents." Another wrote in, "Unfortunately, we live in a sue happy society. Kids have to climb trees with their parents, so if they fall and hurt themselves it's not our fault."

Two hundred forty-two (58.3%) allow tree climbing at their facility while 173 (41.7%) do not allow tree climbing at their facility. Those who allow tree climbing had different perspectives on risk taking play in Question 21. These respondents overwhelmingly recognized there was a risk for potential injury with tree climbing; however, 129 (58.4%) strongly agree, 79 (35.8%) agree, and 13 (5.9%) agree that the benefits of tree climbing outweigh the associated risks. The participants completing the survey that allow tree climbing overwhelmingly agreed (100%) in Question 21 that the benefits of tree climbing outweigh the risks.

Participants who allow children in their care to climb trees noted many positive skills as a result of tree climbing. Children had a moderate to high impact (78-98%) on the following skills through responses to Question 22:

- Critical thinking 208 (94.1%)
- Imagination and creativity 188 (85.1%)
- Problem solving 217 (98.2%)

- Self-confidence 217 (98.2%)
- Social interaction 175 (79.2%)
- Dexterity and physical strength 216 (97.7%)
- Cognitive and emotional strength 199 (90.0%)
- Resiliency 212 (95.9%)
- Risk negotiation 214 (96.8%)
- Spatial awareness 216 (97.7%)

Additional write-in responses noted a potential shifting view on risk taking play in early childhood education with the following comments (see Table 5):

Table 5
Qualitative Comments Highlighting Positive Skills as a Result of Tree Climbing

"We cannot put kids in a bubble. The rules have been taken to [sic] far in some aspects."
"I hope we can encourage tree climbing without all the fears surrounding it."
"Children need to learn about risks and safety. Then push themselves to new levels overcoming fear."
"I'm worried that other places don't allow it."
"It used to scare me. I am trying to embrace nature and some risk in playing."
"I believe adults should be there as a "safety net" but children need the chance to explore and test their boundaries."
"Experiencing nature and risk are high priority for us."
"The child who takes the most risks, is the most careful with tree climbing. He enjoys it so much he follows safety guidelines."
"We have found with young children, if left to negotiate on their own the risk, they are precautionary. When they realize a teacher or parent is watching, they are much more likely to take risks and need help."
"We are getting entirely too soft with kids. They need to feel that there is some risk even if there really isn't."
"We cannot let scary statistics about falling and getting hurt outweigh the benefits."
"I am saddened by the "overly safe" "unchallenging" playspaces created for children. Tree climbing is fantastic way to offer challenge/risk. I wish it were possible for all children."

Respondents acknowledged that other educators may have varying perspectives and different risk comfort levels (see Table 6).

Table 6
Qualitative Comments Demonstrating Tree Climbing Perspectives and Comfort Levels

"We have a few teachers who are afraid to let children climb."
"It drove me crazy with anxiety. For twenty years with nothing beyond minor scrapes but there's always today."
"Thankfully my center has a liberal approach about issues and concerns pertaining to tree climbing—tending to err on the side of trusting comfort levels of the lead teacher."
"Setting up rules all teachers can abide by. Some teachers have a different comfort level when it comes to the children partaking in "risky behaviors." A child may fall and get injured while climbing."
"Director prefers no tree climbing at all!"
"Our facility has no written rules, it is up to individual teaching teams to decide if they are comfortable with allowing this activity."
"I think risks should be taken in parent's care to protect teachers. A sad reality."
"Some teachers are uncomfortable with allowing their students to climb/some do not allow it."
"Not all teachers are comfortable allowing children to take this risk. We have talked about this as a staff and in smaller groups."
"I understand tree climbing is more important than ever but also can be nerve racking at the same time."

"The director would really prefer to not have children climb but allows it because the staff has insisted that it can be a safe activity and is benefits [sic] for the children."
"Some teachers are uncomfortable with allowing their students to climb/some do not allow it."

Participants allowing tree climbing reported few major injuries in Question 27. Exceptionally low injury rates were noted beyond the typical scraped knees, elbows, or skin 174 (78.7%). Four (1.8%) fractures and four (1.8%) broken bones were reported (see Figure 3). Other injuries 50 (22.6%) had a space to write in; however, 30 (60.0%) of these responses were no injuries. No concussions, comas, or fatalities were noted; however, some scratches, a splinter, the wind being knocked out, a low fall, and the need for stitches were reported in the other category. Participants could choose more than one option.

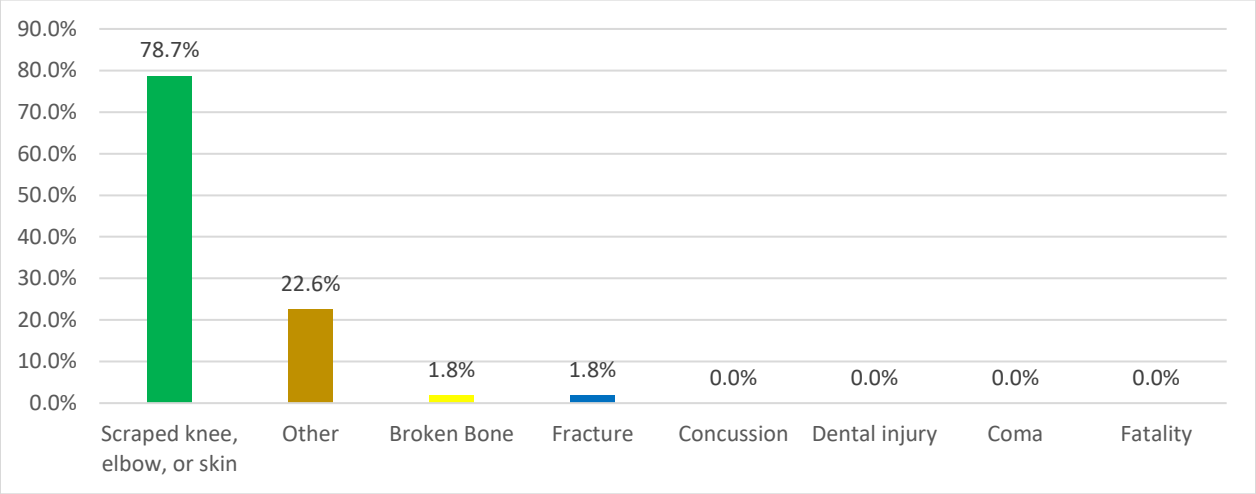

Figure 3. Tree climbing injuries. This graph shows the numbers of different injuries resulting from tree climbing.

Finding 2: Varying Tree Climbing Policies, Facility Licensing, and Liability

Licensing, insurance, policies, and other factors often dictate tree climbing in early childhood facilities. Question 15 inquired about the reasons why tree climbing was not allowed and 63 (40.7%) of the respondents answered due to the policies and 31(20.0%) responded with concerns about licensing. When queried in Question 16 if there were rules or guidelines related to climbing trees for the children in their care, 100 (64.5%) reported that there were no facility rules or guidelines, while 55 (35.5%) answered that there were rules or guidelines in place. Some of the comments included that they were not aware of any rules, is it not allowed per state licensing, strict no tree-climbing policy, no safe fall zone, branches not big enough, no climbing grips, trees too big, unsafe to district, other "climbers" available including downed trees, nothing higher than a step, need fall zone, all children safe at all times, and not allowed to touch or play with the branches.

Many respondents were unclear on how these factors might impact tree climbing. Question 17 inquired participants that do not allow tree climbing about policies through licensing, insurance, professional organizations, or other agents that dictate tree climbing activities and the respondents indicated they do not know how licensing 97 (63.0%), 114 (74.0%) insurance, and 102 (66.7%) professional organizations might impact tree climbing. Similarly, in Question 25, where tree climbing is allowed, respondents did not know if the following factors impacted tree climbing at their facility: 83 (37.6%) licensing, 122 (55.7%) insurance, and 94 (44.7%) professional organizations.

While there is less confusion around policies that may affect tree climbing in the group that allows tree climbing, there is still a fair amount of uncertainty as to how licensing, insurance, and professional organizations may affect tree climbing. Question 18 discussed the issues or concerns with tree climbing and 19 (15.8%) responded that

liability was one of the concerns (see Table 7). One wrote in, "I never thought about the insurance company or licensing's thoughts." Licensing may limit tree climbing. Respondents also mentioned:

Table 7
Qualitative Comments Regarding Issues and Concerns with Tree Climbing

"Licensing doesn't allow it, but we do it anyway. My concern is getting caught."
"It's the playground inspector who is overly concerned. We know our kids; she doesn't."
"There are no policies but we as licensed providers can be sighted [sic] for unsafe play or unsafe supervision."
"Our school is at a nature center. The woods and how we use them are not licensed and regulated. But we do have obligation to keep both children and nature safe."

Some programs choose to allow tree climbing, knowing licensing does not allow it; others seek alternative licensing, and others buck the system and do not seek licensing which gives greater freedom for tree climbing. Licensing varies state by state and inspectors may interpret the licensing mandates differently regarding tree climbing. Programs might seek spaces outside of their licensed areas for tree climbing activities.

Insurance, licensing, and other factors may impact tree climbing in various spaces. Worries abound about getting sued, though that is typically one reason to have insurance in place. Respondents in Question 25 mentioned (see Table 8):

Table 8
Qualitative Comments on Insurance, Licensing, and Other Factors

"As a museum I'm certain that we have a specific liability insurance in place for child injury. However, no waivers signed like with a challenge course activity. Now I want to ask our upper management!"
"I will need to check into our insurance policy."
"Parents may object to risk taking and may sue or remove child if injury occurs."
"The head of the school is concerned that the risk of injury is not worth the liability of injury."
"I never thought about what the insurance company or licensing's thoughts."
"The owner of our organization is very liability conscious so we have to be extra cautious and typically don't let the kids climb when he's visiting."
"We have not been stopped."
"We are part of Washington State's outdoor preschool pilot program. There are specific rules for allowing tree climbing, and lucky for me they align with my own rules as well."
"The playground inspector made us cut down the low limbs so the kids couldn't climb."
"One organization I work for prohibits tree-climbing for insurance reasons."

For Question 23, participants allowing tree climbing were asked about their own personal rules or guidelines for climbing trees for children in their care. They could indicate as many rules as they used and could also write in additional guidelines. In Question 24, participants who allow tree climbing were asked about rules and guidelines specific to their facility, rather than their own personal guidelines (see Table 9).

Table 9
Comparison of Personal and Facility Rules

Rules	**Personal (Q23)**	**Facility (Q24)**
Must climb up and/or down tree independently.	185 (83.7%)	140 (63.4%)
Tree must be safe (thickness of branch, weather conditions, avoid dead limbs)	185 (83.7%)	148 (67.0%)
Check for safety.	166 (75.1%)	140 (63.4%)
Common sense guidelines should be followed.	163 (73.8%)	133 (60.2%)
A buddy system or adult supervision required.	133 (60.2%)	104 (47.1%)
Impose height restrictions.	74 (33.5%)	70 (31.7%)
No tree climbing restrictions.	11 (5.0%)	21 (9.5%)
Must get permission to climb.	37 (16.7%)	40 (18.1%)
Use the three points system when climbing.	37 (16.7%)	27 (12.2%)
Other	31 (14.0%)	55 (24.9%)

Most participants that allow tree climbing have rules or guidelines around safety aspects of tree climbing. Only 11 (5%) indicate no personal restrictions on tree climbing and 21 (9.5%) had no facility tree climbing restrictions.

Question 26 investigated ways the early childhood centers promoted safety with tree climbing activities. To promote safety, participants reported:

- Being respectful of trees 201 (91%)
- Visually inspecting branches 177 (80.1%)
- Test overall tree strength 142 (64.3%)
- Avoiding dead branches 160 (72.4%)
- Using caution if wet or slippery 170 (77.0%)
- Checking branches on each step taken 131 (59.3%)
- Other 36 (16.3%)

Participants could write in responses that showed more insight into this process. Respondents mentioned having one risk/one teacher, doing a site assessment for safety, or having a provider there for guidance and safety. Some noted doing a risk benefit analysis to help assess risk and look at opportunities is needed. Additional responses included (see Table 10):

Table 10
Qualitative Safe Tree Climbing Comments

“I watch closely when someone is climbing and position myself nearby when possible. I may ask a child if he/she feels safe if I feel the need for them to reassess.”
“Children were allowed to climb until they felt safe, height restriction due to my own fear for safety of the children.”
“Teachers make decisions on what they feel is safe.”
“Adults often ask “do you feel safe” as a check in, we give child space to climb solo but when they get higher up will supervise closely.”

Some noted doing a risk benefit analysis to help assess risk and look at opportunities. Various levels of attention may be required for various children.

Many themes came up in the written responses of Questions 23, 24, 25, and 26. The safety of the actual tree was reported in many settings, with some reporting on tree maintenance. "A tree must be sturdy. We have hundreds of trees on our property and each one is inspected for sturdiness." Some schools do a daily check, "Staff check outdoor area each morning to assess safety." Others have a quarterly inspection with an arborist. Some settings used designated trees for climbing. One setting keeps it simple, "Do a risk benefit analysis with all teaching staff. Remove hazards. Mitigate risks. Climb trees." Another wrote, "We observe climbable trees daily and over time. We track for health of tree and are aware of which branches are ill and/or dying. If we have questions, we consult with a master arborist."

Supervision came up frequently, though it may look different at various sites. Supervision ranges from being nearby to being right under the child as a spotter and may also include coaching and guidance before children are trusted with more independence. Some educators are just there to support those who need more help such as a younger or less experienced climber. Others help negotiate turn-taking in trees where multiple children can climb. In one situation, only the teacher can supervise tree climbing, not the aides or volunteers. Respondents mentioned (see Table 11):

Table 11
Qualitative Tree Climbing Supervision Comments

"As with all risk in a nature school setting if proper assessment and training is put in place the benefits of the risk can overcome the negatives."
"Involve children in assessing risk rather than doing it for them."
"Ask if children have a plan should be the first step to approaching intervention."
"Since children are within the view of an adult, we frequently talk them through their climbing (especially at the beginning of the year). Do you feel safe? What do you think about that branch? How can you get down? Each child and each scenario is different, so giving them the opportunity to try things out, watch their friends and talk through problem solving are all important."
"An adult is standing by for younger or less experienced climbers. By spring we know the children's skills and which children need an adult nearby and which don't need that."

Along with the visual inspections, educators might check that it is cleared out under the space, such as being aware of the fence, watching for loose parts, or other children that might be under the tree. Others require appropriate material for fall zones underneath, such as the "Ground must be softened by wood chips or other soft surface" and "Our school has licensing approved rubber matting or deep bark below the climbable trees."

Height was often a consideration, with the sentiment, "Only go as high as you feel safe." Another mentioned, "We only have concerns about the height at which they climb, which we give visual guidelines of where to stop." Some allow no higher than 6 feet with a fall zone. One wrote, "We treat trees like any climbing structure and allow kids to climb the trees that reach the same height, fall zone, and ground depth requirements as a structure."

Gear was also reported, with many requiring proper footwear, such as tennis shoes or closed toed shoes. Weather was a factor at times with no climbing if the tree is wet, when rainy, or if it is very windy. Some choose to use an alternate option for climbing, "We have a man-made climbing structure that is more accessible for children who are still developing some skills."

Many choose to limit the number of children in the tree at a time. Others require an adult to be within arms-reach. Many children must be able to climb and get down on their own. "Strict staffing zones. We would not open the climbing tree if there was not staff in that supervision zone." Another mentioned, "One teacher, one risk."

Others have found too many rules problematic. One wrote, "I have found that the more rules you implement during their free play the more injuries you will have." Another wrote, "I feel we have to jump through so many hoops that

at times it makes it so unappealing to the adults." Another approach was to, "If you feel unsafe, stop climbing—listen to your body."

Finding 3: Differing Tree Climbing Accessibility

Accessibility to climbable trees is potentially problematic. When queried in Question 13 about the accessibility of climbable trees at their facility, 230 (55.4%) responded favorably while 152 (36.6%) responded that they did not have access to climbable trees and 33 (8%) answered the other category. Question 14 asked if tree climbing was allowed at the facility and 242 (58.3%) responded positively while 173 (41.7%) responded that tree climbing was not allowed. If a respondent answered "NO" that tree climbing was not allowed at their facility, 88 (56.8%) answered in Question 15 that it was due to tree inaccessibility. Also, in Question 18 discussed the issues or concerns with tree climbing and 25 (20.8%) responded that accessibility was one of the concerns.

Trees may be available; however, all trees are not suitable for climbing. One respondent mentioned, "We don't have enough trees around us that are accessible for the younger ages to try and climb." Even in a facility with a natural playground, the trees may be "too small or too straight and tall for good climbing trees." Others "wish we had smaller trees." Some settings are quite unique, such as in an arboretum, posing climbing restrictions. A respondent mentioned, "The concern in my facility is that our program needs to use out-of-the-way trees to climb. Most of our trees are for display. But there is so much wild wooded space that this is not a problem." In another setting, trees are scheduled for cutting down, "We are a nature preschool, so tree climbing is part of our program. The only issue is that our favorite climbing trees are invasive non-native bush honeysuckle, which are slated for removal for the integrity of the forest where we operate with native options to replant."

Tree climbing access was limited in some situations, such as trees that were not mature enough, yet other respondents found ways around this writing in Questions 28 and 29 ways they allowed children to climb trees, such as on walking field trips, climbing trees during KinderForest days, climbing stumps and logs, or using a mini orchard. Others suggested, "Even fake trees would be beneficial," suggesting the use of large stumps and logs could help fill that void. Many schools might have another climbing structure. A respondent wrote in, "I don't have a tree in my daycare space, but our local park does;" though being aware of climbing rules can be important. "We try not to upset the parks or nature centers that we frequent by following their tree climbing rules, so as to not have more restrictions imposed." Another chooses to allow children to "climb on the edge of our parking lot and on field trips." Having no access to climbable trees at the early childhood setting does not necessarily limit the tree climbing, as a respondent wrote, "When we visit other places in the community where the trees are big enough the children are allowed to climb them with supervision." Others are looking to the future, "We have trees on playgrounds at each of our sites with plans to plant more this spring." Many expressed wishes and desires to have climbable trees, echoing the sentiment, "We need more trees to climb" and "I wish my current facility had access to trees for climbing on a daily basis."

Some responses related accessibility to climbing trees to luck, saying, "Having the right trees for climbing at a school is partly just luck;" however, others have been intentional about it. The struggle is captured, "The biggest issue is opportunity—find the appropriate time and place to be able to actually climb trees." Some look for other options. For those who did transition to a space with more tree availability, one mentioned, "We recently moved to a new location with trees to climb, in our old location we did not have any. With so much access to nature and climbing trees I have seen so much growth in our children." Even when a tree is available, some schools could use more accessibility, mentioning, "We mostly have the issue with the patience of the children waiting their turn! We only have one climbable tree!" Focusing on solutions, one mentioned looking outside their space, "Climbable trees are outside of our normal play area so we are limited to a small group."

Part of the accessibility issue considers limitations from licensing and other factors such as leadership, as respondents wrote (see Table 12):

Table 12
Qualitative Tree Accessibility Comments

"We have trees but licensing prevents them from enjoying climbing. Children only have access on field trips."
"Someone could get hurt, someone could get hurt on normal playground equipment too though. There are no trees at the facility, if there were, I'm pretty sure the children couldn't climb them, per the boss."
"It used to not be allowed at all and I'm sorry we didn't fight for it sooner."

Finding 4: Parental Considerations Regarding Tree Climbing

Parental considerations came up as a concern in many responses. Question 15 inquired about the reasons why tree climbing was not allowed and 38 (24.5%) of the respondents that do not allow tree climbing cited parental concerns. Study participants mention parents as "freaking out," "uneducated parents," and "parents feeling it was unsafe." Another wrote, "I worry about getting sued by sue happy parents." Some worry about "parent buy in" and parents as "an obstacle." Additionally, other considerations involving parents were mentioned in open-ended responses in Questions 24 and 25 from facilities that allow tree climbing. In Question 28, many responses centered around parental considerations. Parents might get upset if clothing is ripped or the child has a mild injury.

At times there were conflicting perspectives. While educators may allow tree climbing, "The head of the school . . . wishes parents would take on this responsibility at home." Another participant typed in, "Parent concerns for individual children vary, and usually the children most likely to take risks have parents most apprehensive about risk taking."

Some respondents noted the need to involve parents in this decision, allowing tree climbing with parental consent and that "parents have the right to place restrictions on any high risk activity within the program—signature required for high risk activities. (I would argue is it even high risk?)" There was an underlying concern that, "Parents may object to risk taking and may sue or remove child if injury occurs." Additionally, one participant noted, "During tours parents LOVE the idea of nature rich programming and the IDEA of tree climbing and all its benefits. But often the first time they see THEIR child climb a tree at home we start to get I'm not sure, is it safe, maybe the school should get a more traditional structure." Some schools were proactive on parent education, mentioning (see Table 13):

Table 13
Qualitative Parental Consideration Comments

"I explain to the parent in advance and they love our system."
"My families know we believe in takings risks."
"No complaints from staff or parents yet."
"Sometimes we have to defend our position on tree climbing with parents of program participants."
"Once parents and children are familiarized with our guidelines there are few issues or concerns."

Discussion and Further Recommendations

The variety of responses, analysis of data, and seeing the bigger picture of how various early childhood facilities allow tree climbing enabled the researchers to make recommendations related to each finding that might allow safe tree climbing in early childhood settings. Based on the findings and recommendations, the authors created a tree climbing toolkit (see Table 14) to assist in implementing tree climbing safely in a variety of early childhood settings. Combined with a benefit risk assessment, individual settings can analyze their own sites and educate early childhood educators and parents related to risky play, policies, and safety measures around tree climbing. There will not be any one size fits all solution for tree climbing in early childhood settings, as it is based on local and state areas.

Table 14
Tree Climbing Toolkit


Tree Climbing Toolkit


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Findings	***Recommendations***	***Resources***
Perspectives Regarding Outdoor Risky Play	• Recognize fears and risk comfort levels. • Look at benefits of tree climbing • Consider why tree climbing might be allowed • Investigate potential safety guidelines • Conduct a benefit/risk assessment • Look at low injury statistics for tree climbing	• Playground Safety Handbook • Benefit/risk assessment • Parents' perspectives on tree climbing • What to say instead of "be careful"
Policies, Facility Licensing, Liability	• Know your policies (licensing, insurance, and facility) • Communicate policies with all stakeholders • Implement safety and injury protocols, sign waivers • Establish guidelines and training • Create a check list/tool kit for tree climbing • Train on/share the benefit/risk assessment • Create a specific plan for each facility • Continue conversations with stakeholders	• Managing risk in play • Washington State outdoor preschool pilot • Outdoor learning environments and rating scales • Outdoor play guidelines
Accessibility	• Assess trees in current outdoor space • Plant a tree for now • Plant a tree for future • Consider other natural climbing options • Take a walking trip • Plan fieldtrips that allow tree climbing • Create a tree maintenance plan	• Arborist association • Tree resources • Field trip/walking trip permission slip • Tree maintenance/safety checklist
Parental Considerations	• Communicate benefits of tree climbing with parents • Set expectations and culture of facility • Share safety guidelines • Train and educate on risky play • Provide Parent Risky Play Toolkit • Consider waivers/risky play agreement/permission • Involve parents in the supervision of risky play	• Sample parent guidebook • Risky play tool • Waiver information • Info on tree climbing

Recommendations for Future Studies

Based on several limitations that were identified, additional research and future studies are necessary to add value to this important topic. The purpose of this research study was to examine early childhood educators' perspectives on tree climbing; therefore, a broad sample was used for the survey. Although the study provided a diverse mix of early childhood educators, types of education settings, and location, the results were self-reported.

Recommendations for future studies include looking at regional differences, looking at international trends, focusing on specific types of early childhood educators and settings, and developing a study to further explore outdoor play and safety policies, guidelines, and the potential liability for early education settings is warranted. Understanding how licensing impacts tree climbing may be important. Additionally, better understanding the different attitudes and fears from early education providers can add more information of the benefits, risks, and opportunities of children climbing trees.

This study used a convenience sampling technique to investigate current practices and concerns around tree climbing. Employing different research methods to gain unique perspectives is needed. Studies that also concentrate on a certain type of early education setting or specific representation of early education providers could add value to this important topic. Additionally, a follow-up study where focus is placed on one area (region, state, city, or school district) could help provide further guidance and direction.

Conclusion

The four findings from the study were perspectives regarding outdoor risky play; policies, facility licensing, and liability; accessibility; and parental considerations. Overall, tree climbing was accessible to 55.4% of the study participants. Tree climbing was also allowed by 58.3% of the respondents because it is fun, part of childhood, negotiates risk, develops skills, and connects to nature. Additional benefits include critical thinking, imagination and creativity, problem solving, self-confidence, social interaction, dexterity and physical strength, cognitive and emotional strength, resiliency, risk negotiation, and spatial awareness. Most respondents noted personal and facility rules to promote safety within tree climbing in early childhood settings. Early childhood educators that allow tree climbing reported low injury rates, with skin scrapes being the most common. Fears, liability, and licensing were cited by the 41.7% that do not allow tree climbing. While there may be challenges to tree climbing in early childhood settings, the study suggests the benefits of tree climbing outweigh the risks. Early childhood educators can use a benefit-risk assessment and the tree climbing toolkit provided to safely and effectively promote tree climbing.

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International Journal of Early Childhood Environmental Education

ISSN: 2331-0464 (online)

Planting the Seeds for Nature-Based Learning: Impacts of a Farm- and Nature-Based Early Childhood Education Program

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Submitted April 27, 2020; accepted November 17, 2020

ABSTRACT

Farm- and nature-based early childhood education programs have a unique potential to provide young children with skills and experiences that build a strong foundation for future learning and environmental stewardship, but can also to extend positive impacts to families. In this paper, we work to bridge the gap between research and practice by presenting a description and program evaluation of the Farm Sprouts farm-based preschool program. The Farm Sprouts program supports learning and positive child development in the context of the natural world, with a focus on environmental stewardship, food systems, and nature. Semi-structured interviews (n = 16) and surveys (n = 33) were conducted with parents of children enrolled in the Farm Sprouts program. These interviews and surveys collected information on parents' perceptions of how the Farm Sprouts program impacted their child, with specific focus on changes in children's cognitive, language, and social skills, scientific inquiry, interaction with nature, interest in exploration, as well as impacts on family interactions. The results of this program evaluation suggest that quality farm- or nature-based programs can positively impact a child's language and conversation skills, increase their interest in nature and desire to explore, and positively impact family interactions. Lessons learned and implications for other farm- and nature-based educational efforts are discussed.

***Keywords**:* farm pre-school, nature-based learning, place-based education, whole child education, early childhood education

> *"I'm going to be a farmer when I grow up!" exclaims a four-year-old, outfitted in green rubber boots designed to look like frogs as she walks back from the sustainable agriculture field after harvesting asparagus with her teachers and the staff farmers. As they return to the classroom, children wash both their hands and the asparagus, which they munch on raw for their snack. Some can hardly wait to taste the fresh asparagus, while others seem hesitant to try even a small taste of this stalky vegetable. This experience becomes a risky new adventure as they engage first-hand with the food system.*

As farm- and nature-based preschool programs are gaining popularity and becoming more widely available for children across the United States, there is a need to investigate the theories, core values, and strategies associated with positive outcomes for both children and families participating in these programs. Like any early childhood

program, quality nature- and farm-based programs should provide opportunities for children to play, explore, and engage in developmentally appropriate learning experiences. This paper focuses on a specific nature- and farm-based program, Farm Sprouts.

Here, we describe the Farm Sprouts program, a farm-based preschool program in Novi, Michigan – within this paper, we use the term "preschool program" to describe early childhood education programs designed for and delivered with preschool-aged children. This paper outlines the core values and models behind the Farm Sprouts program, and introduces evaluation data that describes the potential impact farm- and nature-based preschool programs can have on children's learning, their behavior, and family engagement. We conducted interviews and surveys with parents of children who participated in Farm Sprouts to gain more information about the impact of the program. Parents were asked about their child's participation in the program, their cognitive skills and engagement in scientific inquiry, their language and social skills, their exploration and interaction with nature, and the impact the program has had on their family.

Foundations of Farm-Based Education

Nature-based and farm-based early childhood education programs engage young children and their families in nature and agriculture, providing foundational experiences that support health and well-being both now and in the future (Sobel, 2008). Nature-based early childhood programs include a curriculum focused on nature, incorporate nature in their indoor environments, and adopt a daily schedule that includes at least 30% of the time outdoors (Bailie, 2012; Larimore, 2019). Such programs place nature at the core of their curriculum, blending traditional, high-quality early childhood education practices with environmental education, preparing children to be environmentally literate stewards of the earth (Chawla, 2009; Wells & Lekies, 2006). Nature classrooms include materials from the natural environment and access to diverse environments (nature trails, gardens, orchards, etc.). These programs help children engage in nature-related activities in multiple formats including small group, large group, and individual activities and activities that take place both inside and outside (Sobel, 2016). Children who participate in nature- or farm-based programs have organic opportunities to ask questions, explore, observe natural phenomenon, be adventurous, and take appropriate risks. They also have increased opportunities for dialogue and exploration around food and where it comes from, gardening, and the natural world.

In many ways, nature- and farm-based education programs are rooted in whole child and place-based education. Most traditional educational models in the United States do not emphasize nature or the natural world within their curriculum or educational theory. Principles of whole child education and place-based education provide a strong foundation for principles and practices in nature- and farm-based education programs.

Whole child education. Early childhood education through its many curricula, models, and methods, seeks to support the healthy development, growth, and education of young children. High-quality early childhood education can have significant positive impacts not only on a child's development early on, but also throughout their lifetime. Studies of high-quality preschool and early intervention programs have shown favorable outcomes for children in several domains of development, including language and literacy, cognitive, and social emotional development (Schweinhard, 2014; Ayoub et al., 2015; The Impacts of Early Head Start, 2002; Head Start Impact Study, 2010).

The educational system in the United States heavily focuses on academic preparation, with the goal of early childhood education programs being able to support later academic success. Whole child education begins with an intent to support and enrich *all* areas of a child's development, including their body, mind, and spirit, as well as finding ways to connect children to their community and the world (Miller, 2010). Whole child education is not focused on specific educational metrics, but instead on other important skills, such as the foundations for social-emotional development, critical thinking, creativity, and curiosity, which all inform a child's ability to learn, retain, and use academic skills (Miller, 2010).

Farm- and nature-based programs and spaces allow children to naturally engage in play experiences either through intentional teacher-led activities or open exploration. These play experiences help children engage in early science exploration, a critical component of early learning. Early nature play experiences can also help children engage in

activities that support the development of healthy emotional patterns as well as intellectual mental patterns (Banning & Sullivan, 2011). The Next Generation Science Standards indicate that children in kindergarten through second grade should be learning how to analyze and interpret data, which includes using observations to describe patterns in the natural world (Next Generation Science, 2013). Children who participate in nature-based education have the opportunity to observe and experience natural patterns on a daily basis. For example, star shapes appear at the core of an apple sliced in half and can be spotted in the petal formations of flowers, such as that of a tomato. Another example of a phenomenon is steam formation, which children might observe as pond water meets colder air or warm-blooded animals exhale on a cold day. Through authentic, hands-on experiences engaging with such phenomenon, children develop schemas to guide growth in future understanding of complex concepts.

Place-based education. The concept of connectedness at the center of whole child education ties into place-based education. Place-based education centers on both natural and built environments, which includes learning opportunities focused around history, folk culture, social problems, economics, and the environment (Sobel, 2013). This model of place-based education uses a theoretical framework known as "pedagogy of place," which emphasizes the interconnectedness of a child's learning within school, community, and environment (Sobel, 2013). Participation in place-based educational programming means that students use not only their immediate environment, but also their other surroundings and community as a framework to construct their own learning (Sobel, 2013).

In place-based educational programs, the child is not an observer, but an active participant in their learning. The child is also an active citizen who contributes to the larger community and environment (Sobel, 2013). The use of the place-based model allows programs to be rooted in and deeply connected to their physical place, their natural environment, their history, and their community to create an interconnected individual-community-environmental learning space.

Embodying a place-based perspective, farm-based programs also provide opportunities for children to become connected to a larger community and to the environment. For instance, maple sugaring is a common farm-based activity in the northeastern portions of the United States. This might involve children tapping a sugar maple tree, harvesting sap, and engaging with volunteers to produce syrup to be sold to the community or planting and harvesting sunflower seeds to be given to families to plant in their yards and community. Farm-based programs intentionally and naturally afford many opportunities for conversations and learning around food including the food system (i.e., where food comes from, how it grows, etc.). Intentional teaching, including direct experiences with the food system and interactions with people working with food, can bring these conversations to the forefront. Children in farm-based programs have unique opportunities to observe and interact with adult models to grow, prepare, and eat fresh food.

Figure 1. A Farm Sprouts preschooler works to harvest asparagus, guided by the Tollgate Farm Sustainable Agriculture Instructor.

Ecological Systems Theory

Children do not develop independently in isolation, but rather within the influence of external forces that impact their development. Bronfenbrenner's Ecological Systems Theory (1979) explains that child development is not only impacted by a child's direct experiences with their own environment, like their direct relationships with their parents, caregivers, or their school, but also by broader environmental influences that impact the family itself, such as their broader community and society as a whole.

Taking the influences and impacts of these ecosystems into account can enhance our understanding of the whole child within the context of the child's environment. Ecological Systems Theory posits that children's experiences and their development as a whole are shaped by inputs across multiple levels. The smallest level of impact is the microsystem, where a child interacts with their immediate environment, including parents or caregivers and schools. The subsequent level, the mesosystem, includes the interactions between those immediate environments, like a child's parents and teachers working together to solve a problem. Children are also impacted by indirect environments and at the exosystem level the interaction between those environments influence a child's development. For example, elections for a local school board will impact school funding or policies that, in turn, impact a child's experiences. Further removed from the child, larger systems, like systemic racism, influence a child's experiences and development at the macrosystem level. The chronosystem level involves changes that occur over time and the impact they have on a child's development, for example differences children today may experience in their upbringing due to the availability of technology or the occurrence of a global pandemic (Bronfenbrenner, 1979). Further, while children are impacted across multiple levels and systems, these impacts are also bidirectional in the sense that children, in turn, impact their families and larger communities through their knowledge, experience, and interactions.

Just as the whole child educational approach dictates that all areas of development must be taken into consideration, Ecological Systems Theory posits that attention must be paid to the other environments that impact young children. Farm- and nature-based preschool programs tie nicely within the lens of the Ecological Systems Theory, as well as the concepts of whole child and place-based education. Instead of an early childhood program solely focused on the direct education and experiences of individual children, farm- and nature-based programs can and should use interconnectedness at the root of their educational principles, activities, and interventions, which can impact children on multiple levels (Bronfenbrenner, 1970; Sobel, 2004).

An example of this can be seen in Figure 2. A young child enrolled in a nature-based preschool program may have a nascent interest in butterflies. Through their preschool program, this curiosity can further blossom and grow through natural exploration and outdoor learning opportunities. Seeing the child's interest in butterflies, their teacher might include lessons on butterflies that would further grow the child's knowledge and interest, discussing the impact of climate change on butterfly populations or conservation efforts to protect endangered butterfly species. The child may become more passionate about conservation after learning about the endangered status of some butterfly species. Seeing their child's interest in butterflies, a parent may ask their child's teacher for ideas on how they might expand on that interest in the home environment, perhaps by planting flowers that attract butterflies in their home garden. The teacher could also share opportunities to advocate for a local millage to protect natural lands used by butterflies, lands that the child and their family could then visit.

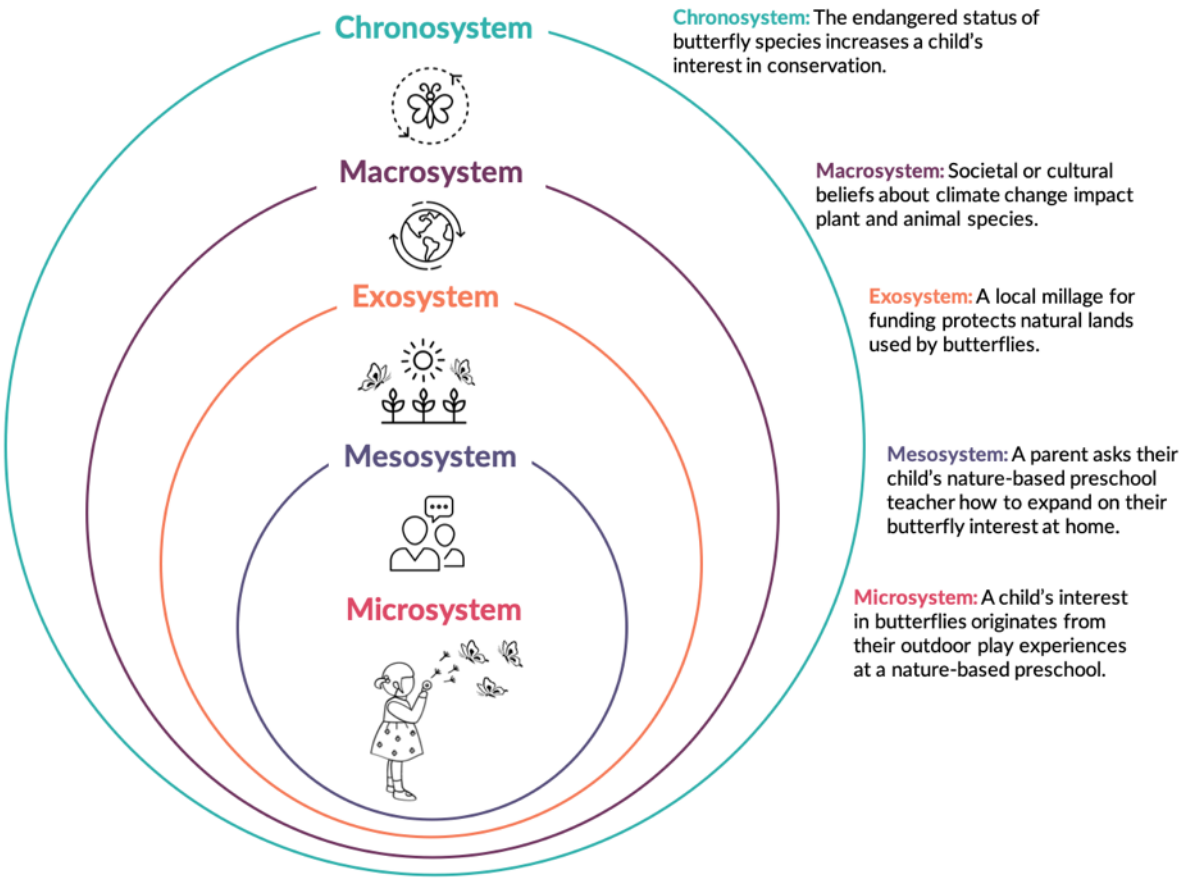

Figure 2. Nature-based education framed within the Ecological Systems Theory

Impacts of Nature- and Farm-Based Programs

Farm- and nature-based preschool programs provide opportunities for children to engage in early learning and science exploration and encourage quality play experiences. Recent research shows that nature-based education programs can have several benefits for children, including increasing motor and social skills, creative thinking skills, and physical activity (Müller et al., 2017; Wojciehowski & Ernst, 2018; Coe et al., 2014). Broadly, time spent in natural learning environments can positively benefit young children's cognitive functioning, self-regulation, and environmental stewardship (Wells, 2000; Burdette & Whitaker, 2005; Chawla, 2009; Wells & Lekies, 2006).

Research also shows that children who participate in nature- and farm-based educational programs may choose healthier options at school meals, increase their fruit and vegetable consumption, and can be more willing to try new foods (Joshi, Azuma, & Feenstra, 2008; Taylor & Johnson, 2009; Rombinson-O'Brien, Story, & Heim, 2009; Bontrager Yoder et al., 2014). Beyond changing eating habits, nature- and farm-based programs have also demonstrated the potential to increase a child's access to fruits and vegetables, improve food security, and even increase the planning and preparing of meals at home (Savoie-Roskos et al., 2017; Health Impact Assessment, 2011). Beyond the individual child, less is known about how these impacts might extend beyond children and into families. Within the Ecological Systems Theory (Bronfenbrenner, 1979), farm- and nature-based early childhood education programs have the potential not only support young children's development, but also to expand upon these impacts by extending more broadly into the family environment. Additional research is needed to elucidate the relationship between nature- and farm-based program participation and positive impacts to families.

The Farm Sprouts Program

The Farm Sprouts program is a farm- and nature-based early childhood education program that takes place at the 160-acre Michigan State University (MSU) Tollgate Farm and Education Center in Novi, MI. The farm includes 40 acres of forest, a pond, pastures, and a variety of gardens, in addition to crop production fields, livestock, and wildlife. The farm is situated 25 miles from the center of Detroit in a suburban setting. Today, the farm reaches approximately 20,000 visitors per year through events, volunteer activities, and programs.

Tollgate Farm and Education Center is run by MSU Extension. Cooperative extension programs act as the educational arm of the university, delivering the research, knowledge, and best practices at the university level directly into communities. MSU Extension fulfills the land-grant mission of MSU through educational experiences for adults and children to both improve their lives to make for a better future.

Program Structure

In the Farm Sprouts program, approximately 60 participants attend one morning or afternoon per week on either Tuesdays or Wednesdays over the course of eight weeks in the spring and fall. The winter season takes place over four weeks on Wednesdays with approximately 30 participants. Many children attend the program from one season to the next for approximately two to three years. The program maintains a low child-to-teacher ratio, with one teacher for every five to six children, and no more than 17 children per group.

The Farm Sprouts program's central purpose is to engage young children with local food and the natural world through hands-on experiences in the outdoors, building a foundation for future learning and stewardship. The Farm Sprouts program philosophy includes:

1. A belief in the importance of play, through which children grow emotionally, develop social, physical, and cognitive skills, and gain the self-confidence required to engage in new experiences.
2. Use of an interdisciplinary, child-centered approach to education in order to create meaningful and essential connections for learning.
3. Providing young children with opportunities to experiment, explore, and engage in science play and practices as they build an understanding of scientific inquiry processes and concepts.
4. Developing lifelong habits and preferences by involving young children in all aspects of the farm-to-table experience.
5. Striving to build a strong learning community in which families, diversity, and collaboration are valued.

On a typical day, the majority of time in the Farm Spouts program is spent outdoors, during which children and educators engage in free and guided play, hikes, animal interactions, and consume snacks sourced directly from the farm. For safety reasons, both drop-off and pick-up take place indoors in a classroom that was once a 1950's hog barn and is now used as a learning space. Free and guided play takes place in and near the children's garden, educational garden, orchards, arboretum, fields, and forest, as well as in the indoor classroom upon arrival or in the case of severe weather.

Farms are places which involve intense and varied work that is a source of interest and fascination for children. The program integrates the work involved in the farm context into play and each day children engage in animal interactions and chores. Children spend time observing animals from a distance and working with smaller animals before caring for larger animals, such as a horse. Preparation for grooming a horse would include reading about horses, sharing in a story about how we are feeling about interacting with the horses, practicing and modeling how to be safe near a horse, and playing as horses. During the winter season, children use a drill, with support, to tap a sugar maple tree, monitor the sap level, and once full, haul the sap to larger tanks to be transported to the sugar shack (see Figure 3). This authentic work is a source of interest and joy as children participate in long-standing agricultural process, part of the rich history of the region as a result of the range in which the sugar maple tree grows.

While this work is happening, children are engaged nearby in free play, balancing on logs, rolling in the snow, and closely inspecting discoveries made in the forest. Opportunities to engage in work activities and with materials in novel, safe, and developmentally appropriate ways provide for meaningful and essential connections for learning. The accomplishment of authentic work, by using real tools, supports growth and development in fine motor and problem-solving skills and self-confidence.

Figure 3. Farm Sprouts preschoolers work with their teacher to tap a sugar maple tree.

The Farm Sprouts program includes collaboration with local farmers: in this case, the Sustainable Agriculture Team that works on-site. This collaboration supports the larger aim of developing lifelong habits and preferences by involving children in the farm-to-table experience. Interactions with the farmers who grow the food the children eat are rich in learning opportunities. Each day children observe and ask questions about the crops and their methods, and work with the farmers to harvest and prepare certain crops for their snack. Program staff attempt to source as much of the program snacks as possible from the farm and involve children in growing, harvesting, and preparing the food to eat. Fresh asparagus, applesauce, and smoothies made with local produce and honey are all on the menu, depending on the season. Children engage in guided play experiences that parallel the work of the farmers.

For example, in the fall children participate in a "veggie wash station," (seen in Figure 4) set up with a bin of water, brushes, and towels before carrying the vegetables to a pretend play farmer's market to be sold to their peers. This close connection to the source of the food and being a part of a community, which celebrates and shows gratitude for the process of growing it encourages children to take the risk to try new foods. Songs, children's literature, and discussion related to the food system and characteristics of the food accompany snack time to guide learning.

Figure 4. Farm Sprouts preschoolers wash vegetables harvested from the farm.

Building a Learning Community that Thrives on Inquiry

Inquiry is at the heart of the educational approach of the Farm Sprouts program, with a particular focus on curiosity, discovery, and instilling a sense of wonder. Teachers model scientific inquiry practices, such as observing, questioning, and forming explanations. Children are accustomed to hearing teachers questioning what they are observing with the sentence starter, "I wonder…?" and soon adopt it themselves as a part of their language and disposition to thinking about the world around them. As children experiment, explore, and engage in science play and practices, they build an understanding of scientific inquiry processes and concepts.

While the Next Generation Science Standards are not a direct aim of the program, they are naturally addressed as a result of the focus on using scientific inquiry practices to make sense of what is happening within the surrounding farm learning environment. For example, as children engage with natural materials and living things in varied and novel ways, they identify patterns which extends to support new understandings of the various systems in which they exist. Identifying patterns, such as observing animals and noting their needs for survival, is one of the Next Generation Science Standards (2013) kindergarten standards.

Figure 5. Farm Sprouts preschoolers engage in pretend play as beekeepers.

Telling the Story

Both Reggio Emilia and Harvard's Project Zero have been sources of inspiration for the strategies that teachers use to tell the story of the learning taking place. Carlina Rinaldi (2003) refers to the idea of both children and teachers engaging in research together, meaning they are continuously asking questions, forming theories, and revising those theories to form new bodies of knowledge within a learning community. Throughout a Farm Sprouts program season, teachers carefully observe, record, and share in dialogue on the children's current understandings in relationship to the larger questions of inquiry. Forms of documentation, such as children's journals, anecdotal records to capture quotes and questions, and photographs all inform the process of interpreting and reflecting on the learning taking place. Teachers and children engage in the process of creating a Wonder Wall each season to present these documentation artifacts to children as seen in Figure 6. The Wonder Wall supports memory recall of past experiences and sparks dialogue with the aim of building important learning connections.

Figure 6. Farm Sprouts preschoolers review the content of the Wonder Wall in their classroom.

Parent and Family Engagement

Throughout the Farm Sprouts program, staff engage parents and families in a number of ways, primarily through the availability of a Community Supported Agriculture (CSA) program and a program blog. A number of families in the Farm Sprouts program belong to the CSA program which, for a fee, provides community members with a share of fresh farm produce. Through the CSA program, children can assist their family members in collecting the produce during the share pick up each week, which includes weighing tomatoes, counting onions, and conversing with the farmers about their day at the farm and the food that will journey from the farm to their table. Children, families, teachers, and farmers all engage in exchanges about the farm and food through these programs and experiences on the farm, including harvesting produce together, engaging in conversations as they navigate the farm, sharing written communications about the program, and moving through CSA pick up. For the farmers, the collaboration adds rewarding and fun opportunities to share their knowledge and passion with an audience who shows great curiosity and enthusiasm for their work, boosting the morale of the team.

In documenting the Farm Sprouts program, teachers also make efforts to engage families. Farm Sprouts program staff write a blog each week to share their children's experiences and discoveries with families. The blog also serves as a place to provide parents with information and resources connected to topics of exploration, including news and events taking place at the farm and within the greater MSU and MSU Extension community. Families are encouraged to read the blog to their children to elicit dialogue, strengthen bonds, and deepen understanding of concepts they are investigating at the farm. Teachers form additional farm-to-school connections by sharing activities for families to engage in at home, such as nature-themed scavenger hunts. At the conclusion of a program season, families are invited to join their child, who becomes the "expert guide," to become an interpreter of the farm. This conclusion event to the season, called the Celebration of Learning, includes a wagon ride around the farm and a tour of the Wonder Wall. Together, these efforts engage families and children in the content of the Farm Sprouts program, providing opportunities for learning and engagement beyond just the "classroom."

PROGRAM EVALUATION

In seeking to capture the impact of the Farm Sprouts program, we conducted a program evaluation to measure the impact the program had on children and families. In evaluating the Farm Sprouts program, we focused on three primary research questions:

1) In what developmental domains did parents observe their children grow after participating in the Farm Sprouts program (e.g., language, social skills, scientific inquiry)?
2) Did Farm Sprouts participation positively impact children's behavior (e.g., exploration, interest in nature/outdoors)?
3) Did program participation positively impact families' engagement with nature- and farm-based activities (e.g., spending time outdoors, conversations about food)?

To answer these questions, we used a mixed methods approach, collecting quantitative data from parent surveys and qualitative data from parent interviews.

Participants

Participants in this program evaluation included the parents of Farm Sprouts children. Semi-structured interviews were conducted with parents during the summer of 2018. Interviews were solicited from parents of Farm Sprouts children graduating from the program in the Spring 2018 season (n = 16). Many of these children had attended Farm Sprouts across multiple seasons; as a result, these interviews allowed us to ask parents to reflect on the collective impact that multiple seasons of Farm Sprouts participation had on their children. Surveys were solicited from parents of Farm Sprouts children participating during the Fall 2018 program season (n = 33), including a number of questions on the impact of the Farm Sprouts program on children's interest and comfort with the outdoors and nature.

Interviews

During the interviews, parents answered a number of questions regarding the impact the program had on their children and their families (see Table 1). Questions centered around families' participation in the program, changes in children's cognitive skills and scientific inquiry, changes in children's language and social skills, changes in children's interactions with nature and interest in exploration, and impacts experienced by the broader family. Interview questions were developed in part based on the Farm Spouts program philosophy (see p. 8), as well as the interests of program stakeholders, an important element of conducting a utilization-focused evaluation (Patton, 2008).

Interviews with parents were audio recorded and transcribed. A deductive analysis process was then used to code transcripts for themes centered around the primary evaluation questions: (1) In what developmental domains did parents see their children grow after participating in Farm Sprouts (e.g., language, social skills, scientific inquiry)? (2) Did Farm Sprouts participation positively impact children's behavior (e.g., exploration, interest in nature/outdoors)? (3) Did program participation positively impact families' engagement with the content covered in the program (e.g., spending time outdoors, conversations about food)?

Table 1
Semi-structured interview questions

Question topic	Specific questions
Program participation	● How many years/seasons has your child been in Farm Sprouts? ● Why did you decide to enroll them in Farm Sprouts the first time? ● What have you enjoyed most about seeing your child in Farm Sprouts?
Cognitive skills and scientific inquiry	● Have you noticed any changes in your child's ability to ask questions about what is around them? If so, how? ● Have you noticed any changes in your child's ability to make decisions? If so, how?
Language and social skills	● Has your child's ability to hold a conversation improved? ● Does your child seem more comfortable interacting with other children since starting Farm Sprouts? What, if any, improvements have you seen?
Exploration and interaction with nature	● Has your child shown a larger interest in nature or a greater comfort level being in nature? How so? ● In what ways, if any, has your child become more daring or adventurous since starting Farm Sprouts? Is your child more open to exploration?
Family impacts and connections	● How, if at all, has your life as a family unit changed due to your child being in Farm Sprouts? ● Did you connect to other parents in the program?

Surveys

In the surveys, parents completed a number of retrospective pre-then-post ratings of their children's interests and behavior before and after participating in the Farm Sprouts program. Questions included ratings of children's interest and comfort in spending time outdoors, interest and comfort in interacting with animals, interest and comfort in making new friends, children's sense of belonging, and children's sense of connection to nature (see Table 3 for specific items).

Results

Interviews. Interview analyses revealed several primary themes regarding the impacts of the Farm Sprouts program (see Table 2). Regarding children's growth across developmental domains, primary themes included children improving their conversation skills and interest in engaging in conversations, children asking more in-depth questions, and improvements in children's decision-making skills. Parents recounted that their children were more communicative and conversational after participating in the Farm Sprouts program. Parents also reported that their children asked more insightful, thoughtful questions and were more decisive after participating in the program.

Regarding the impact of Farm Sprouts participation on changes in children's behavior, themes included children displaying increased interest in nature, and being more adventurous and interested in exploration. Parents mentioned that their children are now more interested in spending their time outdoors, whether playing in their own backyard or spending time exploring while hiking in the woods.

Regarding impacts on family engagement, themes included increased conversations on the origins of food, increases in time spent outdoors, and more time spent gardening as a family. Many parents mentioned that their children

have asked insightful questions about the origins of their food, some even changing their eating habits to stop eating meat. Many parents also spoke about spending more time together outdoors, whether on family hikes or in gardening and planting things together in their yards.

Table 2
Qualitative interview themes

Evaluation question	Theme	Example quotes
In what developmental domains did parents see their children grow after participating in Farm Sprouts (e.g., language, social skills, scientific inquiry)?	Improved conversation skills/interests	*"[He's] definitely more communicative. He even... told one of the stories last week. So he got up in front of the group and told… they were making up stories and he stood up… usually he's more observant, he'll want to sit back and observe. For him to get up and present a story, that he felt comfortable to do that."* *"I think that he... his ability to hold a conversation or even just to be interested in wanting to. Like he'll sit down and do work, but he's very active, but it peaked his interest in learning about things and wanted to talk more about it. I don't know if it improved his ability, but definitely I feel like improved his desire too if that makes sense."*
	Asking more in-depth questions	*"She's interested in how things are sort of interconnecting in with her context, and it's really cool. When she finds new or different bugs in the yard, she talks about like how it's affecting the plant that she found it by, and 'I wonder if what happens when this bug dies. Does it go back into the soil?' Like a whole life cycle, a whole ecology perspective... The way she's asking questions is totally from this program."* *"Before we would just go hiking and it might just be the very basic, 'What is this?' or 'Why is this here?'… [Now] they just ask more in depth questions about the different species and how they work instead of just general questions... I think they go more in depth with their questioning."*
	Improvements in decision making skills	*"She is more decisive. I didn't think about it, but not that she was indecisive before, but she seems to be able to process the information and know what she wants it faster now."* *"Yeah, we tend to give a lot of input what we do anyway, but definitely it's helped to have decision making abilities."*
Did Farm Sprouts participation positively impact children's behavior (e.g., exploration, interest in nature/outdoors)?	Increased interest in nature	*"I would say increased interest because it's a part of her week now... when she comes here, she's engaging in educational type things with the class. She enjoys that. She loves learning... With the Farm Sprouts, there's that educational aspect, and I think that's really enhanced her love of nature and her excitement to get outside.*

		"She just wants to be outside more. She was always wanting to be outside, but now it's like all the time. 'Let's go outside, let's go to the park. Let's see what's out there.' Bugs and stuff. Even though she said she's scared of them, she'll go look for it." *"In the backyard play, we're noticing were able to turn the tv off more go outside more. He can occupy himself outside. Everything gets made into soup outside. He find all this stuff and put it into a big pot. He's able to [do] self-directed play outside and we can work on the garden or just sit there and he can just go."*
	More adventurous and interested in exploration	*"He's usually been the one to sit back and observe... [but] he was right at the head of the pack when they walked out, so he's ready to go. There isn't any, he's gone through a phase even where his comfort thing was wearing a cape and he would wear a cape everywhere and he was just kind of shy and would stand by me. The cape is gone and he just is the head of the pack. He just goes for it and he's not clinging to me, we don't have to calm him by saying "If you feel better, wear your cape," whereas we haven't had to do that. He's into the adventure now."* *"I think it give her confidence... she's kind of always been adventurous, but... yeah, yeah. She's always up for anything, especially if it's outside. But I find her if we do go outside, she goes off the beaten path and is looking for, 'Oh, I look at this ravine. Look at this rock. Look at this leaf.' That's what I see from her."*
Did program participation positively impact families' engagement with the content covered in the program (e.g., spending time outdoors, conversations about food)?	Increased conversations around food and where it comes from	*"We end up with a lot conversations of explaining where different food would have come from… she'll ask where different things come from, how they make it."* *"He started having a lot of questions about meat and where meat comes from and what specific kind of meat comes from a cow… he just had a lot of questions for me when we were the supermarket and a lot of specific questions: 'Are the animals killed?' Yes, they are. 'For their meat?' Yes, they are. 'Do they do it in right in the back of Kroger?' No. Ya, know?"*

Spending more time outdoors	*"It's caused [our family] to do more stuff outside, go on family hikes, and experience things that never really did before."* *"It definitely makes me want to not just take my kids into the woods, or go hiking or to go for a walk, but to actually take time when we're in the woods to explore and learn. I think before it would be 'Oh we're out in nature.' It's nice, but to actually bring their journals with them or to bring a camera with them, or to bring the wildlife or the identifications, really. Then use the opportunity to teach them about things."*
Spending more time gardening as a family	*"[Working in the garden is] a new thing. We had one big gardening plot last year, we built another one this year and built them their own wildflower garden this year. Him and his little brother got to sprinkle all the seeds and help water everything."* *"We started a little garden really because of Farm Sprouts, because they were interested they wanted tomatoes."*

Surveys. Retrospective pre- and post-test survey data were analyzed using paired comparisons. Paired-sample t-test comparisons showed that parents reported statistically significant improvements in their children's interest and comfort in spending time outdoors, interest and comfort in interacting with new animals, interest and comfort in making new friends, sense of community belonging outside of their family, and connection to nature beyond their yard or neighborhood (see Table 3).

Table 3
Mean ratings of pre-post retrospective survey ratings

	Pre-test		**Post-test**		
Item	*Mean*	*SD*	*Mean*	*SD*	*p-value*
My child is interested in spending time outdoors.	4.41	0.56	4.82	0.39	<.001
My child is comfortable spending time outdoors.	4.31	0.54	4.81	0.40	<.001
My child is interested in interacting with new animals.	3.88	0.93	4.64	0.55	<.001
My child is comfortable interacting with new animals.	3.52	0.94	4.55	0.56	<.001
My child is interested in making new friends	3.70	0.95	4.12	0.78	0.002
My child is comfortable with making new friends.	3.58	0.90	4.06	0.86	0.002

My child felt a sense of belonging to a community outside of the family.	3.25	0.76	4.22	0.75	<.001
My child felt a deep connection to a natural place outside of his/her own yard or immediate neighborhood.	3.19	0.95	4.31	0.59	<.001

Limitations

Though these data demonstrate compelling impacts of the Farm Sprouts program on children and families, a few limitations must be acknowledged. Primarily, the small sample of data collected limits opportunities for the generalizability of these findings. Continued research is needed to further elucidate how farm- and nature-based early childhood education programs can impact children's social and cognitive skills, and how these impacts can extend into families. Additionally, survey data was collected using a retrospective pre- and post-test survey design, which introduces potential for bias. Although retrospective pre- and post-test designs can reduce or eliminate response-shift bias in survey data, this methodology is still prone to bias in respondents' memory recall in reporting and rating pre-program thoughts and behaviors (Prat, McGuigan, & Katzev, 2000).

Discussion

The results of this program evaluation suggest that nature- and farm-based preschool programs have the potential to impact change across multiple levels or ecological systems for children and families. Parents reported that children who participated in the Farm Sprouts program engaged in increased conversations around program topics and improved their conversation skills. Participating children also showed positive changes in their behaviors, including increased interest in nature, adventurousness, interest in exploration, and an increased level of comfort with animals. These impacts to individual children align with previous findings that cognitive, social emotional, and executive functioning skills can all be positively impacted by nature- and farm-based learning (Wells, 2000, Burdette & Whitaker, 2005; Chawla, 2009; Wells & Lekies, 2006).

Families of children who participated in Farm Sprouts also reported changes in family interactions, including increased time spent outdoors and time spent gardening as a family, and more conversations about the origins of food. These findings support previous research that children who engage in nature-based learning experiences are more likely to be more in tune with food and where it comes from (Savoie-Roskos et al., 2017; Heath Impact Assessment, 2011).

Lastly, families reported an increased connection to nature on a community level. Parents described spending time with their children exploring the outdoors, planting and gardening, and discussing the origins of food. Research surrounding the impacts of nature-based early childhood education programs on families has been more limited. Findings about the impact of the Farm Sprouts on family engagement and interactions can add to the limited literature base for the impacts of these types of educational programs on family systems. Further research should be done to measure and describe the impact of these early educational programs on larger family and community systems.

Interestingly, program evaluation results did not indicate any strong findings in terms of children's interactions with other children (e.g., improvements in social skills). This could be due to several factors, including the frequency of the program and the short-term nature of the program seasons, which would limit opportunities for children to interact and engage in long-term ways. The ages of the children involved in the program may also play a role in that developmentally, children at these ages are still learning the basics of peer interactions, and appropriately are spending time playing independently or engaged in parallel play that does not involve direct interaction with peers. Future work should more closely examine the specific impact that nature-based early childhood education programs may have on social skills and peer relationships.

Community Connection

In the Farm Sprouts program, a strong community was formed through intentional efforts focused on family engagement, as children voluntarily or naturally participated in engaging activities with their families outside of the program or more formally within the confines of the program (play groups, etc.). Children and families were connected to sustainable agriculture through a purposeful collaboration with agriculture staff at Tollgate, through the CSA program, and through educational inquiry around sustainable agriculture in the Farm Sprouts curriculum. Children also engaged in meaningful play experiences that went beyond having fun and moved into the work of childhood: exploring, asking questions, understanding consequences in the natural world, and engaging in authentic ways with other children, teachers, families, and the larger world around them. Intentionality regarding relationships, connections, and community not only helps children understand concepts like where their food comes from, it helps them build a larger understanding of how the world works, how things and people are connected, and where they fit into the system.

After program evaluation data was collected and analyzed, several changes were made to the program to improve its effectiveness, grow the program, and to build even stronger connections with families. Efforts were made to help build connections for families and emphasize a home-school connection. Teachers and program administrators helped connect families to MSU and MSU Extension services and events by sharing marketing materials and communications through the classroom blog and emails to families. Other small parenting workshops covering topics such as identifying poison ivy and managing ticks provided opportunities to alleviate concerns with knowledge, support, and resources.

Implications for Practice and Future Directions

The implementation and evaluation of the Farm Sprouts program suggests that founding a preschool program with an intentional focus on ecological systems, place-based learning, and whole child education has the opportunity to impact a child's learning and development across multiple levels or systems. Other farm- and nature-based preschool programs, or any preschool programs striving to incorporate farm- and nature-based learning, can benefit from the Farm Sprouts program's successes and lessons learned. Purposeful experiences around farm- and nature-based education can have impactful, positive outcomes for young children. Whether a program is formally nature- or farm-based, or just interested in building connections to the natural world from their more typical preschool classroom setting, using inquiry-based educational approaches and play experiences that integrate concepts within the natural world can enhance a child's learning. Teachers and administrators can reevaluate their core values and philosophy to prioritize an inquiry-based approach, aim to integrate nature and opportunities to connect with the food system into all aspects of their programs (i.e. indoor space, snack time, schedule), seek out relevant professional development opportunities for program staff, and refer to guidelines and best practices to ensure expectations for high quality are being met, such as by utilizing the Nature-Based Preschool Professional Practice Guidebook (NAAEE, 2019).

Connecting preschool programs with local farms, nature centers, or other outdoor spaces in the local community is an ideal way to engage in this systems, place-based approach to learning. As a land grant university, MSU provided networks of resources that were critical in developing the Farm Sprouts program. In Michigan, the MSU Center for Regional Food Systems collaborates with the National Farm to School Network as partners to support efforts to grow young children's connections to healthy local foods, gardening, food and agricultural educational opportunities. Other teachers can mirror this by reaching out to their local and regional food systems and connecting to national organizations focused on these efforts, including the National Farm to School Network and the NAAEE Natural Start Alliance. With at least one land grant university in every state, other US-based educators can connect with their state's land grant university to access similar resources and supports. These resources may also be particularly relevant in situations like the COVID-19 pandemic, where outdoor spaces and programs may create opportunities for safe engagement with children and families.

These connections do not all need to be rooted in larger, more formal systems, however. These relationships can be authentic and informal, such as finding a local beekeeper when students show an interest in insects to help expand

their knowledge and build learning connections between content covered in the program and "real world" professionals. Something as simple as a contract with a local farm to provide some ongoing education or partnership could enhance classroom learning and provide additional opportunities for nature-based and place-based education. To form a healthy, thriving learning culture which truly centers the children's needs and interests as the primary focus, program teachers and administrators must think beyond the classroom walls, enriching the possibilities for learning through connections and relationships formed among the broader systems.

In reflecting on the Farm Sprouts program during the time of data collection and using the results of the program evaluation, several areas for growth have been identified, including funding, staffing, and inclusivity. The short-term and part-time nature of the Farm Sprouts preschool program may have presented barriers for some families. For instance, parents who required regular, reliable childcare, or families with transportation limitations may not have had equitable access to the Farm Sprouts program. Further, the cost of enrolling in the program may also have presented barriers for some families, though financial aid was made available to those who needed it.

Like many early childhood programs, Farm Sprouts had limited external funding to support the program. Additional funding sources would allow for an expansion of the scope and breadth of the program, including being able to offer a more regular or full-time structure, rather than operating on short "seasons." This additional funding would also increase the accessibility of the program for families who needed more regular or full-time childcare. A more regular program schedule would also allow for more stable staffing conditions, as hiring and retaining highly qualified, dynamic, and motivated staff for seasonal part-time positions proved to be challenging. Additional funding would also expand the planning and preparation time for program staff.

Any outdoor program faces challenges regarding inclusion, especially for individuals with physical disabilities or limitations. Additional funding and time for staff would create more opportunities to offer supports for children and families above and beyond the accommodations currently provided in the Farm Sprouts program. These additional accommodations might include more focused one-on-one interactions, a fenced area dedicated to free play and discovery, and wheelchair-accessible paths.

Addressing issues of diversity, equity, and inclusion is also critical to establishing and maintaining appropriate, equitable, and open early childhood programs and Farm Sprouts has made some efforts to address these concerns. Cultural competency and concepts of diversity, equity, and inclusion were incorporated into policies, procedures, and staff development. The Farm Sprouts program has worked to improve cultural competency by designing training for staff, and using an equity lens when writing, reviewing, and enacting program policies. The program continues to seek opportunities to connect and build relationships with diverse local populations by offering events around topics of interest to local communities.

Conclusion

The results of this program evaluation suggest that intentional farm- and nature-based preschool programs that focus on whole child education can impact children's learning and development in many ways and on several levels. Children's learning, connection to nature, food and the environment, as well as family engagement can all be positively impacted by high-quality nature- and farm-based programs. Investment in developing, enhancing, and sustaining these programs can create high quality educational experiences that impact multiple ecological systems and move beyond direct impacts on children to reaching families and communities.

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International Journal of Early Childhood Environmental Education

ISSN: 2331-0464 (online)

CHILDREN'S BOOKS AND RESOURCES REVIEW

Carla Gull
University of Phoenix, USA
Book and Resource Review Editor

Winter Wonderland Books

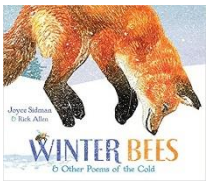
As temperatures drop, educators are wondering about embracing the snow, ice, and cooler temperatures. This collection of books looks at how animals manage the winter, celebrate winter play, and explore the science of snow. As with animals, humans can also prepare for and interact with winter weather, enjoying nature play, investigating snow, and building snow creatures.

Some Suggested Children's Books:

Over and Under the Snow by Kate Messner

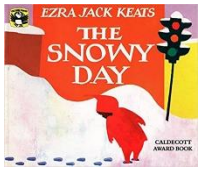
While humans explore the woods via skis above the snow, the reader peeks at what is happening under the snow. From the squirrel eating an acorn, a fox pouncing on an animal under the snow, and a chipmunk sleeping soundly, read about how animals handle the cold blanket of snow. The author's note explains the subnivean zone under the snow.

Winter Bees & Other Poems of the Cold by Joyce Sidman



Enjoy a poetic retelling of life in winter for a tundra swan, snakes, snowflakes, moose, voles, chickadees, and more. Each poem is followed with a paragraph of scientific information about the animal or aspect of winter. A glossary ends the book with words that may need definitions.

The Snowy Day by Ezra Jack Keats

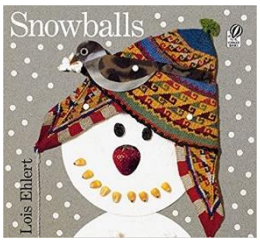


A young boy explores the first snowfall of the year in the city. Bundled up he experiments with dragging his feet in the snow, walking with toes pointed out, playing with a stick, and making a snowman and snow angels. He saves a snowball in his pocket for the next day. He was sad when his pocket was empty yet returned outside for more snow play.

The Story of Snow: The Story of Winter's Wonder by Mark Cassino with Jon Nelson

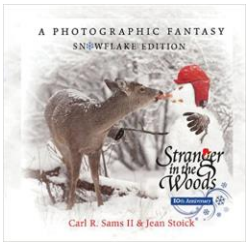
Each page spread has simpler text to tell the story of snow, along with a paragraph to tell the scientific side of snow in more depth. This can be read at a simple or more complex level, with gorgeous photos and illustrations of the variety of snowflakes. Learn how to catch your own snow crystals on the final pages.

Snowballs by Lois Ehlert



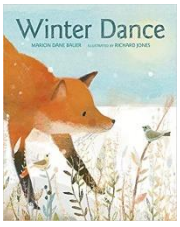
The author tells a story with cut paper and loose parts to show how a family created a group of snow people. Take the inspiration outside and make your own snowballs with character! Move beyond the standard carrot, sticks, scarf, and coal to make a snow family with snow and found items. Animals interact with the snow people which eventually melt. "Good stuff" is illustrated at the end to collect for your own snowballs bag.

Stranger in the Woods by Carl R. Sams II and Jean Stoick



Animals encounter a stranger in the woods. The blue jay, owl, mourning dove, and other animals try to figure out how the stranger arrived, each gaining more confidence as they share how they might get a closer look. Chickadee swoops in and lands on a carrot nose. The deer finds a lost mitten and wonders if more strangers may be around. The "strangers" note the animals ate all the carrots, corn, and seeds and return to leave treats for the animals.

Winter Dance by Marion Dane Bauer



As animals prepare for the snow by gathering nuts, soaring south, and growing fur, fox contemplates what his plan should be. Fox meets a friend who helps celebrate the winter snow. Learn what the turtle, caterpillar, geese, and squirrels do as they hunker down for winter in this sweet story centered on fox.

International Journal of Early Childhood Environmental Education

E-ISSN: 2331-0464 (online)

INTERNATIONAL JOURNAL OF EARLY CHILDHOOD ENVIRONMENTAL EDUCATION (IJECEE)
Addressing Issues, Policies, Practices, and Research That Matter

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