

# International Journal of Early Childhood Environmental Education

Addressing Policy, Practice, and Research That Matters

Yash Bhagwanji, Editor

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## **Being and Becoming in Nature: Defining and Measuring Connection to Nature in Young Children**

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Submitted March 27, 2020; accepted July 2, 2020

### **ABSTRACT**

This paper examines the meaning, assessment, and development of connection to nature (C2N) in two- to five-year-old children. It grows out of a Connection to Nature Workshop organized by the University of Florida, Stanford University, the North American Association for Environmental Education, and the Children and Nature Network to evaluate instruments that measure C2N. Defining and measuring C2N in young children emerged as a current research gap. The workshop was followed by the formation of an Expert Advisory Panel on Early Childhood Nature Connection to address this need. Through semi-structured interviews and narrative responses to a survey, panel participants provided insight on early childhood connection to nature and reviewed existing measures of nature connection for this age group. This paper presents a synthesis of panel ideas. One outcome of the analysis was a detailed description of C2N, highlighting the importance of both quantity and quality of time in nature. Quality time in nature includes opportunities for self-directed exploration, multisensory engagement with nature places, the presence of animals, and the supportive influence of peers and adults. Research implications include recommendations for mixed-method assessment strategies for young children as well as the importance of access to nature for all children.

**Keywords:** biophilia; connectedness to nature; early childhood, measurement

This paper examines the meaning, assessment, and development of connection to nature (C2N) in two- to five-year-old children. Most research that systematically investigates people's connection with nature involves adults or school-age children and adolescents (Restall & Conrad, 2015; Tam, 2013; Zylstra, Knight, Esler & Le Grange, 2014). Early childhood, however, is a formative period when children learn basic patterns of relationship with the world around them and an understanding of the meaning and value of things in the context of their families and societies (Pramling Samuelsson & Kaga, 2008). Therefore, it is important to consider how connection with nature begins to develop in these early years. Nature preschools, nature kindergartens, and the "greening" of early childhood school grounds and curricula are proliferating, and many of these programs identify connecting young children with nature as a core part of their mission (Sobel, 2016). Therefore, there is a need to understand how to identify and assess nature connection in this age group.

The notion of early childhood as an important period for connecting with nature is based on young children's "heightened susceptibility to acquiring understandings and concepts which impact on the individual's life-long attitudes, understandings, and skills" (Wilson, 1996, p. 121). Early childhood is a unique time when children are forming meaningful relationships with their parents, grandparents, caretakers, teachers<sup>1</sup>, siblings, and peers, learning language, constructing a sense of identity, building physical skills, acquiring a sense of agency, and exploring their environment. A rich literature of children's relations with the more-than-human world supports the idea that connecting with nature is important for children's current experience—or *being*—in addition to its contributions to the future adults that they will *become* (Rautio & Jokinen, 2015; Taylor, 2013). Sebba (1991) notes that children "experience the natural environment in a deep and direct manner, not as a background for events, but rather, as a factor and stimulator" (p. 395). Among adults, connecting with nature in childhood is associated with later habits of care for the environment, and children who express greater connection also express greater environmental concern (Chawla, in press). Therefore, we argue for an age-specific conversation on early childhood connection to nature that explores both being and becoming through voices in child psychology, sustainability science, environmental education, and related fields.

Reviews of nature connection across the lifespan indicate that it is a multidimensional construct that includes emotions, behaviors and cognition, but there is no single consensus definition (Beery & Wolf-Watz, 2014). Beery and Wolf-Watz (2014) describe an "environmental connectedness perspective" that includes a broad collection of ideas that describe an affective, cognitive, and physical human relationship with nature by using terms such as affinity, biophilia, commitment, ecological self, identity, inclusion, relatedness, and sensitivity. These ideas emphasize direct experience of nature and physical, emotional, and cognitive outcomes as well as provide a useful starting point for consideration of C2N in early childhood. However, rather than assuming that this perspective derived from research with adults and adolescents directly applies to early childhood, this paper strives to freshly examine characteristics of C2N in two- to five-year-old children.

#### PURPOSE

This paper grows out of a workshop to evaluate approaches for assessing C2N in both children and adults, followed by the formation of an Expert Advisory Panel on Early Childhood Nature Connection with the goal of collectively reviewing existing measures of nature connection for two- to five-year-olds and benefitting from expert insights on the development of nature connection during this period. Several panel members emphasized the importance of building on fundamental research in early childhood development for these years when children are undergoing rapid growth and change in their physical, social, emotional, and cognitive capacities. Within this context, panel members discussed the meaning of C2N for two- to five-year-old children and how it develops. This paper draws on the authors' engagement in workshop discussions, collaboration with the Expert Advisory Panel, and reading of relevant literature to explore the following questions:

1. How is C2N defined when it applies to two- to five-year-old children?
2. How does C2N develop during this period?
3. How is C2N best measured in children this age?

The following section describes the methods followed during the C2N assessment workshop and collaboration with the Expert Advisory Panel. Further sections review the meaning of C2N for two- to five-year-old children, key considerations in young children's being and becoming in relationship with the natural world, and C2N assessment approaches for these ages. In conclusion, this paper discusses key themes that emerged from the Expert Advisory Panel's reflections and suggests implications for future research and practice.

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<sup>1</sup> The term "influential adults" will be used in this paper to refer generally to parents, families, caretakers, and teachers.

## METHODS

### Workshop

In 2018, the Pisces Foundation funded faculty and staff affiliated with the University of Florida, Stanford University, the North American Association for Environmental Education, and the Children and Nature Network to evaluate instruments that measure C2N in children and adults, with the goal of creating an online *Practitioner Guide to Assessing Connection to Nature* (Salazar, Kunkle, & Monroe, 2020). In October 2018, eight members of these organizations joined 14 researchers and educators in a two-day Connection to Nature Workshop in Spokane, Washington to review strengths and weaknesses of existing tools and research approaches, and select measures for inclusion in the guide. Participants considered how different groups may need different tools to appropriately measure C2N, based on age, culture, and program context.

It became apparent that C2N in two- to five-year-old children has received much less attention than nature relationships in later childhood, adolescence and adulthood, when people are capable of responding to long interviews and written questionnaires. For example, in advance of the workshop, participants received summaries and links to 26 papers on C2N and associated assessment tools, as well as three reviews of this literature: only two of the assessment papers involved preschool children, and the literature reviews failed to consider C2N during these early years. For this reason, the first and second authors of this paper, who were participants in the workshop, offered to investigate approaches to the assessment of C2N in this age group and make recommendations for the guide. This paper's third author joined this effort, based on his background in working with young children in nature settings and his interest in research on this topic.

### Identification of Assessment Tools for Two- to Five-Year-Old Children

In preparation for the Connection to Nature Workshop, faculty and research assistants affiliated with the University of Florida conducted a literature search for peer-reviewed articles and book chapters that introduced original C2N assessment tools. The search began with the research library developed by the Children and Nature Network and the Ebsco database. As each article or book was identified, it was used in a citation index search to find additional papers and books introducing new or modified tools. In total, 46 relevant publications were identified, which produced 23 tools that are freely available for reuse. This list was complemented by any paper that explored non-survey forms of assessment, such as games or photography. This process produced two studies that assess C2N in preschool or kindergarten children, by Elliot, Ten Eycke, Chan, and Müller (2014) and Rice and Torquati (2013). During the workshop, this paper's authors suggested the addition of a third study by Giusti, Barthel, and Marcus (2014). After the workshop, a fourth study was published and added (Sobko, Jia, & Brown, 2018).

The authors created individual tables to guide the review of these four studies. Each table summarized the study aims, how C2N was defined as a construct and its different dimensions, the steps followed to create the measure, and the samples used to pilot and apply it. Less detailed summaries of each study are condensed into Table 1 of this paper. As the Table 1 shows, Sobko et al. (2018), Giusti et al. (2014), and Rice and Torquati (2013) created quantitative assessment tools, whereas Elliot et al. (2014) constructed a quantitative tool along with ethnographic documentation of how children relate to nature.

Table 1

*Measurement approaches to assessing connection to nature in two- to five-year-old children*

Article	Construct name and dimensions	Measurement approach	Sample
<b>Elliot et. al. (2014)</b>	Ecological awareness: <ul style="list-style-type: none"> <li>• nature relatedness</li> <li>• environmentally responsible behavior</li> </ul>	1. Child interview via board game: <ul style="list-style-type: none"> <li>• 4 items on nature v. non-nature activity preferences</li> <li>• 6 items on environmental behaviors</li> </ul> 2. Ethnographic observation of children's behavior in nature	43 kindergarten children on Vancouver Island, British Columbia: <ul style="list-style-type: none"> <li>• 21 in nature kindergarten</li> <li>• 22 in conventional kindergarten</li> </ul>
<b>Giusti et. al. (2014)</b>	Affinity with the biosphere: <ul style="list-style-type: none"> <li>• emotional affinity</li> <li>• cognitive affinity</li> <li>• attitudinal affinity</li> </ul>	Child interview via image-based board game: <ul style="list-style-type: none"> <li>• 14 items for emotional affinity</li> <li>• 21 items for cognitive affinity</li> <li>• 6 items for attitudinal affinity</li> </ul>	27 five-year-old children in preschools in Stockholm: <ul style="list-style-type: none"> <li>• 11 children with nature-rich routines</li> <li>• 16 children with nature-deficit routines</li> </ul>
<b>Rice &amp; Torquati (2013)</b>	Biophilia: <ul style="list-style-type: none"> <li>• preference for being outdoors</li> <li>• enjoyment of sensorial aspects of nature</li> <li>• curiosity about nature</li> <li>• interacting with nature</li> </ul>	11-item interview using puppets: <ul style="list-style-type: none"> <li>• one puppet represents the "more biophilic" child</li> <li>• the other puppet represents the "less biophilic" child</li> <li>• the participating child is asked, "which one is more like you?"</li> </ul>	114 children in 10 early childhood programs equally distributed between Nebraska and California: <ul style="list-style-type: none"> <li>• 6 programs had an outdoor play space with natural elements</li> <li>• 4 programs did not have outdoor play space with natural elements</li> </ul>
<b>Sobko et. al. (2018)</b>	Connectedness to Nature Index-Parents as Proxy for Preschool Children: <ul style="list-style-type: none"> <li>• enjoyment of nature</li> <li>• empathy for nature</li> <li>• responsibility toward nature</li> <li>• awareness of nature</li> </ul>	Two studies conducted: <ul style="list-style-type: none"> <li>• Study 1: Piloting and adapting a 20-item index for parents to fill out for their preschool children</li> <li>• Study 2: Large scale evaluation of the new tool and testing its convergent validity</li> </ul>	Two studies conducted: <ul style="list-style-type: none"> <li>• Study 1: Randomly chosen parents of 31 two- to four-year-old children (mean age = 2.16). * Families lived in apartment buildings without front or back yards, as is typical in Hong Kong</li> <li>• Study 2: 299 families with two- to five-year-old children</li> </ul> <p>*ages verified by T. Sobko, personal communication</p>

### **Collaboration with an Expert Advisory Panel**

Nine researchers and practitioners who have studied two- to five-year-old children were invited to join an Expert Advisory Panel on Early Childhood Nature Connection. Panel members agreed to share general reflections about the meaning of C2N in early childhood and its development, evaluate existing assessment tools and approaches, and discuss promising research directions. Together, the panel represented the fields of education, child development, conservation, and sustainability science. Four members were creators of existing C2N assessments for young children, two had designed tools to measure empathy in young children, and two had designed C2N assessments with older children. Two were involved in a nature preschool and two were connected with university lab preschools which included nature settings. Panel members provided an international perspective, as they worked in the United States, Canada, Sweden, and Taiwan. Six had experience with racially and ethnically diverse children, who together came from a mix of professional, working-class and low-income backgrounds, primarily from urban or suburban areas; whereas three worked almost exclusively with children from white middle-class families.<sup>2</sup> (For panel members' names and affiliations, see the Acknowledgments).

Advisory Panel members (hereafter "participants") were sent the full summary tables of measures to assess C2N in young children and associated publications (as identified in Table 1). They received a list of open-ended questions that asked for their evaluation of the strengths and limitations of the four quantitative tools and the ethnographic documentation, as well as their general reflections about C2N in two- to five-year-old children. Specifically, they answered the following questions:

1. For two- to five-year-old children, what ages have you worked with or studied?
2. Based on your experience, how should "nature connection" be defined in early childhood?
3. What pivotal experiences mark the development of nature connection in early childhood?
4. How do children express nature connection at this age?
5. Are indicators of nature connection context dependent?
6. Briefly share your assessment of each of the four studies that measured nature connection in young children.

Six participants chose to return written responses and three responded through phone interviews that were recorded, transcribed, and returned for corrections and revisions. All of the participants agreed to share their responses with each other. Because three of the quantitative tools and the ethnographic documentation were produced by members of the panel, people were critiquing each other's work. For this reason, the collected responses were sent back to participants without names.

### **Analysis of Interview Responses**

The opening interview question about participants' work and research with young children required a simple summary of the information. To identify the topics that participants covered in their responses to questions 2 through 5 about the definition, development, expression, and contexts of C2N in young children, this paper's authors began with a process of descriptive coding (Miles & Huberman, 1994; Saldaña, 2009). Each author began by coding individually. We then created a document that aligned our three coding columns beside the panel responses. From this synthesis, we generated a list of all the codes used, grouped under common topics. In addition to showing considerable overlap in terms of the topics identified, this list revealed a few topics suggested by individual participants. Through correspondence and a Skype conversation, we agreed on common terms for each topic and a final list of topics. For the next step of thematic analysis (Saldaña, 2009), we agreed on how to cluster topics together under common themes. This final list of themes was then arranged in an outline, which structures the presentation of Results below.

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<sup>2</sup> Participants described the diversity of children that they worked with in a separate follow-up email, apart from the survey questions.

The authors also coded participant evaluations of the four assessment tools and ethnographic documentation. Six participants reviewed these approaches separately, whereas one made general comments about the collection as a whole. Due to time constraints, two limited themselves to reflecting about lessons learned during the construction and application of assessment approaches that they created. The final section under Results summarizes these evaluations and presents the contributions that emerged from this process for the *Practitioner Guide to Assessing Connection to Nature* (Salazar et al., 2020).

As we reviewed participants' responses, we highlighted their comments and questions about aspects of early childhood nature connection that remain uncertain or unsettled, and we added questions of our own. These comments and questions inform this paper's concluding discussion. They suggest productive directions for future research to understand C2N in young children.

## RESULTS

This section summarizes key themes from responses to the questions posed to participants, including their review of C2N measurement approaches for two- to five-year-olds. Participants' responses to the initial question about the ages they studied and served showed that they all brought a depth and breadth of professional experience. Most had designed or used C2N assessments with children (or assessments for the related construct of empathy). All nine participants provided details of extensive research, teaching, and parenting experience. Consider the following responses from two participants: "I have worked at a preschool lab school for over 20 years as an administrator and researcher." And, "I have worked with two- to five-year-olds, in our university lab school and as a mother with my own children." The following results share participants' reflections regarding the definition and meaning of C2N in young children, its development, and approaches to assess it.

### The Definition and Meaning of C2N in Two- to Five-Year-Old Children

Participants provided a rich list of key characteristics of C2N in two- to five-year-old children (outlined in Figure 1). The special qualities of this age group was one theme that resonated among participants. Further, C2N was seen as a multidimensional construct that is place-based, associated with child choice, and closely aligned with empathy. One participant, however, expressed caution about the idea of *connecting to nature*, "The term [C2N] itself suggests a separation from nature in a sense. We have to start seeing it through an indigenous worldview...We *are* nature. We are part of the natural world." This observation highlights a paradox in using the term C2N: is disconnection even possible if humans are a part of nature?

**Special qualities of very young children.** At the very foundation of this study is the idea that early childhood is a special time in a child's relationship with nature. One participant captured this idea by referencing related research by Keeler (2008, p. 39):

Children form an up close and personal relationship with the world and they experience the outdoors in a different way than we adults do. While it is true that they are literally closer to the ground than we are, our vantage points differ in deeper and more important ways. Children are tuned in to the magic of life in ways that too many of us have tuned out. They are firmly living in the present moment and can focus on small, intimate places that we adults take for granted.

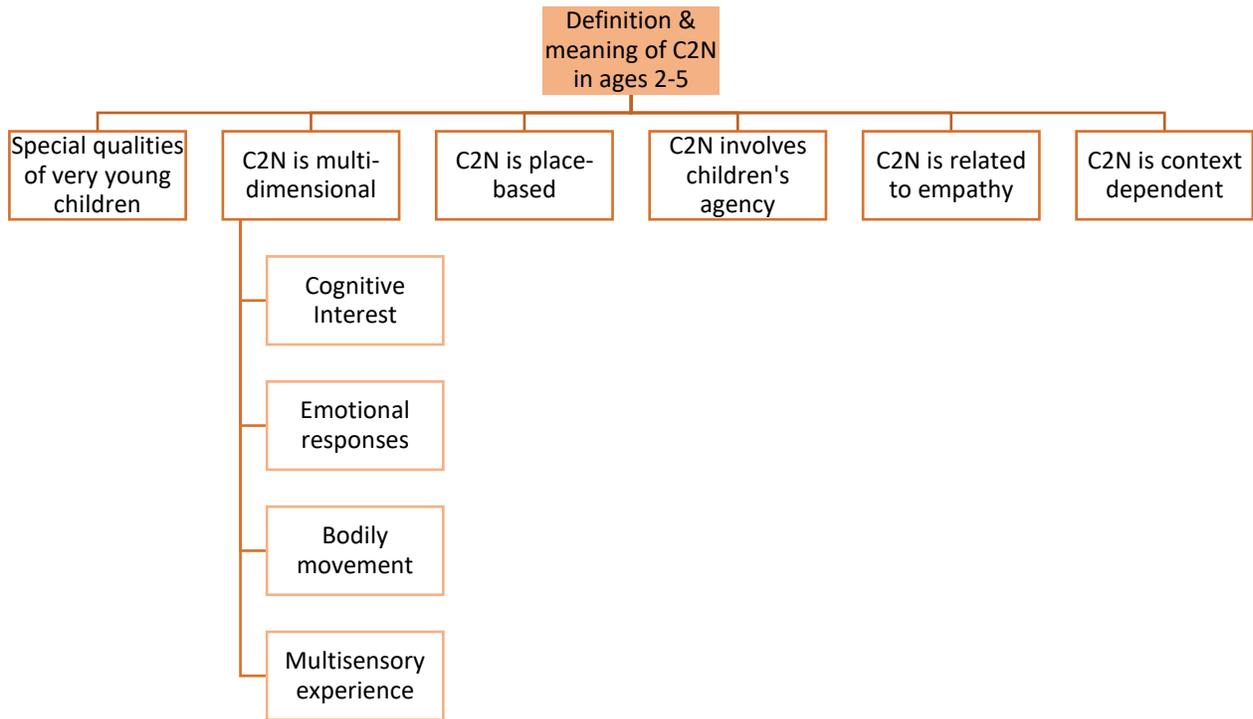


Figure 1: Components of the definition and meaning of C2N in two- to five-year-old children

Another participant captured the feeling that young children may connect to nature in a special way, based on her reflections of interactions with children, such as this shared experience:

I began to see how the children saw things as really alive. Or they would express things in ways that made me look again. One day it was cloudy and then there would be some blue sky. And one child turned to me and said, “The sky is waving at us!” You could say, “Oh, that is perfectly charming,” but in a way it was personal. Or when it was pouring with rain and we were walking down the path, and the rain was uncovering a stone in the path, a big boulder. One of the children said, “Oh, that rock is growing!” They were ways of looking at the world that made me look at the world differently.

This particular participant reflected on whether she, as an adult, has forgotten how to connect with nature in the ways she observes children connecting.

Two- to five-year-old children are in the early phases of a developing self-identity (Harter, 1999). Without a stable sense of “self” versus “other,” they are limited in their ability to process the idea of being “part of nature.” A participant who defined C2N as “the extent to which one sees oneself as a part of nature” suggested that precursors of this understanding may exist in two- to five-year-olds; but she cautioned that we cannot ask young children directly whether they consider themselves part of nature, unlike the way that measures for adults assess C2N. Another participant agreed: “In light of preschoolers having limited understanding about thinking and introspection and often unaware of their ongoing thought activities, and still growing in their ability to sort out and

internalize information and ideas, I am not sure that they could have the cognitive awareness of being or not being part of nature.”

Another participant considered the special way in which we learn about young children: “Kids may not be able to talk about their feelings, but we can observe their behaviors.” For this reason, many participants emphasized the value of observation. Consider these responses from one participant reflecting on parenting, and another reflecting on research methods. “She could not talk too much at that time, but through observation, I could tell her reactions were different in nature and man-made environments.” And, “The role of inductive participatory observations and ethnographic methods is therefore central to understanding how children express nature connection at this age.” Detailed observations can provide clues to special ways that children see and relate with nature.

**C2N is multidimensional.** All nine of the participants identified C2N as an emergent property of relationships between mind, body, culture, and environment. They discussed cognitive, affective, and behavioral dimensions of C2N, with themes that included cognitive interest, emotional responses to nature, bodily movement, contact with animals, and multisensory experience.

**Cognitive interest.** Eight participants described cognitive interest as an expression of C2N in early childhood. They noted children’s curiosity about natural objects, interest in spending time in nature, exploring and investigating natural phenomena, and interest in learning about animals, such as catching bugs and observing them. The focus of their comments was on interest and curiosity, not knowledge. Although curiosity can involve emotions like excitement, one participant cautioned, “Interest needs to be kept separate from enjoyment.” She used the example of children who may show an interest in books about animals while not enjoying actual interactions out in nature.

**Emotional responses.** Seven participants noted affective or emotional dimensions of connectedness to nature. They identified enjoyment of nature, play in nature, displays of excitement, and comfort in natural settings as expressions of emotional bonds with nature. One participant described the state of being emotionally relaxed in nature as another way that young children express C2N. Citing the ethnographic work of Elliot et al. (2014, p. 114) a participant observed that, “Children have the ability to find their way to a love of nature, of being outdoors, of moving their bodies in a generous fashion.”

**Bodily movement.** Six participants included bodily movement as an expression of C2N in young children, in terms of free physical interaction with nature. They noted that feeling comfortable in natural spaces cannot be seen in isolation from bodily sensations, and children pursue their curiosity about nature during active physical exploration. Consider the importance of free movement in this description of a child by one of the participants:

One little boy never, ever, sat still when they would go and sit in their spot. Usually by spring they could stay there for 10 minutes, 15 minutes. But when he was in his spot, he would climb on a log and jump, and climb on a log and jump. He could never sit still. But he could find more salamanders than anybody I ever knew. I don’t know how he found the salamanders. Every day he would come and he would show them to me. One day I thought, I have seen more salamanders in this hour than I probably have seen before. He seemed to have a sense of where to look. And that connection he had. He could connect with salamanders. He knew where to find them.

Another participant observed young children’s desire to be in physical contact with animals: “When we went to the river, kids do not just observe the fish. They want to catch the fish because having something in their hands and observing these moving animals in their hands is more fun.” This same participant described collecting and touching living creatures and plants as “how kids express their connection and love for nature.”

**Multisensory experience.** Five participants highlighted multisensory experiences in their descriptions of C2N. For example, consider this description: A child “exhibits curiosity, experiments with objects, plays with natural loose parts, engages in sensory experiences with plants and animals (sees, hears, touch, smell, pets, etc.)” Relatedly, another participant defined C2N as “kids’ experiences and reactions to any natural element. Natural elements can

be defined as visible (trees, flowers, animals) and invisible elements (sounds, smells, winds)." This definition points directly to a rich multisensory focus.

**C2N is place-based.** Four participants discussed the role of place in shaping C2N. One participant noted that children's nature experiences happen in actual places, places that help us get beyond the abstract conceptualization of "nature." As already stated, one participant quoted Keeler (2009, p. 39) to the effect that young children are "firmly living in the present moment and can focus on small, intimate places that we adults take for granted."

The importance of place is evident in one participant's description of children's explorations and behavior, which included their repeatedly checking on an anthill over the course of an entire year, "They would pass the anthill and think about it—if there weren't any ants out, or why the ants were really busy." This person noted that the same children talked about "my forest," not in a possessive manner, but rather in a way that indicated belonging to the place. Another participant observed that children's responses to nature reflect their level of familiarity and ease in specific places: "I have observed urban preschoolers become frightened of woods on field trips."

**C2N involves children's agency.** Six participants discussed the importance of children's free action and free choice, in the sense of the ability to choose time and activity in nature and nature experiences. One described free action experiences as those "where children pursue their own interests and curiosities, thereby learning their own capacities and boundaries; these experiences are unstructured and child-directed." Another defined C2N as "an affinity for the natural world with freely chosen personal elections to be in a nature-rich environment." It is evident in "child-driven" behaviors such as "gravitating toward natural phenomena," "preference for being in nature," and "requests to access nature spaces."

**C2N is related to empathy.** Four participants discussed empathy in their description of C2N. One person observed young children's concerned response to dead animals in nature as evidence of empathy at work. She did not limit empathy, however, to children's interactions with animals, but also noted that it became part of how children related to one another when they were out in nature. Consider her comment: "When they were outside in the forest, they were a lot less competitive with each other. I have seen that they tried to beat each other as they ran across the school field to the playground but in the forest they helped each other climb the log or get higher in the tree."

A participant who had been measuring both biophilia, or attraction to nature, and empathy in young children proposed that the relationship between empathy and C2N is not yet understood. "Empathy might be a different but highly related construct. I think you could make a cogent argument for empathy giving rise to biophilia or biophilia giving rise to empathy, or having them develop interdependently."

**C2N is context dependent.** When participants were asked whether indicators of nature are context dependent, six of the seven who answered this question said "yes," that measures of C2N need to be sensitive to the context of young children's experience. According to one participant who was emphatic about this point, "The belief that nature connection is a universal and decontextualized indicator is a product of the deductive methodology so far used to construct psychometric measurements." He noted that children's connection with nature "is embodied and so are significant nature situations"; therefore, C2N needs to be contextualized in both culture and space.

Another participant illustrated this point by noting differences in the nature experiences of urban and rural children. For her daughters in rural Asia, nature meant a landscape of paddy fields and mountains, whereas going to urban parks would be the most common form of nature connection in Asian cities, along with storytelling and TV shows about nature. Similarly, another participant observed that C2N is relative "in the realm of familiarity and understanding of the world," giving the example that urban preschoolers might be afraid of woods but comfortable with the nature they find in "dirty, gravelly plant spaces next to a building."

Whether C2N itself is a relative or universal construct is a deeper question. That fact that it is place-based indicates that it must be contextualized, but the key characteristics of C2N that have been discussed in this section appear to apply across cultures. One participant noted that if people define nature objectively through common elements like soil, leaves, water, wood and live animals, then C2N is universal in the sense of feelings for these things; but to the

degree that people define nature subjectively and their behavior varies in different contexts, indicators to measure C2N need to be context dependent.

### The Development of C2N in Two- to Five-Year-Old Children

Participants identified important ways that C2N is nurtured and fostered in two- to five-year-old children. Not surprisingly, qualities that define C2N appear again in people's discussion of experiences that promote its development. This section highlights key themes that contribute to the development of C2N during the ages of two to five. It specifically identifies the following themes: the role of sociocultural influences, positive time in nature, and interaction with animals (see Figure 2).

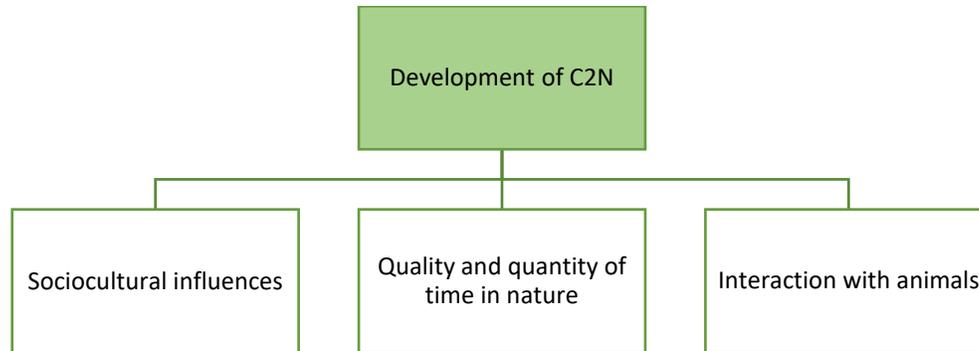


Figure 2: Thematic components of the development of C2N in two- to five-year-old children

**Sociocultural influences.** Six of the nine participants emphasized the sociocultural context of young children's experience of nature. Other people play multiple roles in mediating young children's relations with nature. They act as gatekeepers who control access to nature. They either direct attention to natural phenomena, or suggest that elements of nature are unimportant. They communicate their own emotions and preferences. They either encourage children to value nature as part of their emerging identity, or identify themselves as separate from nature.

Parents are the first gatekeepers to nature experiences. As one participant stated, "Parents' perceptions of nature and preferences regarding outdoor settings matter." Another participant observed that, "Kids cannot go to natural environments by themselves in early childhood; therefore, parents play a very important role to shape kids' connection to nature." A third placed families in larger cultural contexts, noting that the role of culture is evident in "property rights that define access to natural environments, existing codes of conduct in natural areas, or a sense of belonging to a social group that promotes nature-ameliorating rather than nature-degrading actions." It influences everything from "what surrounding mentors and social norms allow children to do in natural areas, to which recipients of empathy, care, and concern are worth paying attention to." Influential adults also communicate their interests and feelings in nature. One participant quoted Chawla and Derr (2012, p. 529) to the effect that others can direct children to either value nature or avoid it: "Children learn what other people around them consider worth noticing and how they appraise it, and they find their own spontaneous interests either encouraged, reprimanded, or ignored."

As young children form a sense of self, their experiences in nature may become part of their identity through social interaction. A participant referred to the expectancy value model of motivation of Eccles and Wigfield (2002) to note that "social interactions within cultural contexts influence not only how children directly experience the world, but also how they integrate the values they are developing into their identity. Thus, parents become an important influencing factor on the extent to which children value nature experiences and identify with nature." While these examples show how sociocultural experiences can support C2N, one participant noted that they can also weaken

C2N over the lifespan: “Children are probably open to things that because of our socialization we are no longer open to.” In some settings, sociocultural influences may conflict or overshadow C2N.

**Quality and quantity of time in nature.** Participants referred to the importance of repeated access to nature experiences, given that “kids’ connection to nature develops over time.” Similarly, another participant highlighted the importance of repetition, noting that children “needed that time of going outside every day to the same spots.” Another participant commented that, “The development of children’s relationships with the environment is influenced not just by frequency of time in nature, but also by qualities of the places they encounter and the social contexts of their experiences.” One person associated quantity and quality with the idea of “authentic elements,” proposing that, “Children with exposure to more authentic elements of nature (soil, leaves, water, wood, live animals) would technically be considered more connected to nature than ones who have less exposure to authentic elements of nature.” Another person suggested that although the link between time in nature and C2N “is not a straightforward nor simple relationship,” when children have little or no contact with nature, it can be seen as a process of socialization by which they come to see themselves as separate from the natural world.

Six people highlighted the role of influential adults in providing opportunities for young children to enjoy *positive* nature experiences. One suggested that, “Parents’ and kids’ common positive natural experiences mark the development of nature connection in early childhood.” Parents communicate pleasure and happiness in nature, for example, by “smiling at a 3 year-old while she is playing in the mud” and sharing wonder. One participant noted that C2N is nurtured by, “Experience in a natural setting that is directed by an enthusiastic nature lover/animal lover; transfer of excitement; being with nature is reinforced as a preferred behavior.” As another participant described, “When parents let kids’ bare feet touch the land and enjoy the feeling with kids, kids will be happy to do that next time.” According to another participant, shared positive experiences are central to the development of C2N. These statements that combine time, place, and sociocultural experiences highlight an over-arching theme from our findings: namely that children’s C2N is a function of a tangle of factors.

**Interaction with animals.** In reviewing ways that young children express C2N, their affiliation with animals has already been described; nevertheless, it is important to underscore how it also relates to the development of C2N. Seven participants believed that experiences with other species are an important condition for fostering C2N. Their examples highlight children’s interactions with a variety of animals, including insects, birds, fish, salamanders, and farm animals. In her role as a parent, one participant commented on how animals figured strongly into her children’s developing C2N. She noted her two daughters’ “interest in observing animals and feeding animals, so they always want us to bring them to a farm because they can feed animals.” She told about her three-year-old’s stopping in front of a cow, very close to it, looking at it for some time, and asking, “Mom, can I stay for a little longer? I like her, she is so pretty.” This incident illustrates the importance of building on young children’s affinity for animals through opportunities for significant interactions. Another participant observed the salience of animals in children’s imaginations, as demonstrated by “fairy tales set in nature and populated by animal characters.” Although participants mentioned interactions with animals most frequently, they also talked about children’s eager engagement with trees, flowers, other plants, water, earth, and rocks.

Participants most often described the contribution of animals to the development of C2N in terms of children’s curiosity, interest, and empathy, but the reality of exploration also included potential mistreatment. As one person observed, “And that didn’t mean that worms didn’t go in pockets and get mistreated at times.” This same participant told a story that showed how empathy for animals sometimes leads children into ethical dilemmas. When a forest kindergarten class was visiting a local stream one day, one child found a dead shrimp floating on the surface.

And they worried about it. So the next day they discussed about that. Should they go in the stream? The shrimp was dead and maybe they killed the shrimp and they shouldn’t go in. You know, a discussion about what the ethics should be. It was very interesting to hear them talk about it, and how maybe they should walk around the edge and maybe they shouldn’t go in. Of course, when they got to the stream, everybody rushed in. But still they had the discussion and had felt concern about that, about what they should do. I thought, “Oh, how like all of us! We know we should do better, but when that water sparkles in front of you, it is too big a temptation.

Although the children could not resist the water, the incident generated ethical awareness and moral reasoning. As the observer noted, "We would all like to have thinking citizens like that."

### **Assessing and Measuring C2N in Two- To Five-Year-Old Children**

In the process of reflecting upon the assessment of C2N in 2 through 5 year olds, research participants encouraged mixed methods, noting strengths and limitations in both qualitative and quantitative approaches (see Figure 3). For quantitative measures, they recommended a playful, game-like format. They also noted the value of gathering information from more than one source, such as teachers and parents in addition to children directly.

**Advantages of mixed methods.** Seven of the nine participants noted that qualitative and quantitative methods complement each other. Four spoke to the importance of beginning with observations and open-ended interviews as a foundation for constructing quantitative measures. The Biophilia Interview created by Rice and Torquati (2013), for example, was derived from many years of watching the authors' own young children and children in a university lab preschool interact with nature. Another participant who led the quantitative side of an assessment realized that when he followed children into their forest classroom, "The few times that I was out with the kids, I really got a better understanding of what was going on.... If you follow them and look at what they do." Another person observed that Sobko et al. (2018) were able to create a C2N index that reflected young children's experiences in the urban core of Hong Kong because they interviewed parents about how children encountered nature in this setting.

**Qualitative methods.** Eight out of nine panel members emphasized the importance of qualitative methods in assessing C2N in young children. They described the value of observations, photography, interviews, focus groups with parents, and informal conversations with children, parents, and teachers. One person stated that these approaches are essential given that "children in early childhood . . . have limiting possibilities to express themselves or focus in rigorous surveying." He pointed out that the observations recorded by Elliot et al. (2014) revealed the social side of C2N, which is missing in psychometric measures. He concluded that, "The role of inductive participatory observations and ethnographic methods is therefore central to understanding how children express nature connection at this age."

Four participants noted that, despite benefits, open-ended qualitative approaches can have limitations. "It is difficult to aggregate this type of data," one participant said, "and there may be issues with reliability." Another person argued that when people want policy makers to invest money in opportunities like forest kindergartens and preschools, "you cannot come just with anecdotes." He continued:

And then you have to have studies where you have a clear operationalization of your construct, with a connection with the behavior that occurs. You need to have inter-rater reliability. You need to have video cameras to record your observations. And then you can come up with numbers and compare them. It is qualitative, but at the same time you have numbers at the end. I think that would be useful but it is very resource intensive. You need a lot of money to do this.

Two other people also recommended translating informal observations into a matrix of observational items that trained evaluators can record and analyze reliably.

The participant who led the ethnographic documentation reported in Elliot et al. (2014) explained the importance of using multiple qualitative methods to understand young children's relations with nature. She found that photographs and video clips complement field notes, showing aspects of children's experience that may get missed during the rapid flow of outdoor activities. Talking with teachers, along with conversations and focus groups with parents, helped her see the children through other eyes, and placed the limited time covered by her observations in the wider context of their lives. When she was outdoors, she sometimes asked children questions to clarify what they were doing or thinking. In this case, "It helped that I developed a relationship with the children. They knew who I was and they would share things with me. That made a big difference."

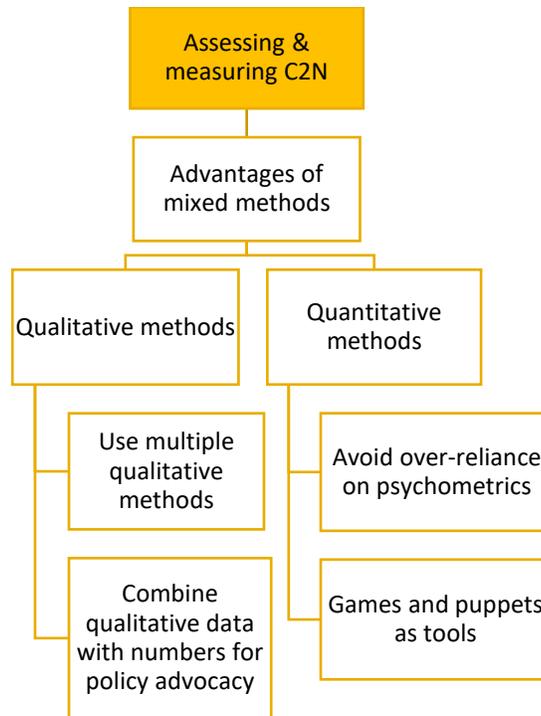


Figure 3: Themes related to assessing and measuring C2N in two- to five-year-old children

**Quantitative methods.** Two participants cautioned that an over-reliance on psychometric measurements can lead to a narrow definition of C2N that fails to represent the fullness of children’s experience. In this case, according to one person, “What researchers believe to constitute children’s connection with nature is what academics have so far assessed in children. This has created a situation in which what *can* be measured becomes what children’s connection to nature *is*.” Relatedly, another participant observed that as she was reviewing the quantitative measures of C2N in two- to five-year-old children, “I am struggling a bit here as it seems we are almost trying to define and operationalize from an assessment (or at least that is what I find myself doing in the review, versus starting with an established nominal definition in the context of young children and seeing if the measurements at hand align and are valid.)” The same participant expressed reservations about forcing young children to choose between preferences for nature versus built settings or manufactured objects. To measure nature relatedness, for example, the board game used by Elliot et al. (2014) asks children whether they prefer to play outside or watch TV inside, or play with dolls and toy trucks or sticks and leaves. She suggested that young children can enjoy play in nature *and* indoors, or play with sticks and leaves *and* a toy truck, yet still feel affinity with nature.

Six participants agreed that games, puppets and pictures are appropriate means to measure C2N in young children. These strategies are engaging and they can present children with simple choices. A participant who used the Biophilia Interview with puppets, for example, found that children enjoyed it and “wanted to ‘play it’ again and again.” Research participants also appreciated the playful approach in the board game used by Elliot et al. (2014) and children’s selection of images in the study by Giusti et al. (2014).

### Contributions to the C2N Guide

A key outcome of our dialogue with Advisory Panel participants was agreement to include two C2N measures for young children in the *Practitioner Guide to Assessing Connection to Nature* (Salazar et al., 2020): the Biophilia Interview created by Rice & Torquati (2013) and the qualitative measures that Elliot et al. (2014) used to document C2N in a forest kindergarten. This selection offered complementary quantitative and qualitative approaches. Several

people were concerned that other measures covered more than C2N. The board game used by Elliot et al. (2014), for example, was designed to assess pro-environmental behaviors as well as nature relatedness; but three participants argued that stewardship behaviors represent a different construct than C2N. Similarly, two participants proposed that empathy and knowledge about human/nature interdependence—which are dimensions of the Giusti et al. (2014) measure of affinity with the biosphere—form distinct constructs. The same issue applied to the index created by Sobko et al. (2018), which includes items related to empathy and responsibility toward nature. Although participants appreciated the way that Sobko and her colleagues carefully adapted their measure to the conditions of Hong Kong’s urban core, some cautioned that parents provide only one limited perspective on young children’s C2N. For the purpose of this project, they wanted to focus on measures used with children.

The Biophilia Interview is based on Wilson’s (1984) biophilia hypothesis, which emphasizes interest, curiosity and desire to engage with nature. The interview playfully involves two gender neutral puppets who express different orientations to nature. With a boy, for example, an evaluator animates one puppet, saying, “This boy likes to splash in puddles”— and then animates the second puppet, saying, “This boy doesn’t like to splash in puddles . . . Which one is more like you?” The child indicates the puppet that is like himself. With a girl, the puppet’s gender changes, and the evaluator says, for example: “This girl likes to dig for worms”/ “This girl doesn’t like to dig for worms.” The final biophilia score is a sum of the child’s responses to 11 statements. Researchers have used it successfully with three- to five-year-old children, from different ethnic backgrounds and countries (Ahmetoglu, 2019; Rice & Torquati, 2013).

As described above, the documentation of nature relatedness (Elliot et al., 2014) uses field notes, photography and videos taken during observations of young children in nature. In addition to recording what children and adults do together outdoors, it captures children’s stories, questions and ideas about nature. Conversations with influential adults provide insights into children’s nature experiences beyond the observation periods. These descriptive records show how a program functions and how children’s relationship with nature develops over time.

## DISCUSSION

This research has attempted to address three key questions about C2N in the context of early childhood study and practice: how is it defined, how does it develop, and how can it be measured? The dialogue about young children’s C2N that we have shared in this paper expanded our understanding by showing that quantity and quality of time in nature matters, *and* many factors condition the quality of children’s time outdoors, including opportunities for self-directed exploration, the places children encounter, the presence of animals, and sociocultural influences of peers and adults. We have also explored the assets young children bring for relating with nature. This is an important discourse to highlight, since people often note the limitations of young minds and bodies.

We have learned that connection to nature in two- to five-year-old children involves freely chosen personal elections to interact with nature. This interaction may take many forms, including bodily movement in nature, the investigation of nature phenomena, place exploration, and free play. During this period of rapid growth and change, young children’s curiosity, interest, and desire to move and explore in nature is coupled with sociocultural learning, given young children’s dependency on adults.

According to the perspectives shared in this paper, early childhood from two to five years deserves a distinct place in the literature on nature connection. In some respects, the experiences described here overlap with definitions and discussions of C2N in research with adults and older children. Reviews of this larger literature by Restall and Conrad (2015), Tam (2013), Zylstra et al. (2014) and Beery and Wolf-Watz (2014) indicate that C2N is multidimensional; and this is also the case for young children. Advisory Panel participants observed emotional, behavioral, and cognitive dimensions of C2N in two- to five-year-olds, but they also noted that young children often express these dimensions in distinctive ways. This section discusses the following characteristics of C2N at this age and their implications for environmental education: young children’s ways of perceiving the world, the importance of interest and self-direction in their encounters with nature, and the body as their pathway for relating with nature. Together, these characteristics indicate the centrality of embodiment and place in young children’s relationships with nature.

## Reflections on C2N in the Early Years and Implications for Environmental Education

**Young children's ways of perceiving the world.** A few Advisory Panel participants observed that young children sometimes see the world in ways that are qualitatively different from adults. They sense the magic of life, and sometimes talk about things like rocks and clouds as alive. While they are beginning to develop their self-identity, they do not draw hard lines between "self" and "other." Two participants suggested that these may be positive capacities, and that when adults are socialized to forget these possibilities, they may lose significant ways of connecting with nature.

These remarks are consistent with a multidisciplinary re-evaluation of "magical thinking," "animism," "anthropomorphism" and inclusion in nature that is currently underway (Harvey, 2013). Magical thinking—or the belief that events can happen that defy conventional causality—includes animism, which endows inanimate elements like stones, clouds, wind and rivers with consciousness and agency (Rosengren & French, 2013). Anthropomorphism attributes human characteristics to non-human things, such as believing that a tree can feel pain (Gebhard, Nevers & Billmann-Mahecha, 2003). In nineteenth century anthropology, these beliefs were associated with primitive colonized cultures in contrast to the scientific rationality of colonizing nations (Rosengren & French, 2013); and in the early 20th century, Piaget (1929) claimed that this is how young children think, gradually giving way to scientific thinking around age 12. Since the beginning of the 21st century, this deficit view of indigenous cultures and early childhood has been challenged on several fronts.

New studies indicate that magical beliefs may peak between ages three to six, but they remain common in older children and adults (Bolton, Dearsley, Madronal-Luque & Baron-Cohen, 2002; Woolley, 1997). Although young children may be more likely to perceive the world in animated ways, they are not unique in this respect. Young children are also more capable than deficit models of development assume. They are actively figuring out the world, which requires experience regarding what is possible and not possible. By age two, young children can distinguish real and pretend events, and during ages three to six, they are more likely to use conventional causal principles to explain events rather than magic (Rosengren & French, 2013).

At the same time, the natural sciences are changing, as new discoveries show interdependence and communication in everything from microbes to trees, earthworms to elephants, ocean currents to weather patterns: inspiring ideas about "vital materialism" (Bennett, 2010), "enchanted animism" (Merewether, 2019) and "enlightened anthropomorphism" (Gebhard et al., 2003). These ideas call for the field of child development to shift from a focus on a solely human world, to seeing children's becoming as a "becoming with" symbiotic communities of species and lively matter like rocks and clouds (Merewether, 2019, p. 237). Rather than rejecting young children's perspectives, educators can value them as ways of entering into relationship with nature, and gradually introduce the language of science to deepen understanding of the interconnectedness of all things (Gebhard et al., 2003).

**The body as a pathway to connection.** This research has highlighted the role of the body in C2N. Children live their lives in nature through sensory experience and bodily movement. As noted by Kontra et al. (2012), "Theories of embodiment provide a structure within which we can investigate the mechanisms underlying action's impact on cognitive changes occurring throughout the lifetime" (p. 731). For example, Beery and Jørgensen (2016) looked at how young children's bodily experiences of nature provide important learning opportunities that support biodiversity understanding. They considered how being in nature provided for direct experiences of biodiversity and connecting with nature. They observed, for example, that "the transformation of sticks, stones, cones, and shells to different purposes were a part of creative processes that have implications for learning" (p. 10). Similarly, participants in this current study used examples that emphasized embodied movement as children's means to connect with nature, such as the participant who noted that "the ability of feeling comfortable in natural spaces cannot be seen in isolation from bodily sensations."

**Interest and self-direction.** The theme of self-direction and child control in connecting with nature ran through our dialogue with Advisory Panel participants. When children freely engage with nature through movement and all their senses, then opportunities for C2N to develop increase. Our results indicate that connectedness is, in part, dependent upon whether or not children have opportunities to explore nature on their own terms, interest driven

and unstructured. This finding is in line with best practices outlined in *Guidelines for Excellence: Early Childhood Environmental Education Programs* (NAAEE, 2010). Guideline 2.3, titled “child-directed and inquiry-based” (p. 21), highlights the importance of opportunities for children to follow their own interests in regard to nature exploration and inquiry.

### **Strengths and Limitations of this Research**

We noted the expertise and experience of our participants. Their willingness to dive into our questions about the meaning, development and measurement of C2N in young children made this paper possible, and their reflections draw on many years of observation, practice and research. Everyone shared an eager interest in understanding C2N in very young children and moving research with this age group forward.

Nonetheless, our Expert Advisory Panel was small in number, limited to people who were doing research on early childhood C2N or empathy for animals, and not representative of the large and diverse field of early childhood educators and researchers. Further, despite our efforts to be consistent in the questions we asked, we allowed participants to respond either in writing or via telephone interviews. These different data collection strategies, combined with our semi-structured approach, may have given participants differing opportunities to elaborate their responses. It was also our hope to nest this dialogue on C2N in early childhood development research. While we have noted some references to the broader field of child development research, this topic deserves a deeper dive than we had space to achieve in this paper. This paper opens a conversation which we hope other early childhood educators and researchers will continue.

### **Directions for Future Research**

**Adapt methods to contexts.** When measuring how young children relate with nature, it is important to understand what nature means within the cultural context of the children we study and ourselves as researchers and educators. For example, Sobko et. al. (2018) adapted the Connection to Nature Index of Cheng & Monroe (2014) to be age-appropriate. However, it did not fit cultural understandings of nature in Hong Kong, and therefore the authors adjusted the scale to fit the parents’ and children’s urban experience. In this way, the measurement of nature is context dependent. Researchers and educators carry the responsibility of ensuring that multiple ways of knowing and connecting with nature are recognized and valued in research and practice. Culturally mismatched scales can not only inaccurately measure a child’s C2N, but also value certain cultural understandings over others.

Just as participants in this study argued that it is important to consider context, they advocated in favor of mixed methods to better capture understanding of C2N. Our results indicate that a combination of qualitative and quantitative approaches can describe special qualities of very young children and specific features of their cultures and the places they encounter, and address complexities of measuring C2N at this age. Our findings are supported by a recent review of early childhood research by Corr, et al. (2020). While their review focused on early childhood special education research, their conclusion that mixed methods may mitigate many of the challenges of working with young children rings true here. Two challenges, for example, are the special qualities of early learners and their limited ability to express themselves verbally.

**Keep different constructs separate.** Moving forward, research will benefit from greater agreement about the characteristics that define C2N in two- to five-year-olds. This paper represents an attempt to create clarity around this construct. Most participants distinguished C2N from general knowledge about nature and responsible behaviors toward nature. Keeping each of these distinct constructs separate will make it possible to explore whether C2N, knowledge, and responsible behaviors are related, and if so, how. Similarly, although connection with nature and empathy for living things in nature appear to be closely related, there is a value in distinguishing them in order to investigate how one may affect the other and how they may develop together.

**Teachers as researchers.** Empowering teachers to be researchers, collaborators, data collectors, and authors on C2N publications is important for successfully garnering a holistic view of young children’s relationship with nature. This idea is evident in one participant’s response: “It was really good to talk with the teachers, because I found they

offered me another perspective on what happened, or they could tell me about what happened the following day.” Also, Guisti et al. (2014) asked teachers to conduct their board game interview, which provided a comfortable situation for the children. As these examples show, teachers are already serving as collaborators and sources of knowledge for both qualitative and quantitative measures of C2N in early childhood.

The practice of practitioners as researchers is firmly established in early childhood research. Elm and Nordqvist (2019), for example, demonstrate how teachers can be incorporated as researchers to investigate sustainable development. Through action research and other methods, scholars should seek partnerships with teachers. Teachers should also be encouraged and trained to conduct their own studies into C2N, using tools such as the biophilia puppet interview and ethnographic documentation described here. Teachers have a rich skill set for collecting observational data, which they are continually sharing in assessments and communication with parents. Many early childhood centers already use the Desired Results Developmental Profile (DRDP) assessment tool to track preschooler’s development on 56 measures, including “sense of place,” “knowledge of the natural world” and “ecology”(California Department of Education, 2013). Partnering with teachers in C2N research may unlock new insights into children’s C2N and enhance our ability to foster it.

### CONCLUSION

In closing, this research suggests two additional points to consider: the contribution of young children to a sustainable future, and the importance of access to nature. One of our participants reflected on the purpose of connecting young children to nature. In her evaluation of the measurement tools, she questioned different perspectives on early childhood education for sustainability:

Could a child like to play with a doll and with sticks? I think yes. . . . I think this also points to a distinction regarding varying perspectives as to what is the contribution of young children to a more sustainable future – is it involvement in environmental behaviors? Some say yes, and I think we see that reflected in the instruments. Others say no – there are other contributions – empathy, compassion, conflict resolution, curiosity . . . and I think then that those views trickle into our thinking about what it means to be connected to nature.

True to the findings of our research, we posit that early childhood environmental education should encourage a combination of these outcomes. A focus on environmental behaviors for a sustainable future emphasizes young children’s *becoming* as they learn adult roles. Experiences like empathy and curiosity in nature—including the full range of experiences described in this paper—are states of *being* that enrich life in the moment, with the capacity to motivate children to continue to seek out nature as they grow. Through early experiences in nature, children may begin to feel part of the natural world before they know how to express this in words. From this beginning comes awareness that, as part of the natural world, they have a responsibility to care for nature and one another.

The importance of embodied encounters with nature in early childhood points to a second consideration: the necessity of ensuring that all children have access to nature. Our participants discussed access in many different ways, from the local level of access to direct physical interaction with animals, for example, to the broad context of property rights and legal access to natural spaces. And beyond proximate access, how do we consider the role of economic access, to enable children to find nature regardless of family income? What about physical access for bodies with differing abilities, and access regardless of whether children live in rural areas, suburbs or cities? Given the dependency of young children, influential adults need to bring nature to the places where they live, learn and play and take them out into nature. We must remember, however, that making nature accessible involves a range of decisions beyond parents’ and teachers’ control. Ultimately, it requires that political, economic and environmental decisions at every level of society make connecting children with nature a high priority.

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## Everyday Learning Opportunities of Young Children With and Without Developmental Disabilities or Delays

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### ABSTRACT

Young children birth to 6-years of age and their families were each studied for 6 months to identify the everyday family and community activities that were sources of informal everyday learning opportunities. The participants included 115 children with identified disabilities or developmental delays and 91 children without disabilities or delays. Including children with and without disabilities or delays permitted an assessment of similarities and differences in patterns of participation in everyday activities. The investigation was conducted at 14 research sites in eight states to insure geographic, economic, racial, and ethnic diversity. This involved in-vivo observations, interviews of the children's parents or other primary caregivers, collection of artifactual evidence, and other sources of information to identify the make-up of each child's everyday learning opportunities. Results showed that both groups of children routinely participated in the same number of everyday family and community activities. The family activities afforded both groups of children the same number of learning opportunities. Children without disabilities or delays were afforded more learning opportunities in community activities compared to children with disabilities or delays. Descriptive analysis of the learning opportunities found that the children participated in a variety of informal environmental learning activities involving nature, animals, insects and bugs, water, plants, natural play structures, and soil (sand, dirt, etc.) in different learning places (forests, meadows, parks, playgrounds, etc.). Implications for practice are described.

**Keywords:** everyday activity settings, informal learning, environmental education, young children, parents, grandparents, siblings

The study described in this paper was conducted as part of a research institute funded by the U.S. Department of Education, Office of Special Education Programs to investigate the use of everyday activities as sources of young children's learning opportunities beyond those used by early intervention and preschool special education practitioners with infants, toddlers, and preschoolers birth to 6-years of age with identified disabilities or documented developmental delays. Case studies of the children and their families were conducted throughout the United States with families differing in race and ethnicity, socioeconomic backgrounds, and place of residence.

As part of the explanation of the institute to early childhood intervention practitioners to recruit children for the case studies, many practitioners often would say that families do not typically engage their children in learning activities in their homes or the community. What we quickly learned, however, was that most of the children's lives were rich in informal everyday learning opportunities, including many informal nature-related learning opportunities. What we observed and what parents described to research staff ran counter to what we were told we would find. To be assured that the types of learning opportunities we identified were similar or different compared to young children without disabilities or delays, we recruited a sample of typically developing children and their families residing in the same geographic areas as the children with disabilities or delays who also were similar in terms of family background characteristics. The results from these comparisons were expected to shed light on both the number of everyday activities and number learning opportunities afforded young children with and

without disabilities or delays and to determine if there was variability in these events and experiences for different subgroups of study participants.

### **Informal Everyday Child Learning**

The everyday lives of most infants, toddlers, and older preschoolers are made up of hundreds of everyday experiences, events, and activities that are sources of naturally occurring and informal, unstructured learning opportunities (e.g., Crinall & Somerville, 2019; Laird, McFarland-Piazza, & Allen, 2014; Wilson, 2018). Informal learning is embedded in meaningful and functional activities, is guided by a child's interests and preferences, involves guided participation by a parent, caregiver, or sibling, has no predetermined goals or expectations for the learner, and does not involve direct teaching or instruction (Callanan, Cervantes, & Loomis, 2011; Rogoff, Callanan, Guitierrez, & Erikson, 2016). In contrast, formal learning is didactic and involves teaching or instruction to promote a learner's acquisition of predetermined knowledge or skills. Findings from research syntheses of both nature and non-nature related activities show that young children benefit from informal, everyday learning opportunities (Dunst, Hamby, Wilkie, & Dunst, 2017; Sawitri, 2017).

Activity setting theorists describe informal (ordinary), everyday activities as sources of learning opportunities and context for early childhood development (Farver, 1999; Maynard, 2005). These types of activities are context-specific experiences, events, and transactions that involve a child's interaction with people, the physical environment, or both. These activities provide a child opportunities to learn about his or her behavior capabilities as well as the behavioral propensities of other people (Bronfenbrenner, 1999). This also includes outdoor activity settings where "children of all ages and abilities play and learn by engaging with and manipulating diverse natural elements, materials, organisms, and habitats" (Moore, 2014, p. 5). This study focused on the everyday learning of young children with and without disabilities or delays to determine similarities and differences in patterns of participation in everyday activities.

Young children experience everyday activities on both a routine and non-routine basis in and around children's homes (e.g., family mealtimes, water play, planting flowers, shared book reading, riding a trike) and in children's neighborhoods and broader-based communities (e.g., visiting friends or relatives, community vegetable garden, petting zoo). Dunst, Hamby, Trivette, Raab, and Bruder (2000), in a national survey of more than 3300 parents of young children residing in 49 of the 50 United States and two Jurisdictions, identified 11 categories of home and family activities and 11 categories of neighborhood and community activities. The home and family activities included things such as food shopping, yard work, and outside play. The neighborhood and community activities included such things as visiting nature centers, parent and child playgroups, neighborhood walks, and attending sporting events.

Dunst et al. (2000) employed an activity setting framework (Billick & Price, 2010; Blewitt, 2006; de Vos, Biggs, & Preiser, 2019; Farver, 1999) where different places and physical locations are considered sources of many different activity settings where any one activity setting is a source of many different learning opportunities. For example, streams, rivers, lakes, or ponds are viewed as sources of multiple activity settings (e.g., a body of water, shoreline, grassy areas, and trees or shrubbery) where different activity settings are viewed as sources of different learning opportunities (e.g., feeding fish or ducks, splashing in the water, digging in the sand, gathering leaves, and making mud pies) (Crinall & Somerville, 2019; Horvath, 2015).

According to Bronfenbrenner (1992, 1993), everyday activity settings, or micro-settings in his terminology, include a developing child, other people, and the objects and materials in both social and nonsocial environments. Bronfenbrenner (1993) noted that "The personal characteristics likely to be most potent in affecting the course...of [child] development...include those [features] that set in motion, sustain, and encourage processes of interaction between a [developing] person and two aspects of the proximal [social and nonsocial] environment: first, the people present in the settings; and second, the physical and symbolic features of the settings that invite, permit, or inhibit engagement in sustained and progressively more complex interactions with an activity in an immediate environment" (p. 11).

Findings from both quantitative and qualitative studies of young children's participation in everyday activity settings illustrate how the social and nonsocial characteristics of these different activities, experiences, and events are rich sources of informal, unstructured child learning opportunities (Crinall & Somerville, 2019; Ernst, 2018; Geerdts, Van de Walle, & LoBue, 2015; McClain & Vandermaas-Peeler, 2016; Schauble, Beane, Coates, Martin, & Sterling, 2013). Informal child learning in the context of everyday activities is defined as those settings where child interactions with people, objects, materials, organisms, and other entities (e.g., animals) provide opportunities to use or acquire behavior or skills to have environmental consequences where those consequences provide opportunities to learn about one's abilities and the response patterns of the social and nonsocial environment.

### **Informal and Formal Child Learning**

Informal, unstructured activities have increasingly been viewed as important sources of learning opportunities for typically developing young children (e.g., Born, 2018; Omidvar, Wright, Beazley, & Seguin, 2019; Schauble et al., 2013; Wilson, 2000). This is less true for young children with identified disabilities and developmental delays and is especially not the case for informal environmental learning activities. Findings from several studies indicate that early intervention and preschool special education practitioners view formal, structured activities as more important sources of learning opportunities compared to informal, unstructured activities (Dunst & Raab, 2004; Raab & Dunst, 2004; Sawyer & Campbell, 2009). Searches of the *Journal of Early Intervention*, *Topics in Early Childhood Special Education*, and *Infants and Young Children*, three publications focusing on young children with identified disabilities and developmental delays, found not a single paper on environmental education of children 6 years of age or younger. This indicates a need for studies of the informal learning opportunities of young children with disabilities or delays to ascertain if these children participate in unstructured learning activities like young children without disabilities or delays.

The same type of search for every issue of the *International Journal of Early Childhood Environmental Education* for studies of young children with disabilities or delays located no investigations specifically focusing on either group of children. Several authors, however, noted the need for studies of the informal learning of young children with disabilities and delays that included learning opportunities involving outdoor nature in different kinds of environments (Dernikos & Bhagwanji, 2018; Ernst, 2018). Dernikos and Bhagwanji (2018) in particular, noted a need for studies of young children with disabilities or delays to identify similarities and differences in the ways these children interact with and learn from nature compared to children without disabilities or delays. Jordon and Chawla (2019), as part of describing a nature-related research agenda, noted the need for an area of research to determine "how does nature exposure impact learning for children with special needs?" (p. 5).

### **PURPOSES OF THE STUDY**

The first purpose was to determine if young children with and without identified disabilities or developmental delays participated in similar or dissimilar numbers of everyday, informal family and community activities. The second purpose was to determine if everyday family and community activities afforded the study participants the same or different numbers of learning opportunities. The third purpose was to use descriptive results to illustrate the types of everyday activities of the children with a focus on informal environmental learning opportunities. Informal environmental learning encompasses activities involving nature, animals, insects and bugs, water, plants, natural play structures, habitats, organisms, and soil (sand, dirt, etc.) in different activity settings (forests, meadows, lakes, rivers, parks, playgrounds, gardens, etc.) (see especially Moore, 2014).

The study is part of a line of research and practice investigating the characteristics and consequences of everyday learning opportunities of young children with and without disabilities and delays with a focus on the importance of informal learning activities of young children with special needs and those at-risk for poor developmental outcomes (e.g., Dunst et al., 2001; Dunst, Hamby, Trivette, Raab, & Bruder, 2002; Dunst, Hamby, & Snyder, 2009; Dunst, Raab, Trivette, & Swanson, 2010; Trivette, Dunst, & Hamby, 2004). The results reported here include descriptions of the types of informal environmental and nature-related learning activities that were identified as part of case studies of the study participants.

## METHOD

### Sampling Procedure

A purposive sampling procedure was used to recruit young children with and without identified disabilities and developmental delays whose families differed in terms of place of residence, race or ethnicity, and focus of investigation (family activities or community activities). Participant recruitment was done by research assistants in 14 sites in Alaska (Ketchikan and Sitka), California (Los Angeles, Sacramento, and San Francisco), Connecticut (Farmington), Hawaii (Oahu), New Mexico (Albuquerque and Grants), New York (New York City), North Carolina (Asheville and Morganton), and Wisconsin (Madison and Milwaukee).

Birth to 3-year-old children with identified disabilities or developmental delays were recruited through Individuals with Disabilities Education Act (IDEA) Infant and Toddler Programs and children between 3 and 6 years of age were recruited through IDEA Preschool Special Education Programs. IDEA is a federal program where state agencies are awarded formula grants who have responsibility for establishing and funding local, community-based programs for young children who meet state eligibility criteria for early intervention or preschool special education. Children without disabilities or delays were recruited through childcare programs, preschool programs, Early Head Start Programs, and Head Start Programs in the same neighborhoods and communities where children with disabilities and delays resided.

Site directors (doctoral-level psychologists or educators) provided research assistants at each of the 14 field sites a child age x race/ethnicity x type of activity matrix (family or community) with specific cells identified for participant recruitment. This was done to ensure that the samples of children with and without disabilities or delays had similar child, parent, and family background characteristics within and between research sites.

### Procedure

A mixed-methods place-based case study research methodology was used to obtain information about the everyday learning opportunities of the study participants (Billick & Price, 2010; de Vos et al., 2019; Yin, 2011, 2014). This involved observations, interviews, and interactions with the children's parents or primary caregivers where the children and families resided (family activities) or visited (community activities) as part of their everyday lives.

A funnel format data collection system was used where different places were coded in terms of the activity settings in each place or location where each activity setting was coded in terms of the different informal child learning opportunities afforded a child in the settings (Baxter & Babbie, 2004). Each child and family was considered an individual case (unit-of-analysis) where the focus of investigation was the social and nonsocial ecology of child learning and development.

Research assistants used a structured data collection protocol to obtain as complete a list of activity settings as possible that were part of each child's (family or community) life and as complete a list of the learning opportunities in each activity setting. The activities were ones that the children experienced as part of either family life or community life as observed during visits or as described by the children's parents or other primary caregivers.

Each family was visited on six occasions over a 5- to 6-month period of time for a total of more than 16 hours per family. The six visits included observations of the children in everyday activities, interviews of the parents or other primary caregivers, coding of artifactual evidence (photographs, physical objects, etc.), and other information to identify the everyday activity settings that "made up" either a child's family life or a child's community life. About half of the families in both groups of children were asked about family activities and half of the families in both groups of children were asked about community activities. Parents and other caregivers were provided no definition or description of what constituted family or community activities since families from different cultural and ethnic backgrounds define the boundaries of these social settings differently (e.g., Bloch, 1989; Göncü, 1999).

As part of visits to the families and after the activity settings and learning opportunities were identified, the children's parents or other primary caregivers were queried to affirm each child's participation in the activities and to confirm the learning opportunities afforded the child while engaged in the activities. The types of activity settings and learning opportunities that were the focus of investigation were informal, unstructured learning experiences (e.g., happening upon a puddle after a rainstorm and getting to play in the water). Formal activities provided as part of IDEA early intervention and IDEA preschool special education for children with disabilities or developmental delays were not included as part of data collection (e.g., instructing a child to complete a puzzle).

Research assistants received extensive training on the use of the data collection protocol prior to visits with the families. The author and two other senior research staff reviewed and coded all of the data collection protocols until there was complete agreement in terms of both the specific activity settings for each child and the specific learning opportunities in each activity.

### Participants

The final sample included 115 children with identified disabilities or developmental delays (57 for family activities and 58 for community activities) and 91 children without disabilities or delays (46 for family activities and 45 for community activities). There was no difference in the proportions of children in the four subgroups of study participants,  $\chi^2 = 0.02$ ,  $df = 1$ ,  $p = .888$ .

Table 1 shows the number of children according to child age, child condition, and focus of investigation (family activities or community activities). There was no difference the proportion of children with disabilities or delays according to age and type of activity,  $\chi^2 = 4.40$ ,  $df = 5$ ,  $p = .197$ , or the proportion of children without disabilities or delays according to age or type of activity,  $\chi^2 = 5.23$ ,  $df = 5$ ,  $p = .233$ . There were also no differences in the proportion of children with and without disabilities or delays for the family activity group,  $\chi^2 = 0.94$ ,  $df = 5$ ,  $p = .967$ , or the community activity group,  $\chi^2 = 9.04$ ,  $df = 5$ ,  $p = .107$ .

Table 1

Number of Study Participants By Child Age, Child Condition and Type of Everyday Activities

Child Age (months)	Children with Disabilities		Children without Disabilities	
	Family Activities	Community Activities	Family Activities	Community Activities
0 to 12	8	4	5	9
12.1 to 24	8	13	9	11
24.1 to 36	13	14	11	5
36.1 to 48	9	10	8	4
48.1 to 60	13	8	9	11
60.1 to 72	6	9	4	5

The distributions of the children according to child condition or diagnosis and parent ethnicity and race are shown in Table 2. The children with identified disabilities had many different etiologies and diagnoses that made them eligible for early intervention or preschool special education. These conditions included motor impairments, language impairments, autism spectrum disorders, vision impairments, hearing impairments, intellectual disabilities, and children with multiple disabilities and impairments. The children with developmental delays without identified disabilities and those at-risk for environmental or medical reasons all met eligibility criteria for either IDEA early intervention or IDEA preschool special education in the States where they resided.

The parents' ethnicity and race were quite diverse as a result of the purposive sampling procedure used to recruit children and their parents. A comparison of the parents' ethnicity or race by type of activity (family or community) found no significant differences in the proportion of parents in the two subgroups of participants,  $\chi^2 = 5.22$ ,  $df = 6$ ,  $p = .157$ .

Table 2

**Selected Characteristics of the Child and Parent Participants**

Child and Parent Characteristics	Number	Percentage
<b>Child Condition/Diagnosis<sup>a</sup></b>		
Typically developing	91	44.2
Identified disabilities (e.g., Down syndrome)	76	36.9
Developmentally at-risk (e.g., Low SES <sup>b</sup> )	19	9.2
Developmental delays	11	5.3
Medically at-risk (e.g., Low birth weight)	9	4.4
<b>Parent Ethnicity/Race</b>		
African American	36	17.5
Asian American	19	9.2
Caucasian/White	49	23.7
Latino or Hispanic	48	23.3
Middle Eastern	9	4.4
Native American/Alaska Native	30	14.6
Native Hawaiian/Pacific Islander	15	7.3

<sup>a</sup>All of the children with disabilities, delays, and those at-risk for poor outcomes were enrolled in IDEA Infant and Toddler Programs or IDEA Preschool Special Education Programs.

<sup>b</sup>Social Economic Status.

**Data Analysis**

Both quantitative and qualitative analyses were undertaken to determine similarities and differences in child participation in everyday family and community activities. Statistical analyses of the case study data were used to determine if the everyday activities and learning opportunities for the children with and without disabilities or delays and for the family and community activities were the same or different. Content analyses of the case study data were used to identify types and patterns of informal, unstructured learning opportunities. Pattern coding was used to conduct the content analyses to establish the links (relationships) between physical locations, activity settings, and learning opportunities. Descriptive findings of the content analyses of the case study data were used to identify types and patterns of informal, unstructured learning opportunities. Pattern coding was used to conduct the content analyses to establish the links (relationships) between physical locations, activity settings, and learning opportunities. Descriptive findings of the content analysis were used to illustrate the types of everyday family and community activities that provided the study participants with informal, unstructured learning opportunities.

The dependent measures for the quantitative analyses were the total number of activity settings per child and the total number of learning opportunities afforded in the activity settings per child. Between subgroup tests were used to compare both children with and without disabilities and family and community activities to determine if child condition or type of activity were related to differences in the number of activity settings and the number of learning opportunities afforded the children.

Between-group *F*-tests were used to make comparisons between the differences in the mean number of activity settings and the differences in the mean number of learning opportunities for both child condition and type of activities. Between-group *F*-tests were also used to make comparisons between the differences in the variability around the mean scores for both dependent measures. The *F*-tests for the equality of two variances are measures of whether the range of scores around the means is the same or different and provides evidence whether the variability in the number of activity settings and learning opportunities are similar or different for the children with and without disabilities or delays and family or community activities.

These statistical tests were supplemented by Cohen's *d* effect sizes for evaluating the differences between child condition and the differences between type of activity comparisons. These metrics were used since it is now generally accepted practice to report effect sizes "For readers to appreciate the magnitude of a study's findings" (American Psychological Association, 2020, p. 89). The estimated effect sizes for the number of activity settings and

the number of learning opportunities were computed as the differences between the average scores for these measures divided by the pooled standard deviation for the average scores (Vacha-Haase & Thompson, 2004). The estimated effect sizes for the differences in the variances around the mean scores were based on the *F*-test statistic for the between variance comparisons. As a general rule of thumb, effect sizes between .20 and .49 are considered small, effect sizes between .50 and .79 are considered medium, and effect sizes greater than .79 are considered large.

The structured data collection protocol was used to develop, for each child, a list of the activity settings and the types of learning opportunities each child experienced in each activity. The results reported in Dunst et al. (2000) were used to categorize the settings and activities into subgroups of family activities (e.g., gardening activities, parenting routines, parent-child play activities) and community activities (e.g., nature activities, children's attractions, family excursions). Comparisons of the activity settings and learning opportunities in the activities for the children with and without disabilities or delays were used to identify and describe the types of informal, everyday learning opportunities that were common for most children, the types of activities that were child-specific, the types of nature-related activities the children experienced, and the factors that were associated with child participation and learning the activities. Photographers accompanied research assistants to each research site on different occasions to document the everyday activities of the study participants. The photographs were used in this study to illustrate the types of informal environmental learning activities that were part of the study participants' everyday lives.

## RESULTS

### Quantitative Findings

**Between Group Comparisons.** Table 3 shows the results for the comparisons between the children with and without identified disabilities and developmental delays for the family activities. There was no statistically significant difference in the mean number of activity settings for the two groups of children or the number of learning opportunities afforded the children in the family activities.

There were between-group differences in the variability of the numbers of family activity settings and the number of learning opportunities experienced by the children with and without disabilities or delays as evidenced by statistically significant *F*-tests and the small sizes of effects. In both analyses, there was more variability in both learning measures for children with disabilities or delays compared to children without disabilities or delays. These results were as expected given the diversity of the children's disabilities and etiologies (see Table 2).

The results for the between-group comparisons for the two community activity measures are also shown in Table 3. There was no significant difference between groups for the mean number of activity settings. There was, however, more variability in the number of activity settings for the children with disabilities or delays compared to the children without disabilities or delays as evidenced by a small size of effect.

There was a significant between-group difference for the number of learning opportunities afforded the children in the community activity settings. Children without disabilities or delays experienced more learning opportunities compared to children with disabilities or delays as evidenced by a statistically significant *F*-test and a medium size of effect. There was, however, similar variability in the range of learning opportunities for the two groups of children.

**Between Type of Activity Comparisons.** The differences between the number of family and community activity settings and the number of learning opportunities within settings for the children with and without disabilities or delays are shown in Table 4. There were both similarities and differences in the pattern of results for both the type of activity and child condition.

There was no statistically significant difference in the mean number of family and community activity settings for children with disabilities or delays. There was a statistically significant difference in the variability of the number of activity settings for these children as evidenced by the *F*-test result and a small size of effect. In contrast, there was

a significant difference in the mean number of family and community activity settings for children without disabilities or delays. These children participated in more community activity settings than in family activity settings.

Table 3

**Number of Activity Settings and Learning Opportunities for the Children with and without Disabilities**

Measures	Child Condition		<i>F</i> -test	<i>p</i> -value	Effect Size
	Children with Disabilities <sup>a</sup>	Children without Disabilities			
<b>Family Activities</b>					
<b>No. of Activity Settings</b>					
Mean	31.05	27.98	1.06	.301	.20
Standard Deviation	17.58	11.12	2.50	.002	.31
<b>No. of Learning Opportunities</b>					
Mean	100.40	102.33	0.06	.801	.05
Standard Deviation	46.22	28.92	2.55	.001	.32
<b>Community Activities</b>					
<b>No. of Activity Settings</b>					
Mean	30.59	32.91	0.92	.338	.19
Standard Deviation	12.98	10.91	1.42	.232	.24
<b>No. of Learning Opportunities</b>					
Mean	70.21	86.49	6.58	.011	.51
Standard Deviation	31.64	32.31	1.04	.873	.19

<sup>a</sup>Includes children with developmental delays and those at-risk for poor developmental outcomes enrolled in either IDEA Infant and Toddler Programs or IDEA Preschool Special Education Programs (see Table 2).

Table 4

**Number of Activity Settings and Learning Opportunities in Everyday Family and Community Activities**

Measures	Sources of Everyday Activities		<i>F</i> -test	<i>p</i> -value	Effect Size
	Family Activities	Community Activities			
<b>Children with Disabilities</b>					
<b>No. of Activity Settings</b>					
Mean	31.05	30.59	0.03	.873	.03
Standard Deviation	17.58	12.98	1.83	.024	.25
<b>No. of Learning Opportunities</b>					
Mean	100.40	70.21	16.76	.000	.76
Standard Deviation	46.22	31.64	2.13	.005	.27
<b>Children without Disabilities</b>					
<b>No. of Activity Settings</b>					
Mean	27.98	32.91	4.56	.036	.45
Standard Deviation	11.12	10.91	1.04	.900	.21
<b>No. of Learning Opportunities</b>					
Mean	102.33	86.49	6.08	.016	.52
Standard Deviation	28.92	32.31	1.25	.459	.23

The children with and without disabilities or delays both experienced more learning opportunities in family activity settings compared to community activity settings as evidenced by statistically significant *F*-tests and medium sizes

of effects. In both analyses, the children with and without disabilities or delays had about 100 learning opportunities in family activities compared to 70 to 86 learning opportunities in the community activities.

There was more variability in the number of learning opportunities experienced by the children with disabilities or delays in the family activities compared to the community activities as evidenced by a statistically significant *F*-test and a small size of effect. There was no difference in the variability in the number of learning opportunities in family and community activities for the children without disabilities or delays.

### **Descriptive Findings**

The family and community activities both included a mix of different routine, commonly experienced everyday experiences. The family activities included such things as meal preparation, family mealtimes, parent-child floor play, parent-child lap games, child bathing and dressing, bedtime stories, household chores, caring for family pets, and family gatherings. The community activities included such things as visiting friends and family, neighborhood walks, water play, visiting playgrounds or parks, attending farm shows, and eating out.

Many of the everyday activities of the children and families were the same or similar but geographic specific. Animals (other than pets) were often part of young children's everyday experiences but the types of activities depended on where the children's families lived. Children whose families lived in urban areas often interacted with animals at petting zoos or community nature centers. Children whose families lived in more rural areas often experienced animals on farms or animal reserves.

Water activities were experienced by nearly all the children but also were geographic specific. Depending on where the children's families lived, the water experiences occurred at oceans, lakes, rivers, community pools, water parks, backyard pools, or other bodies and sources of water. The learning opportunities at these different locations also differed. These included, but were not limited to, feeding fish or ducks, wading or swimming in the water, digging in the sand or along shorelines, and dropping or throwing stones in the water.

Food growing or food gathering activities were part of many of the children's lives. The types of food growing activities included planting and harvesting vegetables, tomatoes, and berries. The learning opportunities afforded the children included such things as mixing soil, watering plants, and picking ripe produce. Food gathering activities included such things as foraging berries, nuts, roots, and mushrooms. Children learned about wild food sources, what is and is not edible, and preparing the gathered food for consumption.

The functions of the same activities also differed for the children and their parents or other primary caregivers. For example, fishing was a recreational activity for some families but was a subsistence activity for other families. The same was the case for children's involvement in gardening activities. For some families, this was a leisure experience (e.g., flower garden) whereas for other families the activity involved growing vegetables and other food for meals.

The everyday family and community activities for most of the children included a variety of informal environmental and nature-related learning experiences and opportunities in addition to routine child, parenting, and family activities. Figure 1 shows selected examples of these types of activities occurring as part of family life. The family activities included such things as planting and tending flower and vegetable gardens, planting backyard shrubs or trees, finding and exploring bugs and insects, playing with a family pet, digging in the family garden, and playing in water. Nearly all of the family activities were informal, unstructured learning experiences that provided the children learning opportunities involving different aspects of nature. For example, the photograph of the young boy and his grandmother in the upper left-hand corner of Figure 1 shows the boy's response to the grandmother modeling digging a hole to plant some flowers by digging a hole himself. The two photographs at the bottom of Figure 1 show a mother of an infant and the mother of a toddler engaging their children in similar types of activities that are age-appropriate for each child.

Figure 2 shows selected examples of different types of activities in the children's broader-based communities. The community activities included such things as nature trail walks, various kinds of water activities, visiting farms,

tending a community garden, wandering through stalks of corn, walking through the woods, picking wildflowers, and visiting petting zoos or horse farms. The two photographs at the bottom of the figure show a toddler being given a piece of bread by his mother to feed ducks at a lake and an older preschool-aged girl feeding fish at a community pond. The little boy is sitting at the edge of the lake where he turns toward his mother to be handed a piece of bread and then turns toward the lake to drop the bread in the water where ducks converge on the foodstuff. Feeding fish at the community pond is a favorite activity for the girl in the adjacent photograph where her mother routinely engages her daughter and son in this community activity.

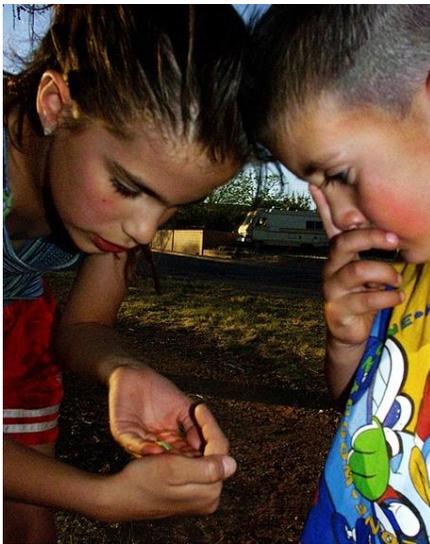
Examination of the photographic evidence of the children's experiences in everyday family and community activities showed that most children participated in a wide range of nature-related activities that provided the children with many different kinds of learning opportunities. These included, but were not limited to, water play (rivers, ponds, lakes, oceans, puddles, etc.); interactions with animals (e.g., feeding pets, ducks, geese, chickens, fish); gardening activities (e.g., watering vegetable, flower, berry, and herb plants); family and child outings (trike rides, wagon rides, biking, etc.); plants (e.g., climbing on trees and logs, picking wildflowers, eating wild berries); digging in dirt, sand, and other types of soil; collecting leaves and stones on neighborhood walks; and picking berries and wildflowers on nature trail walks or walks in the woods. These activities involved parents, older siblings, grandparents, friends, and neighbors as interactive partners where the partners modeled desired behavior, facilitated child engagement in setting-specific activities, and provided the children opportunities to practice existing abilities and acquire new capabilities.

Closer examination of the everyday activities from an activity setting frame of reference indicated the experiences mirrored what Bronfenbrenner (1993) described as the key ingredients of development-enhancing activity settings (developing child, an interactive partner, and the physical settings and materials in the settings) for promoting child competence. Three key characteristics, in particular, emerged as factors influencing child participation and learning in the activities: Child interests, the interestingness of the activities, and the role parents and other caregivers played in promoting child participation in the activities.

**Personal Interests.** Children's personal interests proved especially important as a factor influencing the types of everyday activities the children experienced. Child personal interests included activities children liked to do, enjoyed doing, and preferred to do (Renninger, 1992). Parents of the children in the case studies often used a child's preference or desire to participate in different activities to afford his or her child different kinds of learning opportunities (e.g., taking a child to a community pond to feed fish knowing that this an activity his or her child enjoys; using a child's interest in water to introduce the child to activities at a stream at a local park).

**Interestingness of Everyday Activities.** The interestingness of different types of activities also proved to be a factor influencing child participation in everyday activities. Situational interests include the characteristics of a setting or activity that arouse interest in engaging or participating in an activity (Schraw & Lehman, 2001). Parents in the case studies often engaged their children in everyday activities to elicit situationally interesting responses (e.g., taking a child on a nature trail walk and happening upon a natural play structure that elicited child climbing; getting to pet, feed, and interact with a never before seen animal at a petting zoo). These are just a few examples of how situationally interesting activities were used to engage young children in informal environmental and nature-related activities.

**Interactive Partners.** Parents and other caregivers played important roles as part of providing their young children everyday learning opportunities. This included guided participation (Rogoff, 1993), scaffolding child behavior in everyday activities (Kermani & Brenner, 2009), responsiveness to child engagement in the activities (Chak, 2001), and modeling nature-related behavior and practices (Meltzoff & Williamson, 2008). Nearly all of the family and community activities were contexts for modeling setting-specific behavior and provided opportunities for parents, grandparents, older siblings, and other primary caregivers to describe, explain, and engage young children in conversations about and engagement in the activities. The focus of child-adult and child-sibling activities was



*Figure 1.* Examples of family activities that provided young children everyday environmental learning opportunities.



*Figure 2.* Examples of community activities that provided young children everyday environmental learning opportunities.

engaging young children in age-appropriate interactions with the social and nonsocial environment. For example, the photograph in the upper right hand corner of Figure 2 shows an older sibling modeling behavior for his younger brother.

## DISCUSSION

Two purposes of the study were to determine if the number of activity settings and the everyday, informal learning opportunities afforded young children in the settings differed (a) between children with and without identified disabilities or developmental delays and (b) between study participants who were asked about either family or community activities. Results showed that the everyday social and nonsocial experiences of children with and without disabilities or delays were more similar than different. Results also showed that family activities provided children more learning opportunities than did community activities.

The third purpose was to use the qualitative results to illustrate the kinds of everyday activities of young children with a focus on informal environmental and nature-related learning opportunities. The descriptive findings indicated that children with and without disabilities or delays participated in a wide range of environmental and nature-related activities. The findings also helped identify the child, adult, and setting factors that were associated with child participation in everyday activities. Results were consistent with the factors hypothesized to have development-enhancing characteristics: Children's personal interests, the interestingness of the nonsocial environment, and the behavior of the people interacting with the children in everyday activity settings (Bronfenbrenner, 1992, 1993; Chawla, 2008; Rogoff, Radziszewska, & Masiello, 1995). Chawla (2008), for example, described the same kinds of person and environmental characteristics as the key ingredients of child nature-related learning and highlight the important role adult, adolescent, and older sibling behavior play in promoting young children's participation and learning in nature-related activities.

The results from the study differ from other investigations comparing the participation of young children with and without disabilities and delays in everyday activities in several ways that most likely account for differences in reported results (e.g., Bart, Jarus, Erez, & Rosenberg, 2011; Benjamin, Lucas-Thompson, Little, Davies, & Khetani, 2017; Ehrmann, Aeschleman, & Svanum, 1995; Guichard & Grande, 2018; Soref et al., 2011). In these as well as other studies, results showed that young children with disabilities or delays participated in fewer everyday activities compared to young children without disabilities or delays.

A methodological difference, however, seems to account for the contradictory findings. All of the above-cited studies employed self-report measures of participation that contained *a priori* lists of everyday activities including a mix of informal, unstructured activities and formal, structured activities (Chien, Rodger, Copley, & Skorka, 2014; Lami, Egberts, Ure, & Conroy, 2017; Morris, Kurinczuk, & Fitzpatrick, 2005). The dependent measures were summary scores of ratings of participation in both types of everyday activities. In contrast, the research methodology described in this paper captured the day-in and day-out child and family-specific experiences that made-up the everyday lives of the study participants and how these experiences provided the children development-enhancing learning opportunities (Bronfenbrenner, 1992, 1993).

The fact that the family activities provided children with and without disabilities or delays more learning opportunities compared to the community activities was as expected. This was the case because most young children spend more time in their homes compared to time outdoors (Huston, Wright, Marquis, & Green, 1999; Moya, Bearer, & Etzel, 2004). Moya et al. (2004) compiled data from several studies where the results showed that young children spend, on average, between 19 and 20 hours per day indoors and, on average, between 3 and 5 hours per day outdoors. Findings from the present study nonetheless indicate that when outdoors, young children with and without disabilities or delays, participate in a host of different nature-related activities where those activities provide the children with many different kinds of learning opportunities. The fact that community activities afforded the children fewer learning opportunities is also likely the case because outdoor activities afford children more freedom to explore novel settings compared to indoor activities (see especially Zamani, 2016).

Comparisons of the results from the present study with those from other studies of everyday, informal learning in nature-related activities find that young children in many parts of the world have similar kinds of experiences. These include, but are not limited to, interactions with and learning about animals, plants, soil, water, loose parts, natural structures, and other features of the natural ecology (e.g., Born, 2018; Crinall & Somerville, 2019; Flannigan & Dietze, 2017; Geerds et al., 2015; McClain & Vandermaas-Peeler, 2016; Yidirim & Akamca, 2017). Findings from the present study add to this knowledge base by illustrating that young children with disabilities and delays have much the same kinds of learning opportunities. This was confirmed by the data collection protocol results (Tables 3 and 4), photographic evidence of the children participating in everyday activities (e.g., Figures 1 and 2), and examination of video recordings of the children in the present study.

As noted in the introduction, the present study is part of a line of research and practice on the characteristics and consequences of everyday, informal learning opportunities of young children from birth to age six years. This has included the sources of everyday learning opportunities (Dunst et al., 2000), patterns of child participation in everyday activity settings (Dunst et al., 2002), child learning in everyday activities (Dunst et al., 2001; Trivette et al., 2004), the role of personal and situational interests in promoting child learning (Dunst & Raab, 2012), the use of responsive caregiver interactions to engage children in informal learning opportunities (Swanson, Raab, & Dunst, 2011), and the relative effectiveness of informal and formal child learning opportunities (Dunst, Trivette, Hamby, & Bruder, 2006). Findings from the present study add to this research and practice by identifying the types of informal environmental and nature-related learning opportunities of young children with and without identified disabilities and developmental delays.

Increasing young children's participation in nature-related activities as one type of informal environmental learning can be accomplished by attending to four aspects of that participation: (1) the types of activities available to young children, (2) children's interest in and enjoyment of nature-related experiences, (3) the characteristics of nature-related activities that evoke child engagement, and (4) adult's roles in influencing learning while children are engaged in everyday informal environmental and nature-related activities. While any one of these practices would likely prove effective, the combined use would likely have value-added benefits.

Parents' and early childhood practitioners' knowledge of the different types of nature-related activities that would be appropriate for young children, and especially for children with disabilities or delays, would significantly expand the range and variety of learning opportunities afforded young children. Moore (2014), Wilson (2018), and others (Cooper, 2015; Ernst, 2018; McClain & Vandermaas-Peeler, 2016) provide excellent guidance about multiple aspects of environmental learning for young children. Both the locations of environmental learning and the learning activities in these locations described by these experts include the same kinds of activities identified in the present study as sources of everyday learning opportunities. Moore (2014), for example, describes 24 categories of nature-related activity settings and the types of learning that occur in the settings. Dunst et al. (2010) compiled a list of more than 100 sources of everyday community activities that evolved from the results reported in this paper and elsewhere for providing parents and early childhood intervention practitioners examples of the kinds of learning opportunities that are appropriate for young children. The list of community activities includes many informal environmental and nature-related activities (e.g., nature trail walks, visiting zoos, collecting loose parts, community or backyard garden).

The factors identified as important for explaining child participation in informal everyday activities could help inform what parents and early childhood practitioners can do to provide young children nature-related learning opportunities. For example, many experts (e.g., Ernst, 2018; Horvath, 2015; Moore, 2014; Wilson, 2018) describe the role activity setting affordance plays in encouraging young children to engage in nature-related play and learning. Affordance refers to the characteristics and features of activity settings that invite child engagement and interactions with nature. Developmental psychologists describe this type of affordance as situational interests (Renninger, Hidi, & Krapp, 1992). Situational interests include those aspects of the social and nonsocial environment that attract child attention, curiosity, and engagement with people, objects, and settings in which a child is a participant. Nature trail walks, for example, provide a child many opportunities to "happen upon" natural structures, streams, small animals, and flowers or berries that would likely evoke engagement with the environment.

Personal or individual interests are also factors that influence child engagement with social and nonsocial environments (Renninger, 1992) and were development-instigating characteristics that parents and other caregivers used to engage children in informal everyday activities in the present study. Personal interests include a child's likes, preferences, favorites, and other child characteristics that encourage and sustain child participation in desired and appealing activities. Hidi and Renninger (2006) describe how situational interests become personal interests as a function of interactions with people, objects, and materials in a child's environments that are enjoyable. Research syntheses by Dunst, Jones, Johnson, Raab, and Hamby (2011) and Raab and Dunst (2007) found that interest-based child learning is associated with more positive child outcomes compared to non-interest-based learning opportunities.

A simple but effective way of using both types of interests to engage young children in everyday learning activities is to use an interest checklist to identify the people, materials, objects, etc. that are most likely to engage a child in interactions with social and nonsocial environments. The author and his colleagues have developed several methods for identifying young children's interests and engaging the children in interest-based child learning activities (see e.g., Dunst & Raab, 2013; Dunst, Raab, & Trivette, 2013; Raab, Swanson, Roper, & Dunst, 2006; Swanson, Raab, Roper, & Dunst, 2006). Dunst et al. (2010) include several checklists for identifying child interests in community activities that include many different informal environmental learning and nature-related activities. These checklists include lists of different activities where parents or early childhood practitioners indicate if each activity is something a child likes to do (personal interest) or is something a child might enjoy doing (situational interest). These checklists have proven effective for parents and other caregivers to understand the wide range of learning opportunities available to young children.

One can envision a similar type of checklist that includes only informal environmental learning and nature-related activities where the experiences and events described by Horvath (2015), Moore (2014); Wilson (2018), and others (e.g., Flannigan & Dietze, 2017; Yidirim & Akamca, 2017) are the sources learning activities to promote a child's interactions with the natural ecology. Items (activities) on these types of checklists function as prompts or reminders for a person to appreciate the full range of possible experiences that could be used as learning opportunities for young children. The use of checklists by parents and other primary caregivers often elicits responses like "I never thought about those kinds of activities" or "My daughter would really like to do [activity]". These types of responses provide opportunities to engage in discussions about where and how to engage a child in informal, unstructured learning activities.

The role adults play in engaging children in informal environmental learning and nature-related activities is yet another area that should be considered as part of everyday learning. Chawla (2008), for example, noted the importance of modeling nature-related behavior, adult-guided participation of children in nature-related activities, adult support and encouragement while children are engaged in learning activities, and strategies for providing children multiple kinds of nature-related learning opportunities to become environmentally responsible learners. Adult sensitivity and responsiveness, encouragement, support, and guided participation in child interactions and engagement in everyday activities are especially effective ways of sustaining child participation in everyday activities (see e.g., Chawla, 2008; Wilson, 2018).

## CONCLUSION

Young children with and without disabilities or delays participate in many different everyday activities where the activities provide the children with many different kinds of learning opportunities. Many of the activities and learning opportunities include informal environmental learning and nature-related experiences. Different child, adult, and social and nonsocial environmental factors influence how young children participate in the activities and what is learned as a result of participation. In addition to demonstrating the similarities and differences in patterns of young children's patterns of participation in everyday activities, the findings highlight the factors that ought to be considered as part of engaging young children with and without disabilities or delays in informal environmental learning and nature-related activities.

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***“You don’t wanna teach little kids about climate change”:  
Beliefs and Barriers to Sustainability Education in Early Childhood***

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**ABSTRACT**

To support a sustainable planet, preschools need to engage young children with sustainability education. In the United States of America (USA), nature-based preschool programs are likely to promote environmental science and nature education, given their outdoor curricula, but very little is known about how these programs might also cultivate sustainability education. The purpose of the present study was to investigate nature-based preschool teachers’ craft knowledge (Grimmett & MacKinnon, 1992) about sustainability education within curricula as they presently exist. We interviewed 22 early childhood educators and administrators across nine early childhood nature-based education centers in the Northeastern United States. Following Davis’ (2010) differentiation of education *in*, *about*, and *for* the environment, we found that most participants promoted activities *in* the environment, such as children spending time outdoors in the woods. Educators reasoned that they focused on promoting “in-nature” based activities because they believed that caring for and loving nature were foundational to promoting sustainability practices. Also, the educators promoted simple everyday pro-environmental behaviors, such as reusing containers, as they believed such acts lead to lifelong sustainable behaviors. Ultimately, we found that almost all of the teachers who participated in our study *wanted* to include sustainability education within their pedagogical approaches, and they did so by focusing on “every-day sustainability practices,” but felt they could not engage in more ethically-driven sustainability practices due to curricular and parental barriers.

**Keywords:** early childhood education, sustainability education, environmental education, nature-based preschool

Children need exposure to environmental education programs to develop pro-environmental behaviors (Chawla, Keena, Pevec, & Stanley, 2014; Davis, 2010). Yet, given the current climate crisis, are pro-environmental behaviors enough to help future generations support a sustainable Earth? To date, global climate change has progressed to the point that stabilizing the global temperature would require near-complete elimination of all greenhouse gas emissions (Allen et al., 2018; Matthews & Caldeira, 2008). Affecting such a drastic change in emissions would require a sophisticated approach comprising widespread ethically driven pro-environmental behaviors (Varela-Candamio, Novo-Corti, & Garcia-Alvarez, 2018) combined with sustainable development practices and sustainability education (Council of the European Union, 2010). That is, in times of climate crisis, we need to explicitly educate children in both the ethics and practices of sustainability to promote a sustainable Earth. This dual educational approach is especially pertinent in the United States of America (USA)<sup>1</sup>, where fewer than 50% of adult citizens who believed in

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<sup>1</sup> When referring to the United States of America, throughout the paper, we will use the term USA for both the country, and for things that pertain to the USA, that is, things that are “American,” while avoiding the term, “American” because this could also refer to the entirety of North, Central and/or South America.

global warming identified human activity as its cause (Leiserowitz, Mailbach, & Roser-Renouf, 2010) and government responses to the climate crisis have included environmental deregulations and withdrawal from the Paris Climate Accord (Wallach, 2019).

Currently, educators in the USA target sustainability curricula towards older children (i.e., primary and secondary schools; Lombardi, Sinatra & Nussbaum, 2013) rather than younger children (i.e., preschool-aged). Targeting only older children with sustainability curricula is potentially problematic as research identifies consistent associations between early childhood exposure to nature—a common component of sustainability education—and adult pro-environmental behaviors (Chawla & Derr, 2012; Larson, Green, & Castleberry, 2011; Rosa, Profice, & Collado, 2018). Nature-based preschool programs in the USA are an exception; these programs often embed sustainability education into curricula. In addition to the more traditional subjects of language, literacy, mathematics, and social-emotional development, these nature-based preschool programs often spend a significant part of the day outdoors (Larimore, 2016). However, less is known about how sustainability education is cultivated within these nature-based early childhood programs and the barriers teachers may face when incorporating sustainability into curricula (Somerville & Williams, 2015).

Elliott and Davis (2009; 2018) argue that pro-environmental behaviors stemming from environmental science education, such as recycling or spending time in nature, are foundational if young children are to learn to live sustainably. However, these behaviors alone are not sufficient for children to feel that they have agency to enact positive environmental change, which is a major tenet of sustainability education. In addition to spending time *in* the environment, young children also need exposure to and education about sustainable lifestyle practices that will foster their capacities about actions for the environment.

In the present study, we examined the extent to which early childhood educators incorporated sustainability education within their nature-based preschool curricula. We also examined the educators' perceived barriers to engaging in sustainability education. In order to situate our study within the literature, we first present Davis' (2010) distinctions among education *in*, *about*, and *for* the environment<sup>2</sup>, before highlighting sustainability practices and barriers noted by participating educators. We then turn to our research study.

### **Sustainability Education: *In*, *About*, and *For* the Environment**

The United Nations' Educational, Scientific, and Cultural Organization (UNESCO) Tbilisi Declaration of 1977, states three imperative goals for environmental education. In particular, the third goal: "to create new patterns of behavior of individuals, groups, and society as a whole, *towards* the environment," (UNESCO, 1977) is most pertinent to the present-day climate crisis and education. Also, the "back to the woods" movement (Louv, 2008) in the USA in the early 21<sup>st</sup> century was instrumental in promoting outdoor educational experiences. This movement targeted parents and early childhood educators and can be credited in part with encouraging adults to promote young children's love of nature (Chawla, 2009; Chawla & Derr, 2012) and pro-environmental behaviors, such as recycling (Matsuba & Pratt, 2013). However, the "back to the woods" movement largely failed to address issues of sustainability (Elliott & Davis, 2009). Davis' (2010) definition of sustainability education challenges educators to facilitate children's return to nature, that is, more than just spending time *in* the environment. In particular, Davis (2010) argues that in addition to education *in* the environment (e.g., the "Back to the woods" movement), educators must also consider education *about* and *for* the environment in order to promote long-term sustainable lifestyle practices with children. Education *in* the environment employs the outdoors as a setting and learning resource; education *about* the environment, "helps children appreciate the importance and complexity of the natural world and the interconnections between human and natural systems," (Davis, 2010, p. 30); and, education *for* the environment, "adds the sociopolitical dimension that is missing from the above forms and is concerned with social action for change" (Davis, 2010, p. 31). It is education *about*, and *for* the environment that will train future generations to actively engage with and mitigate

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<sup>2</sup> For clarity and consistency, we are using sustainability education in place of Davis' (2010) term education for the environment.

the anthropogenic effects of the climate crisis. Although sustainability education promotes lifelong benefits, there are also profound barriers to its cultivation.

### **Sustainability Education: *In Nature***

Children's nature experiences can have positive, lifelong effects on their physical and mental health (Chawla, 2009, 2015; Chawla et al., 2014; Gill, 2014) as well as their academic achievement (Cheng & Monroe, 2012; Seltenrich, 2015). For example, daily encounters with nature reduced stress and anxiety (Chawla, et al., 2014) and improved test scores and self-regulation among children (Seltenrich, 2015). The benefits of nature-exposure for children can occur beyond the "wilds" of nature, and include urbanized nature, such as green spaces within cities that have undeveloped land with natural vegetation (Centers for Disease Control, 2013) and urban parks and public open spaces (Twohig-Bennett & Jones, 2018). Thus, we argue that nature-based preschools do not have to be situated "in the wilds" in order to fulfill an integral facet of sustainability education but can also be situated in urban environments.

More critical to the climate crisis however, is that the short-term benefits of nature exposure in childhood extend into adulthood and help promote adult pro-environmental behaviors (Asah, Bengston, Westphal, & Gowan, 2018), identities (Matsuba & Pratt, 2013) and positive health outcomes and life satisfaction (Capaldi, Dopko, & Zelenski, 2014). However, nature exposure by itself is not a 'magic bullet' for ensuring pro-environmental behaviors and proclivities among children and adults. It is not solely exposure to nature, but the frequency of exposure (Asah, Bengston, & Westphal, 2012), agency, and self-selection to exposure (Asah et al., 2018) that promoted positive environmental identities and commitment to pro-environmental behaviors. These details are especially true for school-aged children in environmental and sustainability education programs. In educational settings, teachers' own attitudes towards nature, place, and safety (Padilla-Walker & Nelson, 2012) influenced how children interacted with the environment (Audley, Stein, & Ginsburg, 2020), which may in turn influence which benefits children may gain from nature exposure. Thus, it is essential to consider teachers' personal attitudes towards nature, place, and safety and how these attitudes and beliefs about promoting children's agency influence children's exposure to and participation in educational experiences *in nature*. We argue then, that it is essential to understand teachers' beliefs about and pedagogical practices regarding sustainability education in nature-based preschools.

### **Sustainability Education: Adding the Factors of *About* and *For* Nature**

Sustainability education is a relatively recent addition to early childhood education curricula. In its initial emergence in the USA in the 1990s, early childhood environmental education was focused on sharing an appreciation of and caring for the Earth (Wilson, 1994). Since the recent expansion of preschools, early childhood educators have emphasized implementing higher quality innovative nature and sustainability education. This shift has included both structured and unstructured nature experiences and explicit teaching about sustainability through practices such as reusing classroom materials (Meier & Sisk-Hilton, 2017). In contrast, sustainability education that combines traditional environmental education with "children, teachers, and communities working collectively and democratically towards the resolution of environmental questions, issues, and problems" (Davis, 1998, p. 146), is less prominent. Although Somerville and Williams (2015) identified a growing body of literature in the field of sustainability education, it is not considered an integral part of environmental education as the way it currently functions in the USA. Weldemariam and colleagues (2017) examined concepts associated with sustainability in early childhood curricula across five countries, the USA, Australia, England, Norway, and Sweden, and found that only the USA curricula did not explicitly refer to sustainability education concepts or pedagogical approaches. Instead, the curricula highlighted discrete behaviors and concepts that reflected pro-environmental behaviors, such as reusing and recycling. Thus, the current USA curricula positions the environment as a backdrop for children to act upon: to care for, to save, to experience, rather than to more holistically work towards transformational change *for* the environment. In the USA, preschools are primarily academically focused on pre-literacy and numeracy skills (Tobin, Karasawa, & Hsueh, 2009); this focus has been noted as a barrier to the inclusion of sustainability and pro-environmentalism within curricula. Cultivating love and care for the environment, rather than actively involving children in problem-solving about sustainability challenges might be seen as less time consuming or challenging and therefore, more easily included within any given curriculum.

In some instances, USA early childhood educators may be correct in their assessment about the time commitment and difficulty of teaching about sustainability beyond simple tasks such as reusing materials. For example, Bautista, Moreno-Nunez, Ng and Bull (2018) examined teacher talk about sustainability in Singaporean classrooms and found teachers needed to use sophisticated strategies and dialogic pedagogies, rather than more traditional pedagogies to engage children in sustainability. Although sustainability education may take more time, there is evidence that children are capable of comprehending sustainability education principles (Davis & Elliott, 2014). Moreover, as Kahrman-Öztürk, Olgan, and Guler (2012) importantly note, “if education for sustainability is a lifelong process, then it must begin in the earliest years of life during the most significant developmental period. It must not be left until the child begins formal schooling” (p. 2989). Therefore, we advocate for sustainability education to be a part of early childhood education, rather than simply introduced when children reach traditional school-age.

### **Barriers to Sustainability Education**

Though the benefits of sustainability education are numerous, there are barriers as well. In general, barriers previous research identified included a lack of classroom time and money (Ham & Sewing, 2010), content knowledge coupled with teacher “buy-in” (Simmons, 2011), and parental beliefs about the risks associated with spending time outdoors (Knight, 2013; Michek, Nováková, & Menclová, 2015). For example, in examining the advantages and disadvantages of a forest kindergarten in the Czech Republic, Michek and colleagues (2015) found that parents identified outdoor health and safety risks, such as ticks and Lyme disease or getting lost, whereas, teachers believed that the forest kindergartens were safe and recognized the value of risk-taking. Indeed, in the USA, parental beliefs about the risks of outdoor education programs are mostly unfounded. Frenkel, Tandon, Frumkin and Vander Stoep (2018), in a recent study comparing nature-based preschools and traditional preschools, found no difference in illness or severe injuries by preschool type, suggesting that parent-reported risks of being in nature are indeed just perceptions. Moen, Bakke, Bakke and Fors (2007) found similar results regarding health and injury rates for children who attended forest kindergartens in Norway; while, Mygind, Rønne, Sjøe, Wachmann and Ricks (2003) offered support from Danish studies.

There may, however, be other potential barriers specific to nature-based preschool programs that reflect broader USA cultural assumptions about tenets of sustainability. For example, *for* the environment requires an individual to have agency, individuals should take action to promote environmental change. In early childhood settings, the tenets of *for* the environment would require children to have agency in order to enact environmental change, both at school and in their homes. However, in 1989, the USA did not ratify the United Nations’ Convention on the Right of the Child (UNCRC), which gave children fundamental rights, including recognizing that child agency is universal (Abebe, 2019). The USA did not ratify the convention and is the only country to date that has not done so, in part, because of its societal beliefs that children cannot be “true holders of rights” (Lee, 2010, p. 17). This view of children as dependent is also reinforced in USA early childhood education circles where developmentally appropriate practice (DAP) dominates. DAP includes baseline principles, and guidelines of what constitutes best practice for young children (Brendekamp & Copple, 1997) and makes assumptions about what all children, regardless of background, can and cannot do, including what they are cognitively and emotionally capable of (Lubeck, 1998). Without a USA societal agreement that children have the right to agency and that children’s cognition and emotional capabilities are individual and not universal, early childhood educators may find it challenging to promote certain tenets of sustainability education successfully.

### **Nature-Based Preschools**

We chose to focus on nature-based preschool programs because, unlike other preschool programs, spending time outdoors “in nature” is already a tenet. We assumed that it was likely that if any preschool programs incorporated sustainability education, it would be programs which already included spending time *in* the environment as part of their mission. By definition and for the purposes of this paper, we considered nature-based preschools to be licensed early childhood programs where nature was the central organizing concept, the curriculum was built on both high-quality practices of early childhood education and environmental education, and the natural world was integral to addressing both child development and conservation values (Natural Start Alliance, 2014). As indicated, although

nature-based-preschools incorporate time in nature throughout the school day, USA nature-based preschool curricula also focus heavily on pre-literacy and numeracy skills in preparation for kindergarten (Larimore, 2016; Sobel, 2014). In fact, in a recent USA study comparing nature-based preschools and traditional preschools, Pikus, Skibbe, Konishi, Larimore and Sobel (2019) found comparable growth of children's early literacy skills across both preschool types. This finding suggests that spending time outdoors is only one component of the program and potentially competes with other curricular items, such as kindergarten-readiness. Considering Weldemariam and colleagues (2017) findings about the seemingly anthropocentric nature of sustainability education and the pressure on preschool programs to promote grade-school readiness, it is unclear how nature-based preschool teachers bring concepts of sustainability into their programs despite increased barriers.

### THE PRESENT STUDY

The purpose of this study was to explore how nature-based preschool teachers in a Northeastern region of the USA implemented sustainability education within their everyday pedagogical practices. Early experiences in nature facilitated by adults are important in the development of later environmental activism (Matsuba & Pratt, 2013); and, early childhood education is fundamental to the development of positive ecocultural identities (Audley, Stein, & Ginsburg, 2020). Therefore, we sought to examine nature-based preschool teachers' craft knowledge of sustainability education including perceived barriers, within their nature-based classroom settings. Following Davis' (2010) differentiation of education *in*, *about*, and *for* the environment, we examined nature-based preschool educators (1) craft knowledge of teaching sustainability to young children; and, (2) facilitators and barriers regarding sustainability education with young children.

### METHODOLOGY

How preschool teachers teach sustainability is a question of teachers' craft knowledge. Craft knowledge, as Barth (2001) notes, "is the massive collection of experiences and learnings that those who live and work under the roof of the schoolhouse inevitably accrue during their careers" (p. 56). That is, craft knowledge is not what teachers should do; rather, it is what they actually do in the classroom. We were primarily interested in teachers' craft knowledge about sustainability education content and pedagogy across nature-based preschools, as craft knowledge is location-dependent and develops through repeated experiences.

Teachers' craft knowledge emerges from teacher reflection on pedagogical content knowledge and learner knowledge (Grimmett & MacKinnon, 1992). Therefore, this study was informed by a qualitative, narrative inquiry framework that allowed access to both teachers' experiences and reflections of sustainability pedagogical content and learner knowledge. As such, our data collection method, individual and group semi-structured interviews, aimed at helping teachers make sense of their past experiences, ideas, and lessons about nature-based and sustainability education in order to "restructure the past and the intentions for the future to deal with the exigencies of a present situation" (Connelly & Clandinin, 1990, p. 25). Participating teachers were given the option of sharing lesson plans, but many of the stories that teachers shared were not prefabricated sustainability lesson plans, but spontaneous interactions with young students that addressed issues of sustainability. Participants relaying spontaneous events, rather than traditional lesson plans, was not surprising, as, in the USA, preschool academic time focuses primarily on pre-numeracy and literacy skills (Tobin et al., 2009), rather than sustainability. Where possible, we triangulated the teachers' reports of spontaneous sustainability interactions with classroom observations. However, we did not use observations to determine whether analyses would lead to the same results, but rather to give a comprehensive view of teachers' craft knowledge about sustainability education (Meijer, Verloop, & Beijaard, 2002). We also examined preschool policies and documentation to corroborate teacher discussion of policies and class procedures, such as the importance of time spent outside in all types of weather.

### Participants and Preschools

The participants were 20 preschool teachers (85.7% White; 100% female) and two administrators (100% White, 100% Female) from nine different nature-based preschool programs in the Northeastern USA. All participants had at least a bachelor's degree, and 84% had at least six years of teaching experience. The preschool teachers,

administrators, and their programs mostly reflected the USA national demographics for early childhood education. In line with national demographics (Whitebook, McClean, & Austin, 2016), preschool teachers in this study were predominantly white ( $n = 18$ ) and female ( $n = 20$ ), and preschool programs were predominantly private ( $n = 7$ ). However, participants in this study had higher levels of education (baccalaureate degree,  $n = 9$ ; post-baccalaureate degree  $n = 13$ ) in comparison with the general USA preschool teacher workforce (35% baccalaureate degree). The authors' university Institutional Review Board (IRB) approved this study.

### Procedure

Following IRB approval, we identified nature-based education centers within a 60-mile radius of our target area in the Northeastern USA via internet searches using the keywords "nature education," "nature-based preschools," and "nature-focused preschools." We then examined the schools' on-line presence to determine whether the program was nature-based; that is, whether nature was an organizing principle for the program (Natural Start Alliance, 2014). We identified 23 schools that had early childhood programs (including both stand-alone preschools and elementary schools with early childhood programs) and contacted the administration about potential participation in our study. Seventeen schools responded and provided the names and email addresses of early childhood educators in their programs. Over a three month period during the winter of 2017-2018, we emailed participants and arranged interviews for those who were interested. Before each interview, participants first provided written consent and then engaged in either individual semi-structured interviews (ten interviews) or group interviews (three interviews ranging from 3-5 participants from the same school; Frey & Fontana, 1991). Individual and group interviews were chosen to highlight teachers' personal and shared views and reflections on their craft knowledge surrounding sustainability education within the early childhood setting.

Individual and group interviews occurred at the participants' schools and ranged between 45 and 95 minutes in length. The interviews were audio-recorded and focused on two main questions: (1) What is nature-based preschool teachers' craft knowledge of sustainability education? And, (2) What are the facilitators and barriers to sustainability education with young children? All interviews and focus groups were audiotaped and transcribed verbatim by the first author. In order to increase the validity of our findings, we triangulated (Denzin, 2015) a subsample of participant interviews with classroom observations made by the first author along with documents from all centers about their policies and classroom procedures. Classroom observations were made by the first author on the same day that the interview occurred. Observations were both passive (observing in a corner) and active (helping to facilitate an activity). Following observations, the first author asked teachers clarifying questions about the observed activities. Finally, in order to ensure credibility and participant validity, we invited all participants via email to member-check our themes and categories (Birt, Scott, Cavers, Campbell, & Walter, 2016) by emailing them tables we had compiled to organize codes, categories, and themes of the data during the beginning phases of the analysis process.

### Data Analytic Plan

In order to ensure proper bracketing, both authors corroborated in study design, codebook creation, and interview analyses (Tufford & Newman, 2010). Following Braun & Clarke (2006), we used inductive methods to determine initial codes from participants' interview transcriptions, staying very close to the language that the participants used. After identifying preliminary codes, we organized each initial code into three key analysis areas: education "in," "about," and "for" the environment based on Davis' (2010) differentiation. We coded *in*, *about*, and *for* the environment using the following criteria for codes or quotations. *In* the environment: a code or quotation that focused on or employed the outdoors as a medium for learning, such as a learning setting or a resource. *About* the environment: a code or quotation focusing on or employing commonly accepted notions of science either in general or for a specific purpose, or activities that connected humans and the natural world, for example, lessons on the water cycles or composting. *For* the environment: a code or quotation focused on a concern for social action for change, such as a discussion of existing practices about water use or food waste followed by problem-solving and/or taking action to change behaviors. Once initial codes were grouped into the three areas of analysis—*in*, *about*, and *for* the environment—we further analyzed our initial codes into categories and themes (Saldaña, 2015). To ensure both reliability and validity, both researchers coded themes together, and disagreements were resolved by

consensus. To ensure credibility and participant validity, we emailed each participant individually with the codes, categories, and themes and invited them to comment on our findings (Birt et al., 2016). We revised categories and themes following participants' responses.

## RESULTS AND DISCUSSION

Our analyses focus on two central questions: (1) What is nature-based preschool teachers' craft knowledge of sustainability education? And, (2) What are the facilitators and barriers to sustainability education with young children? As we were interested in teachers' craft knowledge of sustainability content and pedagogy, we organized the findings utilizing Davis' (2010) differentiation among education *in*, *about*, and *for* the environment, focusing first on the cultivation of sustainability practices within early childhood environmental education followed by the barriers to those practices.

### ***In the Environment: Cultivation and Barriers***

*In the environment* was the most frequently represented category (over 75%) for participants' descriptions of how they cultivated sustainability practices. We identified two major themes: *participants' placement of nature* ("wild environment" and "human-made environment"), and *facilitation of love and care for nature through explicit instruction and unstructured nature play*. This category also included two interrelated themes of barriers: *the culture of child-rearing in the USA* and *top down fears*.

**Cultivation.** Participants described lessons and spontaneous activities as occurring in two distinct places: the "wild environment," and the "human-made environment." The wild environment comprised outdoor spaces where humans did not primarily reside, such as the woods, rocks, or trees. For example, teachers commonly discussed the importance of "let[ting] children go as far as they feel comfortable in the woods," (Participant 4, School B). The "human-made environment" referred to adult constructed outdoor spaces made to promote children's interactions with the more-than-human world, such as a garden or water play table. For example, one teacher noted that "just having a garden and having that place to grow food and watch food grow from seed to fork" (Participant 9, School F) was instrumental to their sustainability education practices.

The prevalence of "*in the environment*" coding was not surprising, as a core characteristic of nature-based preschools is that children spend time daily outdoors (Larimore, 2016). However, by highlighting the instrumentality of every day "wilds", such as mud play to expose children to nature, these participants inadvertently challenged the "back to the woods" movement (Louv, 2008), by suggesting that nature exposure can readily occur on a school playground. For our participants, the accessibility of everyday "wilds" was vital for promoting sustainability, as participants reinforced the importance of creating positive emotions *in*, *about*, and *with*, the more than human world (Audley et al., 2020; Dickinson, 2013). That is, for our participants, spending time in nature was equated with learning to love nature. One teacher noted,

You want kids to just go and fall down a hill, or go climb a tree, or get stuck in the mud so that they are having that association and attachment with nature, instead of the fear, which doesn't actually in the long run create environmentally sound practices as an adult. (Participant 4, School B)

Similarly, another teacher stated,

It's definitely our goal to help kids love the earth, and sunshine, and mud... really getting them outside in all of the seasons, and much of the weather, and having them interacting with whatever's out there... One day, all the girls were just covered in mud, head to toe, just filthy, and just how important that was for them to just be having so much fun and interacting. (Participant 12, School H)

Indeed, the theme of *fostering love and care for nature* emerged across all participant interviews. The fostering of a love for nature so that children would learn to care for and become stewards of the environment was an explicit

educational practice. For example, educators included “nature-play” in their explicit curricula so children would develop a love for the environment. Participants surmised that this love would be the place from which students might then want to care for and protect the environment. In the USA, it is not uncommon for environmental education curricula to focus on loving the Earth as a means of caring for, stewarding, protecting, and sustaining it (Weldemariam et al., 2017). One teacher’s story about her students’ encounter with what she called a “magic mushroom” highlighted this premise,

[A]t the end of the path there’s this mushroom on the log that the kids found. It’s huge, it’s like two hands big. So, they found this mushroom in the summer. Of course, it’s magical, it looks like it has a face, and of course we made a big deal out of it saying: ‘this is a magical mushroom, you have to be really careful.’ It was right at the end of the log bridge and so the kids had to go around it in order not to break it. The two times that they came in the summer the magic mushroom was this huge deal. But what was so amazing was that over the winter we had a group of kids come back ... for a couple days, and we didn’t know if the mushroom would still be there, but it was. We were playing out in the swamp, and the mushroom was still there, and some of the same kids who saw it in the summer immediately went into protection mode, and they took turns standing guard over the mushroom while the other kids played around so that it wouldn’t get broken ... They would yell at each other as they were coming down the hill saying, ‘remember the mushroom! Don’t break the mushroom!’... think that’s a perfect example of being there with them when they found it and taking that moment to help them be so in awe of how beautiful it was ... to have an adult there to be like, ‘wait, this is a really special thing, I’ve never seen this before.’ So it’s that idea of grasping those moments and creating a story or a narrative for the kids, and I know that some of those kids will remember that for the rest of their lives. And having had that experience of caring for a thing simply because it was uniquely beautiful in nature is really powerful, and nothing we planned for. (Participant 4, School B)

However, this story also exemplifies how our participants’ formulations of education *in* the environment, especially when the focus is on care, can translate to education *for* the environment with the right framing (Audley & Stein, 2017; Audley et al., 2020) and curricular additions (Chawla, 2009). The mushroom story highlighted how the teacher’s framing of a nature experience as “magical” (a reference to the power of nature rather than fantasy) shaped the children’s reactions to the mushroom, creating a reverence for nature. More so, the children took action to change their behaviors for future interactions with the mushroom, protecting it. With this point, we want to reiterate, however, that though education *in* the environment has its benefits, it alone is not enough to promote pro-environmental inclinations nor sustainable behaviors (Ajaps, McLellan, & Gritter, 2015). Children may continue to protect that magic mushroom, but they may not engage in other sustainable behaviors without explicit education (Chawla & Cushing, 2007).

Preschool teachers also facilitated children’s love for nature through unstructured free play in nature. As one participant told us, “We really foster as much uninterrupted play time outside as we can, in spaces that are intentionally set up, and also what they think of as wild spaces” (Participant 18, School I). Preschool teachers’ re-telling(s) of their unplanned activities highlighted how unstructured outdoor explorations helped children develop empathy with the more than human world. One participant highlighted how unstructured free time provided the space for children to both be agentic and empathetic with the more than human world:

So, lately there are a few five-year-old’s who are really feeling their feelings, and when we go outside, they don’t want to run around, they want to be in nature, climbing the tree, and singing songs. It’s two specific kids and they’ll just sit together in a tree. The other day there was this one kid who was really upset because another kid was splashing him, and he said to me ‘Jamie is trying to kill mother nature, and all we’re trying to do is talk to her,’ and I was like okay, well I’m curious so I walked over, and I told Jamie to ‘quit killing mother nature.’ I was lingering to see how it was going to play out and Bea says, ‘just listen to mother nature,’ and they are crouched over a puddle next to a tree and Camille says ‘is it [mother nature] gonna talk back to us?’ and Bea goes, ‘no, it talks to us in our minds, so you have to really listen.’ (Participant 2, School B)

This story highlights an essential caveat amongst teachers' descriptions about the importance of spending time outdoors. Education *in* the environment is not by itself the catalyst for children's love for the more than human world; it is the children's agentic and social interactions *in* the environment that cultivate this love. The teachers' use of unscheduled outdoor free play provided children with space to develop their own patterns of nature interaction (in this case, "nature-protector").

Research supports our participants' assertions that agentic outdoor free play in childhood may foster pro-environmental identities and behaviors in adulthood (Asah et al., 2012; Asah et al., 2018). However, our participants also described tensions they experienced from parents and the broader cultural community about their approach to free play. Parental concerns about child safety, especially that children are vulnerable and "at risk" (e.g., Valentine, 1997), are present in the USA. Although research suggests that parental risk concerns are disproportionate to actual risk (e.g., Carver, Timperio, & Crawford, 2008) the very existence of risk and its liability corollary was perceived as a barrier to study participants' educational goals.

**Barriers.** Of the two barrier themes, *the general culture of child-rearing in the USA* and *mitigating uncertain risk including parent fears*, the former was the most prevalent. Participants focused on the way that the USA culture in general and family culture, in particular, appeared at odds with the very concept of nature-based education. This cultural mismatch was most present in the participants' descriptions of "in-door kids." This term referred to children who spent the majority of their time at home indoors in front of screens and therefore, did not have the temperament or stamina to spend time outdoors, especially in cold or rainy weather. As one teacher noted, "We battle the indoor problem kids ... they're cold easily, they complain about not being able to walk a certain distance" (Participant 1, School A). Our participants' perceptions of indoor children reflected how USA preschool-aged children are spending their time. The average preschool-aged child spends about three hours a day in front of a screen (Chen & Adler, 2019), and parents of preschool-aged children report using the screen as a "babysitter" (Hesketh, Hinkley, & Campbell, 2012).

Parents also reinforced the concept of "indoor kids" by telling educators that their children did not like to spend time outdoors. One teacher told us that, "[Parents] would say 'so and so doesn't want to spend as much time in the woods as they are'" (Participant 4, School B). It is not necessarily surprising that parents believed that their children did not like to spend time outdoors, as over one-half of USA adults spent five or fewer hours outside in nature weekly (Kellert et al., 2017). In the same study, parents self-reported that their children spent three times as many hours with screens as they did engage in outdoor play. Although the teachers experienced pushback about the amount of time spent outside from both parents and children, they reported that their classes continued to spend time outdoors in all-weather regardless. The teachers reported taking this approach for two reasons. Firstly, the preschool programs were nature-based, and spending time outside was part of the schools' mission. Secondly, contrary to parental communication, teachers reported that children apparently learned to enjoy their time outdoors once they had repeated experiences outdoors. For example, one teacher noted,

[W]e had a child two years ago who came in, and I remember one of the really rainy days, one of the moms was like, 'good luck, you're not gonna get my daughter out, I promise you, she's not gonna go.' I said, 'oh, we'll see.' And now this is a child who runs out the door, she plays with complete abandon. So, she hadn't had that experience before coming here. (Participant 9, School F)

The second barrier, *mitigating uncertain risk*, explained why "in-door kids" existed. Teachers reported parents were unsure about the harm that could occur outdoors; and, because parents were unsure of the risks, the children stayed indoors and did not have the necessary experience or stamina for playing outdoors. Parental uncertainty about the risks (and subsequent parental fears based on perceived risks) of having children spend time outdoors were then "passed on" to the children. Within this theme of *mitigating uncertain risk*, we identified two categories: *managing parental uncertainty*, and *managing fears and concerns that parents passed on to their children*.

In the United States, fear of parental litigation is a common occurrence for schools and teachers, especially with regards to outdoor risk (Tobin et al., 2009). It was no surprise then that all participants spoke about managing risks and balancing programmatic requirements with parental concerns. For example, one participant commented on her fear about parents suing or removing their child from the program because of an accident occurring outdoors. Although not all participants were worried about this, all participants did recognize the need to mitigate parental perceptions of risk. Participants noted that parental concerns did not necessarily reflect reality, but originated in parental uncertainty; that is parents did not have an accurate understanding of the actual risks of spending time outdoors and felt that the outdoors was 'unpredictable.' As a participant told us, "when you have an indoor classroom, you can be checking for safety, you know what to expect, so there's this idea about reasonable risk." Participants acknowledged that many parental concerns were about aspects of outdoor play, such as ticks, where risk was uncertain (e.g., will my child get a tick?), but clearly manageable (e.g., tick checks) therefore, though ticks are a parental concern, they are not a hazard. The key to uncertain, but manageable risks was to focus on parental education. For example, one participant shared,

I think [parents] are very concerned. Ticks are a huge thing in this area. So, again, it comes back to managing risks, and deciding what reasonable risks are, and having education and the time and the resources to learn it. (Participant 4, School B)

Teachers took parents' fears in their stride and considered outdoor risks to be reasonable, and when possible, educated parents and children about why spending time outdoors was important. For example, one teacher said, "I front load [to the parents] that kids are gonna be coming home with ticks, kids are gonna get poison ivy, and I just give a rationale behind why that still, that's just a by-product of the philosophy" (Participant 18, School I).

Teachers reported that they responded to adult concerns because they worried that adult fears transferred to the children, which was our second category. Our participants' perceptions that adults' beliefs and behaviors influenced children's pro-environmental behavior is commonly found in the literature on the subject (e.g., Grønhoj, & Thøgersen, 2009, 2012). Although teachers did not note specific instances where children's fears reflected adult fears, teachers did note that "[C]hildren have less fear, although I think they can be affected by the adults." Teachers responded to perceived children's fears by having children spend more time outdoors and by modeling adult risk-taking behavior that the children could copy and partake in, such as playing in the mud alongside children. This approach is reasonable, as pro-environmental values socialization in schools has shown to influence children's pro-environmental behaviors and consciousness (Olsson, Gericke, & Chang Rundgren, 2016; Pauw, Gericke, Olsson, & Berglund, 2015). In sum, the teachers seemed committed to addressing the barriers to education *in* the environment with both children and with the children's parents through active participation and respectfully challenging families' risk-averse values. Teacher willingness to engage with and push-back against parental fears and cultural values was not reported in barriers *about* and *for* the environment.

#### **About and For the Environment: Cultivation and Barriers**

*About* and *for* the environment were less commonly categorized responses than *in* the environment, with aspects of *for* the environment intertwined with the more commonly reported *about* the environment. We identified two major entwined themes that addressed how teachers cultivated about and for the environment within their already present science curricula: *incorporating developmentally appropriate questions about sustainability lessons* and *focusing on content that reinforced love of the Earth*. This category also included one barrier for *about* the environment—*paucity of curricular time and abundance of content*—and one barrier *for* the environment—*inadequate family engagement and economic resources necessary to promote sustainability practice*.

**About and For the Environment: Cultivation.** Within our study, teachers rarely report teaching stand-alone sustainability lessons; instead, participants embedded the sustainability content within common early childhood science topics, such as the weather or butterfly life cycles. The actual sustainability content the participants chose to present was, in part, based on the developmental appropriateness of the activity and the ease with which an activity or issue could be paired with an already established preschool science lesson. In addition, participants also commonly chose sustainability content that they believed would help children learn to love the Earth.

Almost all participants reported incorporating developmentally appropriate issues, problems, and solutions that encompassed sustainability education. However, what was included within the lesson depended on what the teacher considered developmentally appropriate. For example, when teaching about geography, some teachers talked about land use and occupation of land. A participant whose teaching was founded in social justice and anti-bias education told us about her geography lesson,

We talk about indigenous land and who was on this land before us, and that really allows us to go further and talk about reservations, and how they are the worst land for people. (Participant 7, School D)

This teacher felt that it was appropriate and integral to talk about land rights and the negative impacts of the reservations on Indigenous peoples. However, this same teacher also noted that within the water cycle study they only talk a little about pollution,

This year we're doing a lot of talk about the work of water, so, learning about rivers, and how water makes its way to the earth, and how it lays its path. We'll talk a little bit about polluted water too ... keeping people aware that Flint still doesn't have water. (Participant 7, School D)

Although the teacher's discussion was limited to the allusion that not everyone has clean water to drink, the lesson did incorporate a concern for others and that concern may be planting a seed for future social action for change.

A common retort among participants for not including traditional sustainability lessons, such as addressing the climate crisis, was that certain environmental phenomena and their framing were not considered developmentally appropriate practice. Developmentally appropriate practice (DAP) is one of the required tenets for high-quality preschool programs in the United States (Copple & Bredekamp, 2009). DAP is a framework that is designed to help early childhood educators promote young children's optimal learning and development, by considering children's development and social and cultural context (National Association for the Education of Young Children, 2019). Thus, teaching to DAP means that lessons should not contain ideas or concepts that may be cognitively or emotionally difficult for young children to process. As one teacher explained, the idea about "time" in relation to climate change was cognitively too difficult for her students to understand,

It seems like one of the impediments to teaching about sustainability is true for kids as well as adults. It is so hard to get a sense of time, and most of the things that impact sustainability happen over generations, or at least over seasons. So, I know that's a difficulty, even with just doing school gardening ... I think it's hard for people to get their heads around the speed of change, and our impact on change. I don't think it's a matter of explaining it better, I think it's a matter of kids, and maybe some adults can't get their heads around time. (Participant 6, School C)

For this teacher, the content was not developmentally appropriate, that is, the children could not cognitively understand the concept of time, ideas related to sustainability are not concrete enough for young children to comprehend, and young children cannot comprehend the concept of time even with teacher scaffolding. In particular, the most common reason teachers gave for not talking explicitly about the climate crisis or sustainability issues, including problem solving, was that the issues were labeled by the teachers as too scary or sad for the children to grapple with. For example, one participant shared that they, "don't do the heavy load of the world is crashing and things are falling apart," similarly, another participant commented about the hopelessness of the climate crisis, "It's that balance of finding where young children are capable of understanding without being overwhelmed. A lot of times, so much of it feels overwhelmingly hopeless." However, teachers did not ignore issues of sustainability, rather they focused instead on what they viewed as developmentally appropriate responses - teaching children sustainable behaviors and lifestyle practices. These behaviors included concrete environmental tasks, such as recycling, and turning off lights, composting food scraps, tending compost to use for school gardens, and other conservation behaviors such as reusable snack containers and reducing water use. Teachers noted that they were teaching the children these behaviors for sustainability purposes; however, they rarely revealed those reasons to the children.

For example, in one classroom the children's water play comes from a rain barrel, rather than plumbing. The teacher explained this policy to the children as such:

So, we teach them 'you have water when it rains, and water is a precious commodity.' When they ask, 'I need water for something I'm building,' sometimes we have to say, 'we can't it hasn't rained in a while, we should do a rain dance and hope that it rains.' (Participant 9, School F)

In this example there was no explanation that water is critical for socio-economic development or that not everyone has access to running water, therefore, this teacher does not include "the sociopolitical dimension that is missing [nor is this statement] concerned with social action for change" (Davis, 2010, p. 31). However, teachers did report that the children reminded each other to turn off the lights or use less water—evidence that children were focusing on everyday sustainability issues. In these cases, it seemed that even if children do not understand the sociopolitical factors associated with water conservation or composting, they still learn to do these behaviors and that these behaviors, as Miller, Davis, Boyd, and Danby (2014) note, "make a difference for sustainability within [the children's] everyday experiences" (p. 50). Thus, rather than focusing on global sustainability issues, which may be abstract and hard for children to understand, our participants focused on issues that were concrete and could make a difference to children's everyday lives in terms of sustainable practices. As one teacher described,

When I imagine teaching sustainability, I think of concrete things ... I think it's important to include the design cycle because it's about figuring out how to solve problems. We try to use a problem-solving approach ... It goes ask, imagine, play, create, improve, ask again, and keep going. It's sustainable in itself. (Participant 6, School C)

Similarly, another teacher reported about how she explained the reason why the classroom engages in certain practices,

[W]e really try to give the kids an awareness that they are part of this planet, and we really want them to be aware of the things that they do on a daily basis impact our planet. We do simple things such as rinsing out containers that they've used in the classroom, or, using reusable materials ... We really want kids to be ambassadors of the planet as they get older and understand that even if it's a small thing, it makes a difference. So, by picking up trash that you find outside, by saving your water bottles to recycle instead of throwing them out... we talk a lot about that stuff in the classroom. I feel like the kids in this area [urban, lower socioeconomic status] are not always given that much of an impression about that. (Participant 10, School G)

Here, we see this teacher speaking about many easily accessible forms of pro-environmental behaviors such as using the other side of the paper that has not yet been used for drawing, picking up trash, and recycling plastic water bottles. This teacher was demonstrating to the children that as Chawla and Derr (2012) note, human action is what creates environmental problems and solutions, and it is human action that is the basis for sustainable lifestyle practices.

Although the teachers in the present study focused on the importance of following DAP, providing developmentally appropriate curriculum within early childhood settings is controversial, as some researchers and teachers question whether it supports experiences for all young children equally (for a review see Brown & Lan, 2015). Thus, although the participating teachers used DAP as a guideline to determine what and how to talk about sustainability issues, this does not mean that issues such as climate change or sustainability problems solving should not be included in sustainability education with young children. Indeed, within the present study participants used DAP to highlight a variety of conflicting practices that ranged from addressing socio-political dimensions of climate change to personal behaviors that can help the Earth. What was considered DAP was not based on an external age-based framework, but rather on the participants' own perspectives about the capabilities of young children. The focus on DAP, and its inherent belief that children are dependent, rather than agentic, may also explain why teachers described sustainability practices *in* the environment much more than *for* the environment, as sustainability practices that are *for* the environment focused require a child's agency.

For most participants, sustainability, however, was not a stand-alone lesson, but was combined with more traditional science content such as lessons on the water cycle, geology, and geography, in addition to environmental science-focused lessons such as tree-studies. In these combined lessons, teachers merged *about* and *for* the environment, that is, when learning about the topic they incorporated aspects of problem solving or enacting change. A common embedded sustainability lesson often accompanied the use of school gardens or the study of butterfly life cycles. For example, one teacher described her lesson on pollinator gardens and the reciprocal relationships that pollinating insects have with humans,

With the butterfly gardens, what we're talking about essentially is if we don't protect the earth, these insects will not be around anymore, and these pollinators produce one in every three bites of food that we eat. I feel like, even though that's a really big concept for the kids, the truth is that when we're looking at food groups, and nutrition, and environmental practices—I garden a lot, so I bring a lot of farming into the classroom—it impacts the animals, and the air we breathe. (Participant 10, School G)

Many preschool and kindergarten classrooms study the life cycle of monarch butterflies in the fall; however, this curricular example is different because this teacher specifically utilized the study of butterflies to develop conservation behaviors (Chawla & Derr, 2012). Similarly, another teacher remarked on how she connected the study of monarch butterflies to sustainability,

...in the fall we start off talking about monarchs ... I've tried to really enlarge it so that we are talking about monarchs and milkweed so that we can really understand the relationship. Monarchs depend on these particular plants, and these particular plants depend on being their space. So, we're just trying to be more conscious of making sure the children understand how these species are dependent on these particular foods, and how much habitat, and protecting habitat is important. (Participant 11, School H)

Here, this teacher demonstrated the connection between an insect and a plant, therefore, teaching the relationship among different life forms and the interconnectedness of species. Understanding this relationship, as this teacher noted, could form the basis for children's understanding of other relationships on larger scales later in life and therefore, encourage pro-environmental behaviors (Steg & Vlek, 2009).

In addition, many teachers structured their science lessons to reinforce love and wonder about the natural world, a common practice in USA early childhood education curricula (Weldemariam et al., 2017), and one which the preschool teachers believed would foster sustainability practices in the future. In nature-based centers with access to the woods, a common lesson was a tree-study. As one teacher explained,

We start off our school year studying the forest, and we go to a few local forests. It's been evolving, but really just our main objective is to instill this sense of wonder about nature, and to see earth at its most raw in this local area. We have our own classroom tree that we visit and see changes and see how it sustains natural life. (Participant 11, School H)

Here, the educators touched on environmental themes that they believed connected to their general curriculum and program goals and again, focused on practices that were developmentally appropriate.

In sum, preschool teachers reported teaching children everyday sustainability through conservation and sustainable behaviors, and positive reinforcement of the interconnectedness of living organisms. Teachers did not, however, approach sustainability from a crisis perspective, citing the importance of following developmentally appropriate practice (DAP). Thus, these teachers reported that through their lessons *about* the environment they were able to connect to actions *for* the environment, a form of early childhood sustainability education. However, as much as the preschool educators included in our study did to endorse lessons and practices surrounding environmental and sustainability education, they also faced many barriers to their practices.

**About and For: Barriers.** We identified one barrier for *about* the environment—*paucity of curricular time and abundance of content*, and one barrier for the environment—*inadequate family engagement and economic resources necessary to promote sustainability practice*. For the barrier, participants described how they lacked time in the school day and when combined with pressure to teach academic content, it was difficult to engage children in sustainability education every day. For example, some teachers highlighted the length of the preschool programs, where many of the participants taught in half-day programs with larger numbers of students, “we work in schools where we have large numbers and we only see them for an hour sometimes”. Other participants felt they had to cover too many “other things,” in the school day including standard academic content, such as pre-numeracy and literacy, and socio emotional learning, and thus, sustainability education was often only a few times a week. As one teacher complained,

We have a lot of things in line that we have to talk about, and this [sustainability education] is just one of them. It doesn't mean that we won't always do things about the environment with the kids, but we don't every day because there are so many other things that we're teaching. We're busy. (Participant 14, School D)

That there is not enough time and too much content to cover was a common complaint of USA preschool teachers across the USA (Tobin et al., 2009). This complaint of time and content was further confounded by the participants' perceptions that students were not able to sustain expected attentional levels, and thus, how content was covered, and the amount of time spent on content was negatively impacted. One teacher outlined how this impacted her thinking about environmental science lessons,

And then top it off with the attraction of fast-clip programs that the children are watching on television. The children's focus times have decreased a lot. Many years ago, I would bring crickets in and kids would look at them, talk about them, think about them, draw them, for maybe 15 minutes. And now, you're lucky if you can even get one minute of some children that are just so used to faster moving things. (Participant 1, School A)

In the USA, preschool teachers feel pressured by the “pushdown” of academic curriculum, which includes both more complex and faster moving content (Tobin et al., 2009). Broadly speaking, preschool teachers feel the tensions between the importance of play-based pedagogy and academic readiness for kindergarten (Sisson & Kroeger, 2017), which teachers within this study echoed.

The second barrier that limited teachers' ability to promote sustainability practices within their classrooms focused on burdening families with the economic resources necessary to promote sustainability practices. In particular, teachers highlighted their struggle with including zero waste or “waste-in and waste out” lunches as a classroom or school-wide practice. Zero-waste lunches and “waste-in and waste” out lunches connected with and encouraged sustainability practices within the home and allowed parents, children, and teachers to quite literally see the amount of waste generated (Lewis & Pearson, 2010). However, not all families in the respective programs that we examined had the time and or economic resources to use reusable containers or not include pre-packaged foods. In some cases, teachers were worried that by labeling waste as “bad”, children would start policing each other's lunch waste, which children had no control over. Hence, some teachers decided not to point out lunch waste, even though identifying amounts of lunch waste is a pedagogical outcome for sustainability instruction (Stone, 2007). As one teacher noted,

There are kids who bring in all reusable lunch stuff, and there are kids who bring in all packaged stuff. At this age they don't tend to point out those differences, that I've noticed. It's just, they're so into what they're own stuff is, they don't think about it. I mean, if it was explicitly taught, ‘oh, plastic baggies are bad,’ then they would definitely start policing each other. (Participant 3, School B)

Another teacher thought that expecting students to participate in sustainable lunch practices was unfair if parents were expected to shoulder the economic burden.

I don't ask for [no waste lunches]. I don't think it's fair. In my own lunch, or my kids' lunches, sometimes we have packaging, because it's what they like or it's fast and easy... When I look at my students' lunches, the students whose families are all working, or don't have a lot of money, are all packaging. I could either send the trash back home, and I know the parent who's sending all that packaging doesn't have time to clean that out, and it feels really rude I think, or I could ask them to provide a reusable container, but then I am asking them to do extra wash, and buy a container. (Participant 7, School D)

Other teachers told us about their struggle with enforcing their schools' zero-waste lunch or "pack-in, pack out" lunch rules. These rules were created explicitly to encourage parents to use reusable containers and to help families identify the amount of trash and food waste they were generating. However, teachers who endorsed zero waste or "pack-in, pack out" lunch rules also recognized that these rules were not always accessible to their students' families. Re-using and not buying pre-packaged foods required parents to have the disposable income to buy lunch containers and the time to clean them, which was not an assumption that any of the teachers in our study were willing to make. For example, a participant noted,

Here we aim to have zero waste lunches, but then we have families who send packaged food ... And, I know that it is sometimes cheaper and easier to have the packaging because those are the things that are on sale, or they're higher in calories a lot of the time, while we also have kids who have fifty-dollar lunch boxes, and not everyone can afford that. (Participant 7, School D)

The economic burden of sustainability practices in preschools often fell to parents, and the teachers overwhelmingly felt that they could not or should not ask parents to shoulder that burden. In some cases, zero-waste or sustainable lunch programs became an ideal, rather than an actual practice. As one administrator noted about her school's failed attempt,

It was a feeble attempt, but we tried to get students to take their lunch trash home. Pack in, pack out was the idea. The idea was that you will be more likely to put things in reusable containers if you have to pack it back in and take it home. Kids did not want to put half eaten sandwiches back in their lunch boxes. It was too messy and too gross. Or, a yogurt cup that had yogurt still in it, they really didn't feel like they had the time or space to take care of their dishes properly. So, they would either throw things in the trash can anyway, or be really mad about it. So, that was a school wide attempt that didn't work, but it was an attempt. (Participant 6, School C)

The economic difficulty of zero-waste lunches, and other sustainability practices that require economic resources are not barriers that teachers can control or even influence. Unlike the barriers identified within education *in* the environment, with the barriers to education *for* the environment, the teachers felt that they could not ask families to participate in sustainable practices if those practices were an economic burden. In this way, barriers impacted how teachers and children were able to fully engage in everyday sustainability practices, and at times these barriers ended program-wide sustainability practices.

## GENERAL DISCUSSION AND CONCLUSION

In this study, we examined nature-based preschool teachers' cultivation of and barriers to early childhood sustainability education. Although all participating teachers engaged in sustainability education *in* the environment, a built-in component of all programs, most teachers struggled to cultivate sustainability education *for* the environment in ways that "attempt[ed] to redress the perceived 'greenness' of sustainability education and to focus more on the pedagogies of humans as agents of change" (Elliott & Davis, 2009, p.67). In their seminal book, *Research in Early Childhood Education for Sustainability*, Davis and Elliott (2014) note that reviews of sustainability education:

"described young children *in* the environment, experientially-engaged with gardening or playing in/observing nature" (p. 4) which is congruent with our study findings. Thus, nature-based preschool programs are providing a foundation for sustainability education by educating children *in* the environment. The teachers in our study emphasized being outdoors in almost all weather despite parental and cultural barriers that suggested such extended outdoor time was both inaccessible and risky. Given the perceived misalignment of educators' and parents' goals regarding sustainability education across all measures of education *in*, *about*, and *for* the environment, it is not necessarily surprising, then, that teachers reported only pushing back against perceived barriers that prevented children from spending time outdoors, as a requirement of nature-based preschool curricula.

Teachers in this study reported supplementing time outdoors with traditional environmental-focused school topics that integrated pre-literacy and numeracy into the study of the water cycle, trees, animals, and insects. Their inclusion of traditional environmentally focused school topics is congruent with the finding that environmental education has been somewhat integrated into science and geography courses throughout K-12 curricula (Puk & Behm, 2003). The barriers that the participating educators reported to education *about* the environment are barriers that are common across public and private USA preschools—time and developmental appropriateness (Tobin et al., 2009), and broader cultural narratives about what is essential to teach in the preschool classroom (Ham & Sewing, 2010). Thus, our findings pertaining to nature-based programs are reflective of literature on sustainability education in USA preschools.

We would like to note a few limitations of our study. Teachers' craft knowledge and practice of sustainability education is uniquely influenced by their own training, the number of years they have taught, and their physical location, including what type of nature the teachers and children have access to. This is especially pertinent because access to nature, in particular forests and gardens, played a large role in cultivating specific sustainability practices, such as learning to love the Earth. Therefore, we limit the generalizations as to how nature-based preschool teachers cultivate sustainability education to programs that have similar outdoor facilities. Future research should replicate this study in other regions of the United States or in facilities with access to other types of nature (such as urban parks, deserts, lakes) to determine whether the type of nature influences how sustainability practices are cultivated.

We want to also point out that although we included observations, we did not ourselves rate or code the specific sustainability practice, as we were looking for congruence across interview and practice. This present study could have been strengthened by including more systematic and repeated observations in order to further understand how sustainability practices were cultivated on a daily basis within the context of nature-based preschool classrooms and how those practices were built across the school year.

In conclusion, there is wide-spread support for sustainability education, but it is hard to implement in schools in a systematic way without broader changes to the United States educational system, including curricula and pedagogy. However, this idea does not mean that teachers cannot incorporate aspects of sustainability education, such as school wide-policies, that promote everyday sustainability, as experiential and engaging with young children as agentic. As our study suggests, however, without more substantial societal shifts, the sustainable behaviors that children learn in the United States schools will not translate easily to the children's home and family lives (Grønhoj & Thøgersen, 2009, 2012). Thus, if every day sustainable practices are to play a part in combating the climate crisis, sustainability education must not just be relegated to schools, but also must make its way through broader culture as well.

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## Bringing Mythical Forests to Life in Early Childhood Education

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### ABSTRACT

In this article, I have sought to develop an understanding of the contribution of imaginative and nature appreciation in early childhood environmental education dealing with old, cultural nature myths and beliefs. The argument rests on the belief that the basis of a child-environmental education is in imagination which resonates with play, aesthetics and storytelling as old, historical nature myths have a story-like power to transform human perception of the world and our relationship to it. The thinking of the old nature myths and development of early childhood environmental education is in this article relying on new materialism and posthumanist thinking of intra-action (Barad 2003; 2007). This article specifically considers the usage of material *Whisper of the Spirit*, which places educators in the position of examining their environmental education practices as relative, evolving and emergent situations in which the old nature myths and the existing material components could have their role and significance.

**Keywords:** nature myths, environmental education, Finnish education, early childhood education

The focus in this article is on considering education with nature myths in the early childhood environmental education setting. I was originally inspired by Farrelly's (2019) thought of exploring philosophical, psychological, and pedagogical domains to begin developing a holistic vision of what imagination could contribute for human-environmental flourishing. In his article, Farrelly considered the significance of myths for environmental education. The other inspiration, Engelmann's (2019) kindred spirits – learning to love nature the posthuman way – identified human beings as entities that engage with significant others. According to Engelmann, understanding of pedagogical love might become the key to form new practices of sustainable action.

In this article I am seeking to develop an understanding of the contribution of imaginative and mythic nature appreciation in early childhood environmental education. My purpose is to explore the educational potentials of developing and supporting a child-environmental imagination through actions considering old Finnish nature myths and beliefs. My argument rests on the belief that the basis of a child-environmental education is in imagination which resonates with play, aesthetics and storytelling as historical myths have a story-like power to transform human perception of the world and our relationship to it (cf. Farrelly 2019). Therefore, it is worth addressing questions of turning the old mythic way of being in the world to education of ecological interest, care and hope. As Farrelly (2019) states: "Developing a human-environmental imagination in ourselves and our students may prove intrinsically powerful and transformative, but may also help our students become all the more prepared to experience the natural world and the self-in-relationship-with-nature in a qualitatively richer way" (p. 139). This is highly relevant in the times of ecological crises and should also be the concern of early childhood education and future.

Farrelly (2019) leans on Martha Nussbaum in explaining how myths, as one kind of story, could be especially helpful in developing students' human-environmental imagination and support those striving to form bonds with nature by providing immersive experiences therein. Farrelly (2019) is asking what philosophical-anthropological visions could provide fresh illumination to develop students' sense of how they could live in relationship with nature and pondered how stories could shape civic engagement and human-environmental imaginations. He offered myths as a

pedagogical principle potentially serving in creating ideal conditions for students' richer, immersive experiences in nature. Engelmann (2019) is re-reading Bernhard Heinrich Blasche's *Naturbildung*, the German text from the 18th century. According to Engelmann, Blasche understood nature and interconnectedness of life-forms in a similar way to posthuman thinkers. In his article Engelmann grounded his thinking on Haraway's idea of 'response-ability' and 'multispecies storytelling' and remarked how knowledge is always situated locally and temporarily.

Early childhood environmental education is specifically considered in this article by relying on new materialism and posthuman intra-action (Barad 2003; 2007) in conjunction with the material turn that has been lately applied in the field of early childhood studies (e.g. Olsson, 2009; Lenz Taguchi, 2011; Kind, 2014). In thinking of subject and object, the focus is typically in the interaction and relationship, but the new materialist thinking shifts the focus to their entanglement; there is something resonating in between, in intra-action (Barad, 2007). As Kind (2014) explains, "materials are not immutable, passive or lifeless until the moment we do something to them: they participate in our early childhood projects. They live, speak, gesture and call to us." (p. 865). In this article, material entanglements are also considered from the imaginative point of view: there is a need to develop an understanding of the contribution of imaginative nature appreciation in early childhood education, because sustainable and equitable futures depend on education in relation to ecological and global factors. UNESCO (2008) pointed out over ten years ago that our societies urgently require new kinds of education that can help prevent further degradation of our planet and these new kinds of education must be available to all. According to them, new kinds of education will foster caring and responsible citizens genuinely concerned with and capable of contributing to a just and peaceful world, and this need to begin in early childhood.

#### **From myths to materiality and intra-action in the posthuman era**

Myths and beliefs are oral tradition that can easily cross the national boundaries and are reinterpreted in various social practices (e.g. Siikala 2002). Still, old myths and beliefs can tell us a lot about the distant, local past and immaterial worlds. In Finland, people in the past believed in the existence of non-human beings, such as trolls and spirits, and considered a variety of material things from artefacts to landscape elements to have special properties such as agency, consciousness, and personality. According to Herva and Ylimaunu (2009), folk beliefs in early modern northern Finland, and in other similar contexts, represent local perception and engagement with the material world. According to them, folk beliefs were embedded in the dynamics of everyday life and manifested in two-way relatedness between people and various constituents of the material world (Herva & Ylimaunu 2009).

According to Siikala (2002) myths continue to play an important role in social movements attempting to create group unity on national or ethnic grounds and they address both cultural and existential questions. She continued by explaining how myths carry mental models of the past; "they are one structural manifestation of *longue durée* of culture", because notions concerning the world and its phenomena are structured in different systems of knowledge and mental imagery (Siikala 2002, p. 15-16).

Siikala (2002) explains how the most fundamental areas of cultural consciousness are related to the community's world view and basic values; mythology is constructed as a representation of precisely such basic structures of consciousness. Similarly, new materialist thinking builds on the insight that "our material lives are always culturally mediated, but they are not only cultural" (Coole & Frost, 2010, p. 27), and it questions the primacy of language and social forms in constructing meanings, identities and even bodies. New materialisms have emerged as part of a material turn in the humanities. Stuff is not merely unruly, as Boscagli (2014) says in his *Stuff Theory*; it becomes the grounding of a new relationship between people and matter that might be built. The material turn is needed because constructions through language and culture leaves little room for understanding the materiality of either human and nonhuman beings or the world.

As mentioned above, in thinking of subject and object, the focus is typically on the relationship, but the new materialist thinking shifts the focus to their relationship and entanglement. New materialism relays matter as agential, indeterminate, constantly forming in unforeseen ways (e.g. Coole & Frost, 2010). Something resonates in between, in intra-action (Barad, 2007): an interdependent collaboration among material and human actors that co-constitutes play, design, and experimentation. Barad observed mutual relationality, that things are because they

influence each other. She (Barad 2003) notes: “If we follow disciplinary habits of tracing disciplinary-defined causes through to the corresponding disciplinary-defined effects, we will miss all the crucial intra-actions among these forces that fly in the face of any specific set of disciplinary concerns” (p. 810).

The concept of intra-action reframes materiality from designed affordance to a cycling interplay produced by the physicality, fluidity and messiness of entangled bodies, things and places (Wohlwend et al., 2017). “Matter is promiscuous and inventive in its agential wanderings: one might even dare say, imaginative”, as Barad (2015, p. 287) says. Barad (2007; 2015) emphasises mutual relationality: things are, because they are in relation to and influencing each other. Various material resources can inspire imagination (Alesina & Lupton, 2010) and the tangibility of material working can be engaging and stimulating (Clapp et al., 2016). For Barad (2007), agency emerges when things and bodies come together: humans and nonhuman entities become agents only by way of each other. “Agential intra-actions are specific causal material enactments that may or may not involve ‘humans.’” (Barad, 2003, p. 817.) Also, Garber (2019) notes that what new materialism brings to education is recognition that objects as materials have agency and affect us. Garber (2019) continues that the intra-actions are what we must take account of. “Objects and materials have effects on makers and viewers when they find the smooth spaces between making and materials, among objects, and within interactions between them”, emphasised Garber (2019, p. 12). As materials are in intra-action with the creator, further studies and deeper analysis are needed to research the role of materials as drivers of processes through which children learn. “Objects, materials, and the processes surrounding them have roles in the decisions and choices we make in our lives”, said Garber (2019, p. 3).

Through deepened understandings of their material articulations of the world, creators and learners construct new knowledge and thickened experiences, and they develop first-hand sensitivities to making that help them find the “causal structures” underlying what they do (Barad, 2007). This “knowing in being” can be transformative with regards to how a person interacts with and lives in the world (Garber, 2019). Following Barad’s (2015) thinking, if matter is promiscuous, inventive and imaginative in its agential wanderings, unforeseen smooth spaces will then be the key educational focus. In this article, old nature myths and beliefs are considered materials interacting and being with us, although they are not touchable or visible objects.

### **Why teach the mythical past to young children?**

In Finland old nature myths and beliefs are a keen part of our cultural heritage and knowledge; myths resonate with our nature relationship and the way of perceiving the world. Mythic traditions “carry voices from the ancient past to the present today” as Siikala (2002, p. 18) puts it. The relationship with nature had been spiritual, aiming to find and maintain a balance between human and nature. The ancient Finns’ life survival was dependent on nature and its conditions and the balance between people and nature was very crucial. The ancient Finns lived in constant interaction with both the visible and invisible forces of nature and they believed in spirits: Maintaining the balance formed the basis on which people’s living, the way of life, religion and even language were developed (Hyry et al., 1995; Alhonen, 2012).

For the ancient Finns, everything in nature had its own invisible soul which was somehow connected to the natural phenomenon perceived by the senses. The forest and other nature elements – trees, water, stones, fire, animals and plants – were all controlled by guardian spirits (*haltijat*). Respected and valued spirits could be distinct kinds of creatures such as trolls, elves or fairies. All things, whether animate or inanimate, human or nonhuman, had their own spirit: for example, houses and saunas had their own spirits, as did many objects and beings. The spirits’ duty was to protect and defend many things, and sometimes also to control them. Every human being also had a spirit as people inherited their spirits from their grandparents. People believed that a spirit could turn, for example, into a tree or stone. In order to secure luck and success in life one had to maintain a balance with the spirits. (Hyry et al., 1995; Alhonen 2012.)

In modern times, myths are important as they establish a link to immutable principal events in the past. Myths also establish a social whole united by notions of common origin. Addressing both cultural and existential questions, myths also form a basis for self-definition and national identities. (Siikala 2002.) How should things from the past be connected for young children’s environmental education? How can children’s active intra-action with ancient nature

myths be advanced? Especially Finnish early childhood education stresses children's agency and the sociocultural nature of learning and development, with a focus on children's active interaction with peers, teachers, adults, community members, and the environment (e.g. Kumpulainen 2018). This also enables children to participate in planning, creating, and evaluating their own activities and learning environments (Kumpulainen 2018.) Still, when coming to teach old nature myths and beliefs, children are not capable of planning their own learning activities and environments (as they have not culturally experienced those things), but they will be able to plan the way through which they will make stories alive and gain more understanding about old nature myths and beliefs.

In Finnish early childhood education playful learning and self-initiated play have been seen as having an important role for children's holistic learning (see Pramling Samuelson & Asplund Carlson, 2008), and children's play is highly valued. In the Finnish national context teachers are given agency, autonomy and trust to design their teaching by following a non-prescriptive curriculum. Finnish teachers are not forced only to deliver the curriculum: on the contrary, the demand is to adapt the curriculum into the local context which contains a group of individual children with different interests and different backgrounds and cultures (see FNAE, 2018). Because of the teachers' own education and training, they are trusted to transform the curriculum and their chosen materials into activities in the local context. Teachers' autonomy and their freedom to innovate within teaching processes, and the opportunities teachers have to explore what works in their practice, stems from the accommodating and always evolving Finnish education system (Toom & Husu, 2016). However, despite the teachers' agency and the holistic nature of early childhood education, imaginative and mythic nature appreciation has not been the key interests of early childhood education practitioners. This is also in connection with teachers' general material relationship, which is typically rational. As Kind (2014) formulates:

“As educators, we tend to understand materials from a scientific, rational, or functional viewpoint and through predictable properties of colour, shape, density, mass, friction, and gravity. Further, our understandings of materials are shaped by deeply rooted cultural dichotomies – animate/inanimate, active/passive, self/other, to name a few. These binaries lead us, often unconsciously, to think of ourselves as animate agents who act on passive, inanimate materials. This conception then affects how we see materials, how we engage with them, and what we create with them” (p. 866-867).

The resource behind the idea of considering cultural myths and beliefs in early childhood education, *Whisper of the Spirit*<sup>1</sup> (Erfving et al., 2017; see also Nordström et al., 2019; Sairanen et al. 2019), has been created to encourage children to exercise their imagination and to take an interest in Finnish nature and ancient myths from a variety of perspectives and modalities. The freely available material *Whisper of the Spirit* has a playful educational aim of encouraging children to imagine, to observe, to collaborate, to participate, to reflect, to innovate, and to experiment in various ways and take an interest in Finnish nature and ancient myths. In the Finnish context, teachers have the autonomy to choose the learning resources and materials they have decided are the best for the group of children they are teaching. The environmental education's insight of this material can be understood in the way in which the teacher and student relate to one another and to nature – are in intra-action.

### **Turning the historical mythic way of being to the early childhood education**

The Finnish early childhood education curriculum guides practitioners in teaching cultural traditions and values (see FNAE, 2018). As mentioned earlier, at the same time the Finnish early childhood education has a long tradition of child-centred pedagogy that emphasises children's initiatives and agency in and for pedagogical activities and consequent learning opportunities (Kumpulainen, 2018; see also Pramling Samuelsson & Asplund Carlsson, 2008). Children's agency is referred to as a dialogic process which develops in interactions between individuals and the environment, and agency can be defined through the interaction between a child and the context (Vygotsky, 1976). The pedagogical content and actions are based on the early childhood education centre's own plan of action which follows the municipality's and the national early childhood education and care curriculum (FNAE, 2018).

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<sup>1</sup> <https://helda.helsinki.fi/handle/10138/222483>

A typical day at kindergarten includes pedagogical activities indoors and outdoors combining children-led activities and free play and adult-led activities. One of the key elements in the Finnish early childhood education weekly schedule is outdoor time, which is spent either in the kindergarten's own yard or in conducting trips to nearby resources (forests, play grounds, libraries, etc) as well as meals and rest times (Määttä et al. 2019). One of the targets in early childhood education is to learn to live in an affective, aesthetic intra-action with nature and foster human-environmental imaginations. This requires considering myths as a cultural resource which children can use to create, build and make meaning of the world and of themselves. Building a sustainable future could also include aesthetic perspectives within environmental issues, but education does not drive these issues in that direction. This is confusing, because the development of human morality (as deeper thinking) within aesthetic discourses could be fruitful when solving challenges of environment problems now and especially in the future (see Autio 2017).

The two following *Whisper of the Spirit* examples from Finnish early childhood education demonstrate applying myths to early years environmental education. The examples also show how the teachers' actions to strengthen children's human-environmental flourishing through intra-action (see also Sairanen et al. 2019). In these examples the material resonates in children's creations and intra-action with the local material nature resources and places:

"The talking rock": The early childhood education group from Eastern Finland was used to visiting the kindergarten's nearby forest several times per week and they children were allowed to play freely there. Children also had opportunities to take digital photos in places which they felt were interesting and of figures that aroused their attention. One particular rock was of interest to the children because its shape resembled a man's face. One day at the kindergarten, the teacher shared her own creation, a digital short video of a talking rock with the children. (She used an app to make a still photo of a rock appear to talk with a big mouth). The talking rock asked (with the teachers' lowered voice): "Would you like to hear my story?". This was a great inspiration to the group who started to look at other talking figures and their stories in the forest. Each child wanted to find her/his own spot and create videos with talking nature elements. The local, familiar forest suddenly came to life.

"The spirits' new home": The project began by reading an inspirational email (written by the early childhood education teacher, Southern Finland). The email was sent to children by a "good spirit" living in a familiar forest near the kindergarten, and the email contained an invitation to visit her. Children were very eager to go to the forest and they started spontaneously and gradually to create their own story world around the good spirit; they wanted to design a bigger home for her, build furniture, organise many actions and maintain a fairy's flying school for each other. Children made a large chandelier with branches and sticks. The group developed, lived and played the same story throughout the autumn semester.

The two examples resonate with the idea of intra-active pedagogy by Lenz Taguchi's (2010) saying that the force of learning comes from intertwined material-discursive and embodied reality. She highlighted how intra-active agentic engagements in-between multiple materials cannot be planned ahead, which means "delaying our [teacher's] movements in pedagogical space" (p. 128). In these examples, the early childhood education teachers were active motors at the beginning of the processes, but gradually allowed the children to continue the story and develop the process. The adults' role became one of co-player, with children and adults producing experiences together. The environmental connectedness, material intra-action, reinterpreting, re-telling and representing the myths from the past were based on being together in a local forest, having sensory, aesthetic experiences, free material producing, play and storytelling. The children "thought through making" (Ingold, 2013, p. 6) as a type of play, creation and inquiry. Following Ingold's (2013) thinking, human and non-human bodies affected each other as equal agents in emergent social, cultural, and material production.

As children typically are familiar with imaginative play and stories, they can use their toys and other material objects symbolically, creating narratives and making rules and roles they can act out (e.g. White, 2012), but also evoke emotions and retain information through those (Lawrence & Paige, 2016). Through shared play and storytelling,

connection will become stronger. In a live situation, stories are created in the presence of recipients. Storytelling is a social activity as well as a communal process; from a cultural perspective, stories are central to many cultures, as storytelling provides a platform and medium for retaining information that should be retained. Similarly, storytelling is important for children growing up in a culture insofar as it maintains a cultural continuum. As Brown (2009, p. 67) claimed, storytelling “occupies a central place in early development and learning about the world, oneself and one’s place in it”. As Lawrence and Paige (2016) beautifully illustrated it:

“The elements of a great story are imagination, believability and content. In terms of the content, it is all about the problem, resolution and moral of the story. Moreover, a well-told story of the distant past can illustrate the value and importance of the myths we invent and how they serve to hold cultures together and empower individuals to build their lives around these experiences” (p. 66).

Researchers have long identified imaginative play as a vital component in the normal development of a child (Bergen, 2002; Garvey, 1993; Vygotsky, 1976). Imagination differs from normal reality, the material environment and the social presence of others and, as such, can widen our experience of the world (Zittoun & Cerchia, 2013). Imagining creates a new space or form of thinking with which children can surpass their own level of understanding and create a zone of proximal development for themselves (Vygotsky, 1962). Zittoun and Gillespie (2016) defined imagination as “the process of creating experiences that escape the immediate setting, which allow exploring the past or future, present possibilities or even impossibilities” (p. 2). Imagination feeds on a wide range of experiences people have with or through the cultural world, through diverse senses, combined, organised, and integrated in new forms (Zittoun and Gillespie, 2016).

The students’ own actual and embodied feelings, thoughts and experiences of nature and environment are often ignored (see Pulkki et al., 2017) and this concerns young children as well. Environmental education considering the old nature myths and beliefs recognises children’s embodied thoughts and feelings and allures children to use them. Instead of loading their minds with the fear and feelings of guilt for the mistakes of previous generations, the aim is to strengthen children’s positive and imaginative interest towards shared history, old nature myths and beliefs – the affective bond between people and place. Then the familiar, local places start to become the carrier of emotionally charged, playful and meaningful events, which open the opportunities for deeper connections and relationships. Only in this way is the education really about attending to things, and to the world (cf. Ingold 2018).

Myths are “products” of human social imagination, cultural reflections of nature. Teaching and learning myths does not mean transferring cultural content or to socialising in a culture, but above all, it is a process through which every generation has the possibility to grow into their full human size and lead a good and a happy life. As Ingold (2018) phrases it: “Every life is tasked with bringing other lives into being and with sustaining them for however long it takes for the latter, in turn, to engender further life. The continuity of the life process is therefore not individual but social.” (p.17). Learning about myths in early childhood education means having a glimpse from the past. The possible connective element is the similar material and immaterial natural environment that the ancient people experienced, which modern education turns to re-lived, playful experience. This connection might lead to a stronger interest in environments and other living things and multispecies. Interest opens the way to change and hope. As Snaza (2019) puts it: “And given how knowledges sustain us, this means that mutations in knowing cannot be separated from mutations in being (Haraway would, rightly, instead say “becoming”). The hope of knowing is that someday we will come to know differently and to be otherwise than we are” (p. 5). This is related to Ingold’s (2013) concept of leaking, meaning “things can exist and persist only because they leak: that is, because of the interchange of materials across the surfaces by which they differentiate themselves from the surrounding medium” (p. 95). Both entanglements and leaking things are based on the understanding that objects, people, and things in general are constantly changing and acting on other things.

### **Conclusion**

Myths and beliefs are cultural, shared stories about entities, material and immaterial events and places no one has seen or experienced but which are nonetheless held to be true in the past. Non-human beings and material things

were believed to have agency, consciousness and personality. The target of this article is to turn the mythic way of being in the world to early education of ecological and environmental interest enriched with imaginative play and stories. Education, especially in early years, needs the new grounding of an appreciative relationship between people and matter that might be built and enhance intra-action as such. Early years' environmental education considering old nature myths needs to address a wider scope of relevant educational questions: How to learn about sustainable and equitable futures? What imaginative and mythic nature appreciation could be brought to early childhood education?

In early childhood education imagination, play and creation can contribute to human-environmental flourishing, and strengthen children's experimental, immersive, richer experiences in nature (cf. Farrelly 2019; Engelmann, 2019). Through re-productive myths consideration, early childhood environmental education brings the affective, narrative bond between people and place, enabling the imaginative, aesthetic and mythic nature appreciation in early childhood education, and it understands the knowledge and wisdom being locally situated.

Tangible material working is engaging and stimulating in early childhood education and rich material resources can inspire imagination. Kind (2014) discovered how "children, like artists and makers, follow materials as they work with them" (p. 873). Children's imagination, play and stories emerge when things and bodies come together, and educators need to understand how objects, materials, and the processes surrounding them have roles in the decisions and choices we make in our lives. Things simply are, because they are in relation to and influence each other (Barad 2007; 2015) this material relativity has been exceptionally strong in the Finnish cultural history concerning the nature myths and beliefs. Early childhood environmental education and its pedagogy could benefit from that and a new relationship between people and matter that might be built. The reinforcement of a foundation which enriches experiences and imagination and which is connected to cultural, narrative and playful human and non-human experiences in and of nature is important in children's developing nature relationships. New materialist thinking offers an alternative to the objective approach (adopted from the technical fields, natural sciences and rational understanding), and new materialism places educators in the position of examining their practices as relative, evolving and emergent situations in which the material component has its role and significance. The material relationship also moves in time. In this consideration of the relationship with the world (which, from the growing child's perspective, is still developing), learning cultural myths related to the relationship with nature may help the child to engage with nature in an understanding and invigorating way.

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## CHILDREN'S BOOKS AND RESOURCES REVIEW

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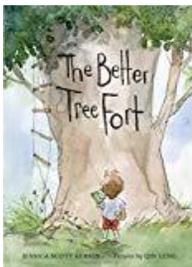
Book and Resource Review Editor

### Fort and Den Making Resources

Children love hidden spaces and building forts, dens, and cubbies. Forts can be made from a variety of objects - cardboard, fabric, blankets, cushion, sticks, pallets, tarps, and more! The outdoor context allows for more space and different materials for fort building. Check out these books and resources for den making inspiration.

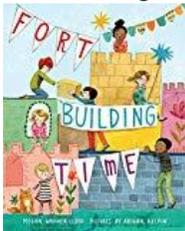
#### Children's Books:

*The Better Tree Fort* by Jessica Scott Kerrin



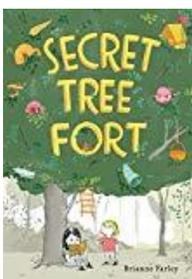
Russell's family moves to a new house with a large maple tree in the backyard. He wants to build a fort in the tree; however, his dad is not so handy at building forts. The boy creates plans, including a basket and rope. Slowly they began to work on the plans. They eat dinner and even slept in the fort. Russell could see a bigger, better tree fort being built a few yards over and went to say hello. It ends with Russell and his dad in their tree fort, realizing there will always be better tree forts and Russell says, "But not a better dad."

*Fort Building Time* by Megan Wagner Lloyd



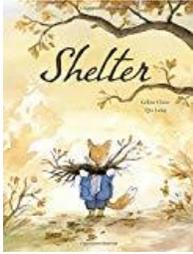
*Fort Building Time* follows nature play through the seasons with a different type of fort for each season—snowballs, sheets and rope, driftwood and beach blankets, and a tree house. At the end the fort falls down (as many do!) and it allows for fixing projects and imaginative play. The text is lyrical and poetic without too many rhymes. The illustrations are lovely and include depictions of children of color.

*Secret Tree Fort* by Brianne Farley



Two sisters are sent outside to play. The older sister sits and reads while the younger girl shares details of her secret fort. It has a rope ladder, water balloon launcher, a roof, a basket and pulley, special flags, natural treasures, magnifying glass, a crow's nest, an underwater viewing space, and more. Obviously, she has quite the imagination when whales, mermaids, and pirates are near her fort as well. The secret is the fort is made of candy. The older sister doesn't believe her; however, they realize that maybe they can build it.

*Shelter* by Celine Claire



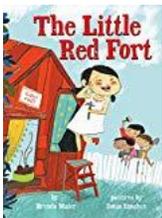
The animals are preparing for a storm and two strangers arrive to the area; however, no one will help them find shelter for the storm. The strangers (bears) make a shelter with the snow. The fox family finds themselves on the outs as their shelter begins to sag and seek refuge with the strangers who help them out. This book shows how we can be kinder to others than they might have been to us.

*Stick!* by Irene Dickson



A young boy uses a stick in so many ways! He uses it as part of a flag, to write in the sand, float it down a stream, etc. At the end, many sticks are put together as new friends gather together.

*Little Red Fort* by Brenda Maier



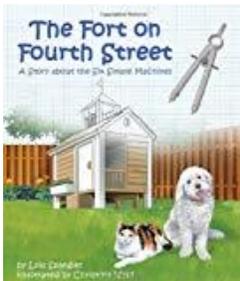
In this spin on the Little Red Hen, a young girl invites the other children to help build the fort; however, none help. With little encouragement, she learns how to build a fort and builds it! The end has an illustration of different types of forts--bunk bed, snow, kitchen chair, sofa, etc. I love that the girl has dirty knees sometimes and that the children are allowed some freedom to play outside and build!

*King Jack and the Dragon Fort* by Peter Bentley



King Jack and his friends must protect their castle fort from the dragons. The book has good illustrations showing their fort made of cardboard, blankets, and other items they find. The friends stand together to defend the castle, yet King Jack also realizes when it's time to return to his parents. The text rhymes.

*The Fort on Fourth Street: A Story About Six Simple Machines* by Lois Spangler



This book is a little more formulaic with a cumulative rhyme. A young boy and his grandfather build a fort, using simple machines, like wheels, pulleys, etc. This is a more "formal" fort, rather than a simpler, child made fort. Sometimes the text seemed a little forced; however, it does great at introducing the various simple machines. There is a section on simple machines at the back, along with ideas and questions to get started on building your own fort.

**Other Resources:**

***Meet the World's Leading Expert of Why Kids Build Forts*** by Paula Spencer Scott

This article on fort building from Children and Nature Network includes information from David Sobel on why children build forts, a typical developmental timeline of children's interest in den building, benefits of fort building, and ways to support this type of play in children. Find it at:

<https://www.childrenandnature.org/2016/03/20/meet-the-worlds-leading-expert-on-why-kids-build-forts/>

***Fabric as a Loose Part/Den Making*** by Carla Gull

This podcast episode from *Loose Parts Nature Play* explores fabric as a loose part and den making as a corollary concept, including information on making a fort making kit, celebrating Den Day, and a summary of a research article on den making. Find it at: <http://loosepartsnatureplay.libsyn.com/fabric-as-a-loose-part-den-making>

***Children's Places of Secrecy and Play: Playworkers Guide to Dens and Forts*** by Morgan Leichy-Saxby

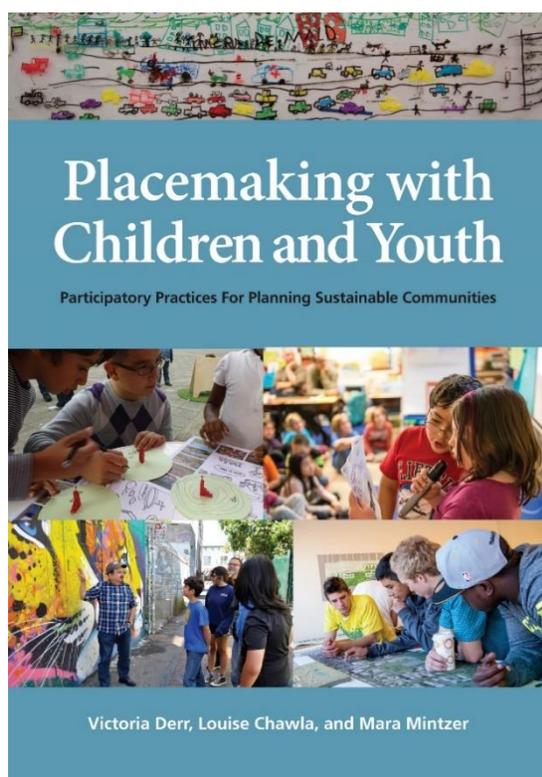
Sponsored by Islington Play Association, this guide explores the background behind den making with sections on constructive play, types of play, playwork principles, and information on affordances. Additionally, there is another portion looking at the practice including how we can facilitate fort making, best practices, and gender and forts. Find it at: <https://islingtonplay.org.uk/wp-content/uploads/2017/09/den-booklet-web-version2.pdf>

## BOOK NOTICE

*Placemaking with Children and Youth: Participatory Practices for Planning Sustainable Communities*, co-authored by Victoria Derr, Louise Chawla and Mara Mintzer (New York: New Village Press, 2018).

400 pages, 220 illustrations, available in paperback, hardcover, e-book

<https://nyupress.org/9781613321003/placemaking-with-children-and-youth/>



*Placemaking with Children and Youth* is a comprehensive guidebook to engaging children and youth in place-based education that focuses on investigating and evaluating local communities. Its examples begin with children as young as 3, and many examples and methods are drawn from work in elementary schools. For those who want to go from investigation to action, it includes detailed examples of school ground greening, ecological restoration, public art, and participatory planning and design with city agencies, local nonprofits and community organizations. Topics include a history of children's rights to active participation in their societies—with a special section on the ethics of working with young children, best practices for establishing programs and partnerships, intergenerational events for planning communities that serve the needs of all ages, project evaluation, and the communication of achievements. Five chapters provide step-by-step directions for nearly

100 participatory methods and variations. Examples and case studies are drawn from high- and middle-income countries and environments of disadvantage, with special attention to working with marginalized populations. Winner of the 2019 Achievement Award of the Environmental Design Research Association.

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

**Information for Authors**

The journal has two broad visions:

- (a) To encourage thoughtful sharing of information about important ideas, conceptualizations, and frameworks, as well as effective practices and policies in early childhood environmental education; and
- (b) To reach an extensive global readership in order to maximize the impact of the thoughtful information.

Thoughtful information may manifest through book reviews, description of educational approaches and programs, research investigations, and development or interpretation of theoretical perspectives. Associations among and between the following will be emphasized:

- Young children
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- Community opportunities
- Policy mandates or recommendations
- Environmental activities, education, or experiences
- Mechanisms or processes related to knowledge acquisition
- Attachment or maintenance of affective dispositions
- Abilities, behaviors, or skills development related to good decision making in a range of environmental contexts; and
- Cognitive, economic, and social influences or impacts.

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