Routledge
Taylor & Francis Group

Journal of Adventure Education and Outdoor Learning

ISSN: 1472-9679 (Print) 1754-0402 (Online) Journal homepage: https://www.tandfonline.com/loi/raol20

‘The woods is a more free space for children to be creative; their imagination kind of sparks out there’: exploring young children’s cognitive play opportunities in natural, manufactured and mixed outdoor preschool zones

Zahra Zamani

To cite this article: Zahra Zamani (2016) ‘The woods is a more free space for children to be creative; their imagination kind of sparks out there’: exploring young children’s cognitive play opportunities in natural, manufactured and mixed outdoor preschool zones, Journal of Adventure Education and Outdoor Learning, 16:2, 172-189, DOI: 10.1080/14729679.2015.1122538

To link to this article: https://doi.org/10.1080/14729679.2015.1122538

Published online: 04 Jan 2016.

Submit your article to this journal

Article views: 3417

View related articles

View Crossmark data

Citing articles: 9 View citing articles

Full Terms & Conditions of access and use can be found at
https://www.tandfonline.com/action/journalInformation?journalCode=raol20

JOURNAL OF ADVENTURE EDUCATION AND OUTDOOR LEARNING, 2016
VOL. 16, NO. 2, 172–189
http://dx.doi.org/10.1080/14729679.2015.1122538

Routledge
Taylor & Francis Group

'The woods is a more free space for children to be creative; their imagination kind of sparks out there': exploring young children's cognitive play opportunities in natural, manufactured and mixed outdoor preschool zones

Zahra Zamani

Center for Health Facilities Design and Testing, School of Architecture, Clemson University, Clemson, SC, USA

ABSTRACT
Outdoor preschools are critical for children's play and development. Integrating observational and interview methods, this study examined four-to-five-year-old children's cognitive play experiences in an outdoor preschool with natural, mixed and manufactured zones. The observational results indicated that the natural and mixed zones offered a diverse spectrum of cognitive play, were supportive of different learning styles and expanded their understanding about the world. Children preferred the diverse, challenging and constantly evolving natural settings in these zones. Integrating diverse natural and manufactured settings with loose elements, the mixed zone supported considerable opportunities for functional, exploratory and games with rules play behaviors. The accessible loose materials inspired children's imagination, social engagement and games. In contrast, the manufactured zone offered the most functional and non-play behaviors, and was perceived as an unexciting, predictable and tedious environment. The findings suggest incorporating natural features and settings in outdoor preschools to support a diverse spectrum of cognitive play.

KEYWORDS
Cognitive play behavior; natural zone; diversity; outdoor preschool; behavior mapping; risky play

Introduction

Recently, there has been a growing state of interest to understand how the outdoor environments set the stage for children's learning, exploration, construction and problem invention and solving (Maynard & Waters, 2007; Ouvry, 2003). The outdoor environment's variable and less constraining qualities provide children opportunities to be active, engage in risk-taking behavior, make decisions, solve problems and think creatively (Burdette & Whitaker, 2005; Ouvry, 2003; Sandseter, 2007).

Recognized as an important outdoor environment, natural spaces heighten healthy behaviors by providing opportunities for exercising, socializing and relaxing (Corraliza, Collado, & Bethelmy, 2011; van den Berg, Hartig, & Staats, 2007; Wells & Evans, 2003). A growing number of studies indicate a positive relationship between children's development and constant contact with nature (Berto, 2005; O'Brien, 2009; Wells & Evans, 2003). Nevertheless, children's contact with natural environments have been reduced due to children's reduced levels of freedom, parental control and fear, safety concerns and inadequate access to outdoor playgrounds (Ridgers, Knowles, & Sayers, 2012).

A number of studies have evaluated the association between various existing natural and manufactured components in playgrounds and children's play behavior. For instance, Sandseter (2009) found that natural playgrounds were more supportive of challenging play, in comparison

CONTACT Zahra Zamani zamanizzz91@gmail.com
© 2016 Institute for Outdoor Learning

with traditional playgrounds. Barbour's (1999) study indicated that traditional playgrounds primarily promoted exercise play, while natural playgrounds offered diverse play opportunities. O'Brien (2009) found that children's confidence, focus, inspiration, language levels and physical abilities improved after playing in Forest Schools for a period of time. The study by Fjortoft and Sageie (2000) described the value of natural features for stimulating ranges of play and children's preference for exploring and experiencing challenging activities in nature. Waite's (2010) study found that natural playgrounds inspired children's curiosity, developed their environmental education and improved their speaking and listening skills.

Since young children are spending long periods at preschools (Moore & Cosco, 2010; Titman, 1994), supplementing outdoor preschools with nature provides essential opportunities for children to engage in challenging, complex and interactive activities (Fjortoft & Sageie, 2000; Moore & Wong, 1997). Creating high-quality childcare environments can provide quality settings for children that not only support healthy child development, but also serve as places for learning through play. Outdoor preschools can offer children opportunities for free play and daily contact with nature (Moore & Wong, 1997; Tai, Haque, McLellan, & Knight, 2006). Yet adults have paid inadequate attention to the learning capacity of outdoor childcare centers (Maynard, Waters, & Clement, 2011).

Focusing on children's neurological and psychological development in terms of information processing, conceptual resources, language acquisition or other areas of brain development, the literature has shifted to tracing children's cognitive development through play behavior observation assessments (Farmer-Dougan & Kaszuba, 1999). The environmental assessment of outdoor preschool playgrounds provides insight and expands knowledge into whether particular types of zones are more effective in promoting children's cognitive play behaviors. With the many benefits of natural playgrounds compared with traditional playgrounds, a further question is whether combining natural settings and elements in typical outdoor preschools is a contributing factor for supporting a diverse spectrum of cognitive play. Rubin's (2001) 'Play Observation Scale' offers an exhaustive and hierarchical organization of cognitive play behaviors that are defined as follows:

- *Functional*. Involves simple or repetitive motor behavior, such as jumping, climbing and so forth.
- *Constructive*. This behavior is recognized when children manipulate and shape an already familiar material with a direct goal in mind.
- *Exploratory*. Identified when children examine the qualities of objects to gather visual data about physical features.
- *Dramatic*. This behavior occurs when children play the role of someone, engage in a pretend activity with an object or someone, or assign life to an inanimate object.
- *Games with rules*. Identified when children employ a sense of competence with peers while creating regulations for games.

Based on a geographical perspective, this research employs the term 'zone' instead of playgrounds. Zones are areas of land with unique qualities, applications, a particular design, and certain settings and elements. The degree of available and accessible natural settings and elements classifies zones:

- *Natural zone*. This zone is mainly composed of wild and natural spaces, creatures and natural loose materials (Fjortoft & Sageie, 2000). Natural zones include diverse natural elements (plants, vegetation, etc.) and settings (stream beds, sand, tree areas, etc.). Natural zones provide different hands-on learning, explorative and manipulative experiences as a result of the diverse textures, smell, visual cues or audible signals (Fjortoft, 2004; Zamani, 2012). Natural zones reconnect children to nature and provide various open-ended play options that stimulate creativity and imagination for children (Waite, 2010).

- *Mixed zone*. This zone incorporates manufactured settings (swings, play structure, etc.), natural settings (trees, hills, sand, etc.), natural elements (sand, sticks, leaves, etc.) and manufactured elements (toys, swing, ropes, etc.) (Cosco, 2006; Zamani & Moore, 2013). This diversity supports different play options and hands-on learning opportunities for children associated with the evolving and openly designed quality of natural settings, as well as the challenging experiences of manufactured settings (Cosco, 2006).
- *Manufactured zone*. This zone is mainly composed of manufactured settings (climbing structure, play houses, etc.) and immovable synthetic elements (such as swings, bars, slides). These elements are mostly one-dimensional and supportive of gross motor development (Barbour, 1999; Moore & Wong, 1997; Zamani & Moore, 2013).

In reviewing some of the knowledge acquired to date, few studies have focused on the outdoor preschool zone features that children prefer and the cognitive play behaviors these encourage. The following paragraphs discuss the research aim, site selection procedures, participants, data collection and analysis, and results and discussion.

Research aim

This research aims to compare the perspectives of young children and teachers concerning the cognitive play opportunities in outdoor preschool zones with different proportions of natural settings. It was hypothesized that the natural settings offer a variety of play options, challenging experiences and educational encounters that inspire a diverse spectrum of cognitive play behaviors. In this study, the voices of children were taken into consideration to understand their preferences for particular features and characteristics in different playgrounds that encourage their cognitive play. This approach significantly adds to the gap of knowledge, as limited data are available on the views of young children about their outdoor preschool environments.

Additionally, there is too little evidence on early childhood educator's views that compare children's cognitive play opportunities and learning experience in different outdoor preschool zones. Further, inadequate information is available from teacher's accounts and perceptions on children's cognitive play and preferences in these zones. Therefore, teachers were interviewed in order to assess their professional opinions and perceptions relative to the cognitive play value of natural, mixed and manufactured playgrounds. These interviews aimed to understand views about the value of outdoor preschool zones on children's development and educational experiences and children's play behaviors, favorite play settings and preferred activities in different zones. Complimentary to the qualitative approaches, the behavior mapping method was conducted to objectively record and compare children's cognitive play behaviors in the three playgrounds. Addressing these questions provides valuable knowledge in terms of cognitive play behaviors young children enjoy, the settings and elements offering these opportunities, and the educational value of manufactured, mixed and natural zones.

Site selection

This study aimed for an outdoor preschool site that had diverse natural and manufactured settings and concurrently included manufactured, mixed and natural zones in which children had opportunities for free play. The evaluation with experts of all existing outdoor learning environments revealed an exceptional outdoor environment for children's play, located in North Carolina (Figures 1 and 2). The three accessible zones in this preschool are defined as follows:

- *Manufactured zone*. This zone included a play house, a looped pathway, a composite play structure, a porch, a sand play setting (covered with a shade structure), bike sheds, bikes and scooters, storage with accessible toys, three gathering settings (benches and tables), a swing

Figure 1. Aerial view of the outdoor preschool with configured zones.
Source: https://www.google.com/maps

pergola and a basketball loop. This zone had a smaller square footage (0.11 acres) compared with the other zones.

- *Mixed zone*: Referred to as the 'hill,' this zone had an area of 0.48 acres and was located between the manufactured and natural zone. The mixed zone had a recognizable, yet moderate, downward grass-covered slope from its entrance. This zone included a linear pathway along the hill, a music wall with a stage, four pieces of rocking equipment, a set of six swings, a sand box, a gazebo, a stone-covered stream (without water) and two play houses. At the back, the 'woods' consisted of several trees and bushes, extending from the natural zone. In this zone, children had free access to natural loose elements (sand, leaves, flowers, etc.) and manufactured loose elements (tires, rope, toys, etc.).
- *Natural zone*: This zone, referred to as the 'woods,' was an extended portion of a wild natural landscape. The non-structured green space in this zone encompassed an area of 0.40 acres. The natural zone was rich in natural loose elements, such as leaves, twigs, dirt and stones. The zone included two looped pathways and one straight pathway covered with dirt and natural loose elements. The only existing manufactured elements in this zone were a piece of crawling equipment and three rope-swings attached to trees. A metal fence provided a mostly transparent barrier between the two adjacent natural and mixed zones.

The following paragraphs explain how the participants were chosen, data collection procedures and data analysis.

Participants

Initially, the Institutional Review Board reviewed and approved the research methods and parents' and teachers' consent forms. Data collection involved behavior mapping from children during outdoor free play, interviews with teachers and interviews with children. Overall, 22 four-to-five-year-old children (13 female and 11 male) participated in interviews, and 36 children (15 female and 21 male) took part in the behavior mapping data collection. Of these children, 31 were

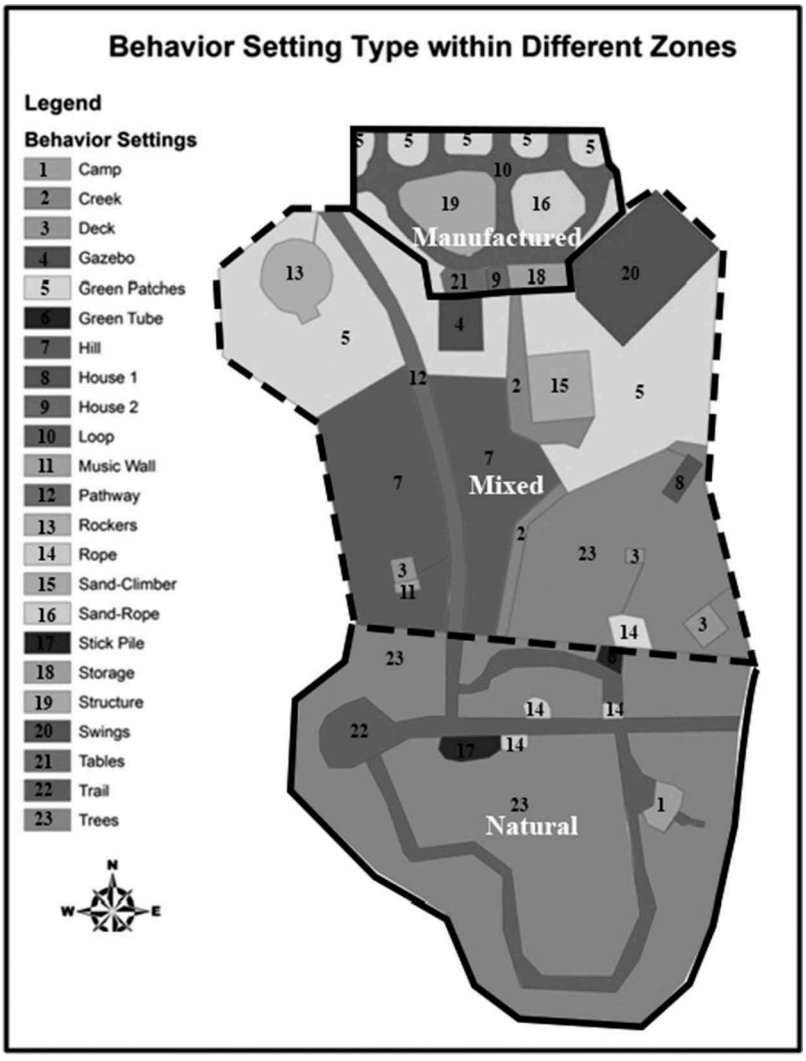

Figure 2. Diverse settings in the outdoor preschool.

Caucasian, three Asian, one Indian and one African-American. For the focus of this study, gender difference in preferences and behaviors will not be explored. Further, four early childhood educators associated with the four-to-five-year-old children agreed to be interviewed about children's daily experiences in the outdoor preschool. The teachers had bachelor's of science or master's degrees in the areas of childhood education, human development and psychology, birth to childhood education and art education. Their experience level ranged from one to 14 years of practice with young preschool children.

Data collection and analysis

The interviews were conducted during preschool hours inside the school building. Responses were recorded with a digital audio-recorder. Children's interviews followed photographic preferences and drawing sessions as starting points in which children were asked to select or draw their favorite play outdoor preschool spaces. Subsequently, children were asked to further explain the

reasons why they preferred the selected areas and the supported activities in which they engaged and enjoyed within these settings. If children were patient to continue with the interviews, they were asked to explain more about their perceptions, as well as the places they disliked in the outdoor preschool. If explaining opinions and feelings agitated children, the conversation was directed to an informal and unstructured interview.

To better understand the perceptions of early childhood educators on children's cognitive play behaviors, a series of individual interviews were conducted from four teachers. The following questions were asked:

- Do you consider outdoor spaces as a learning environment? Why?
- Which areas of the outdoor learning environment do children mostly like? How do they engage in these areas (what activity types, with what materials, etc.)?
- Which part of the outdoor learning environment offers the most 'educational' experiences for children? How do they engage in these areas?

The interview responses were transcribed and organized using hand-written notes and Microsoft Word. Once the data were classified and coded, patterns and themes were identified to create an understanding of children's cognitive play and learning experiences in playgrounds. The themes also described the teachers' views on the school's curriculum and the outdoor learning environment, the value of children's play, what children prefer and enjoy the most, and the cognitive play opportunities in each zone.

Prior to the behavior mapping observations, the research was explained to the children. Behavior mapping was employed as a quantitative research method (Moore & Cosco, 2010) to objectively record children's cognitive behaviors in the outdoor preschool. Children were observed for seven days, in 12 observation sessions and during recess hours (which began at 11:30 a.m. and 4:15 p.m. and continued for 45 minutes). Each zone was divided into multiple observation zones, with the observer positioned in a predefined place for easy scanning. After each observation zone was scanned, the observer relocated to the next observation zone.

Each child within the observation zone was observed for 10 seconds and recorded for 20 seconds. An audio device with a pre-recorded 30-second interval assured the reliability of the time sampling sequence. Rubin's (2001) Play Observation Scale definition provided the basis for coding children's cognitive play behaviors. The researcher did not interrupt children's actions unless confused regarding the behavior type (see Pack & Michael, 1995). In these instances, the child was approached and asked about their play in order to determine their type of play. This interruption was immediate and coding was continued after relocating to the predefined point of observation.

The behavior mapping data were inserted into the Geographical Information Science program. Afterwards, the information from each zone that connected spatial attributes to cognitive play behaviors was pooled and imported into the SPSS program for descriptive statistical analysis. The second level of the behavior analysis was creating a contingency table for comparing zones and distribution of cognitive play behaviors.

Results and discussion

As the research reviewed in this article suggests, evidence is mounting that natural environments are beneficial for children's development and learning. This study contributes to the growing field of research, combining teachers' and children's accounts with observational data to understand children's cognitive play behavior preferences and experiences in three outdoor preschool zones. Selected quotes and emerging themes from children and teacher's responses are displayed in Tables 1 and 2. The emerging themes from children's explanations indicated their preferences for functional play, places to hide, climb or jump (inspiring their dramatic play), explorative play in

Table 1. Representative quotations from children's accounts on their play experiences.

1. Children enjoyed fast movement and functional play opportunities in different zones

1. I like the scooters because I like riding on them. Because they go super-fast!
2. I like running down the hill.
3. People hold on to each other and chain down the slide and say 'whee'!
4. Rope swing; on the bike playground. You stand on the bucket and you swing. I like that because it's so fun on it and I like to dance on it.
5. I like the ropes. I swing a lot and play there all day long.
6. I like swinging because I like swinging back and forth and getting higher.
7. I like playing with the rockers because we get to rock.
8. I like running and kicking ball on the hill.
9. I like to run up and down it and have races. Sometimes I run on the pathway and pretend to be a snail, and I also pretend that I am a fast 'fairy' when I go over the concrete.
10. In the back woods [natural playground] I like to play on the swing because I like to swing on it.
11. I like to jump on to the swing from the logs and swing off of it and do a back flip.
12. I like the slide in the Bikes. I like it because it is really fun, and there is a lot of toys, like the rope swings and the bikes.
13. I like rolling down the grass hill.
14. I like to kick balls and run around the pathway.
15. I like playing pirate ships at the stage in the woods. We normally play football or soccer over there too.
16. I always play with the path and I always go there and run.
17. I like playing with the bikes mostly, and I just play with bikes, because sometimes I get to go fast, even though if someone is on the bike with me I can go fast.

2. Children enjoyed climbing, hiding and jumping experiences inspiring dramatic play

1. I like climbing the structure
2. I run down this hill and there is a big tire, I pretend to be an animal in the tire.
3. I hide in the sand structure and we play 'snowy wolves' where we hide.
4. We climb over the tire, and play 'boats.'
5. I jump on the rocks. It is called 'Jumping house.' We jump from one place and another friend jumps to another place, and the other friend jumps to the 'two' place. Then I jump, and other friend jumps to the 'three' place.
6. I like to play, jump over the rocks. It's where you jump on to rocks and try to miss a few of them.
7. I love the tire. I get in it and I hide under it … I also like to play jump over where I have to jump over it, it is a little hard.
8. We go inside the house and I pretend to be the 'Iron man.'
9. I play with my friends in the shelves and we hide when we are bats.
10. I like hiding in the structure and pretend to be fighters.

3. Children enjoyed explorative play opportunities in nature

1. I like the trail in back woods: I play running to find a baby cheetah.
2. I like playing in the rock area when there is water and when I have boots on. We find worms and we put them in the water and that means that dig and die or live.

4. Natural playgrounds promoted dramatic and games with rules play combined with challenge

1. You have to look for the caves in the back woods; there is just one cave that is really a house.
2. I like to run in the woods and play 'Ninja Turtles.'
3. We usually play in one of the wood houses [stick piles] and you think you are a 'kiddy' and you live in the house.
4. We play dinosaurs in the back woods.
5. I climb up on it and I like to hang from the tree.
6. In the back woods we usually play rope play.
7. I like to play hide and seek in the woods.
8. These are the trees out in the woods with lots of branches; where monkeys mostly swing on. I try to swing on it with rope to imagine.
9. I like to run fast in the woods and jump.

5. Children enjoyed playing with loose materials that supported constructive, dramatic and games with rules play

1. We make sand castles in the sand box.
2. We make a big mountain, with lava coming out or make sand castles.
3. I just mix stuff and pretend to make cakes and sometimes pretend to make food.
4. My friends and I collect sand and pretend it is pixy dust; some type of sprinkles that you think it is sprinkles that you use to make cake or cup cake.
5. I like to pick up sticks and play with them. I throw them and sometimes I scrape shells with them. We pretend fire with sticks.
6. I like to play with the sand to make food.
7. We play sticks, and chase each other.

6. Natural environments inspired different senses

1. I like to feel [touch] the trees.
2. I love to take the bark off the trees. Because sometimes we use the bark to make something, and we crack the bark on the soft place and we pull it off.

(*Continued*)

Table 1. (Continued).

7. Disliked playgrounds

1. I like all the things in the playground, except the mud. Because once I walked through the mud and I almost fell down.
2. I don't like the sand in the 'bikes' playground too much when people throw sand in my eyes
3. The bikes playground, it's boring!
4. In there [manufactured zone] there is not a lot of things out there and I always don't get bikes. The woods [natural zone] is more fun!
5. I don't like the bikes' [manufactured zone] because, there is not much to do right there.
6. I don't really like the swings because I don't really know how to use them. I'm not that good at it and it never works.

Table 2. Representative quotations from the teacher's accounts on children's experiences in the outdoor preschool.

1. Outdoor preschools as a complementary learning space for indoors

1. Children love to *jump, throw, catch, coordinate and run* in the outdoor environment; developed children's *gross motor skills*.
2. Children appear to be more *social* outside.
3. They learn about *life cycles, insects or nature*, in terms of learning outside.
4. We did this whole thing of *measuring* [indoors] and we took it outside and started measuring outside, and started measuring from the ground up and all kinds of things outside.
5. We did a bug *investigation* so that was obviously more outside learning.
6. Therefore, there is all kinds of different projects that extend to the outdoors. Outdoor spaces are totally open and almost as we consider it *as equal to the indoors*.
7. I think teachers notice how *imaginative* kids can be and how much more the kids learn by their own by being in the outdoor space. As teachers, we have noticed how much they gain from those experiences that it almost allows us teachers to automatically integrate them to our lesson plans.
8. Outdoors is a space for children to run and be more *physical and get their energy out*, but some kids doesn't even want that. I do see a variety of kinds of play outside. We do have some children that are not clearly gross-motor advanced as others.
9. Outdoor learning can definitely *tie into many aspects of our curriculum*, more creativity, social aspects; it gets the children to talk to each other a lot. It might not be direct but it has lots to offer.

2. Comparing different playgrounds

1. Children develop their *motor skills* by riding with the bikes and playing with the sand [in the manufactured zone], which is fun for them. They get to do the most *experiments* in the back woods.
2. When children play on playground structures, it is very much *predictable*. The steps are always a certain measure of height and the slide, and it's the same every time. But when they are in the woods, they climb up on the logs; and this log might be different from that log; and it might roll over; and it might crunch. They really *learn their bodies* out there. It's fun! They enjoy it.
3. We don't typically bring materials out to the woods, because it's a more *creative* space. It is different since if you ought to do that in the [manufactured] playground, it is almost a very different atmosphere. They just use that space more differently because there are so many *places to hide* and *so many things to do* out there with the natural environment that already creates that kind of situation.
4. It is important to be able to have that times for the kids to *explore* and *understand about nature and life cycles*, and *animals* [in the natural zone], that we *don't see that much often on a man-made [manufactured] playground*.
5. Children spread out and can *work together on things*. As long as they stick to the trails, they can do their own *exploring*. There are things for them to have a look at in the woods. For example, they can even just roll over the bugs and look at bugs. In the woods [natural zone], we *don't see any arguments* and they can branch out and do their own thing. Considering the age of children, as they get older they kind of *lose interest of the bike playground* because the playground's structure is *small*; the sand kind of gets *boring* for them after a little bit. The hill, there is enough for them to do; we just have to keep introducing *new loose parts*. The woods, is somewhere that is *constantly evolving*.
6. Just comparing the hill compared to the bikes, the hill is so much *open*, they have so much space to be *imaginative*. They often do that in the hill compared to the bikes. Also in the manufactured playground, they *don't have much space to run* and be as *imaginative* and *open* as their play can be. Whereas, out in the hill we may not always provide them a lot of things but that space provide them so many opportunities to *create*. Children are *more limited* when they are in the bike playground.

3. Children's preference for playgrounds

1. I think the hill is the best, and that's because there is a more *variety* of *areas to play* in. There is a flat grassy area, rock area, climbing feature, the swing, there is houses and back woods in that area.
2. I think they get excited about the *swings*, and a lot of our kids know how to swing, and they do different things on swings: sometimes they stand on it; lay on it; or whatever. Same things happen on the bikes [zone]. They run out to get the *bikes* first, then they lose interest, and they go to the *pretend place*.
3. The hill and the woods are their favorite, just because they can be *more open and imaginative*. If we let it up to them to choose everyday maybe one time out in the week, they choose the bike; but the rest of the time will be the hill and the woods. Because we cannot always see wherever they go, and they can be rather *hidden*, or they can play *hide and seek*, and they can play all those *games*. Whereas, up here [manufactured zone] they are more *noticeable* and more seen, and it is almost as they can't get away with their play as they much as they can as it is so much more open out there.
4. Some kids like the bike playground because they can *play basketball*. There is *sand* in both [mixed and manufactured playground]. So that does not play too much of a factor

(*Continued*)

Table 2. (Continued).

5. Most children like the back woods [natural zone] because *they do something different*. We don't go there every day, and they look forward to going back there. Sometimes I begin a project, they take over, and that rather *takes them involved*. The woods [zone] is always *developing*, so there is *always introducing new things* and *trying new things* so the kids like it back there.

4. Children enjoy risky behaviors and independent mobility in natural and mixed playgrounds

1. When you see kids, you worry that they might get hurt or they might fall down. But they really can *control their bodies*. A lot of kids fall down; they just hop back up and try again. They say, 'No, I don't want your help. I can do it myself.' They have that *pride*, and it's a more free space [in the natural zone] to be *creative*. Their *imagination* kind of sparks out there.
2. Therefore, it is almost like that they realize that there is a risk, and they know that the supervision for the woods and hill allows them to be more *responsible*. We never talked to them about that, but they can internalize that, and they realize that, 'You knows we are older now; *we can take care of ourselves*.' We talk about responsibility in the classroom, and it allows them to be more *independent* in setting boundaries and seeing what boundaries are good to test and which ones are not.

5. Natural and mixed playgrounds offering diverse cognitive play chances

1. Children are *finding the bugs underneath the logs*, climbing the trees, running around playing games and making up games with other friends.
2. Children learn about *nature and science, change of seasons, the weather and the bugs*, and beyond that in the outdoor play environments.
3. Then we also got the woods [natural zone] and hills [mixed zone] that have more *natural types of environments* like animals and bugs. There children focus on *planting and taking care of plants* and watching it grow from the seed to a giant plant.

6. Natural playgrounds and learning opportunities

1. The woods provide a lot of *educational* experience because you see a lot of *nature* happening there.
2. I can see some kids to be more *outgoing* in the woods, because once again we are not providing the toys for them; they are *making up their own game* and are more *willing to play and choose who to play with*.
3. In the natural playground, children *talk* a lot, and they even say, 'We are in the same *team*' or 'Let's work together,' even [when they are] just picking up a stick, or *building* something that they all can use.
4. I think the back woods has the most educational experiences for them because it offers that natural environment for them to *explore*. They can *cooperate* in projects. They get to *build* things. It offers the most opportunities for *creativity* for them.

nature, dramatic play and games in the natural zone, and loose elements for diverse cognitive play stimulation. The developed themes from the teacher's accounts explain the value of outdoors for children's learning, comparison of the zones, children's joy for risky play, diverse play options in mixed and natural zones, and the learning capacity of the natural zone for children. The behavior mapping data produced 6801 data points, which were somewhat evenly distributed in natural, mixed and manufactured zones (n = 2225, 32.7%; n = 2483, 36.5%; and n = 2093, 30.8%, respectively). Table 3 presents the contingency table that compares how different zones provided particular cognitive play types (within cognitive), and the distribution of cognitive plays in each zone (within zone).

Table 3. Cognitive play behavior instances in the natural, mixed and manufactured zones.

		Cognitive play behaviors							
Category of behavior settings		Functional	Constructive	Exploratory	Dramatic	Games with rules	None	Sum	χ^2
Natural	Count	683	180	285	825	68	184	2225	281.704***
	% within zone	30.7	8.1	12.8	37.1	3.1	8.3	100	
	% within cognitive	27.5	47.2	45	40.2	12.2	26.4		
Mixed	Count	874	111	271	666	345	216	2483	201.469***
	% within zone	35.2	4.5	10.9	26.8	13.9	8.7	100	
	% within cognitive	35.2	29.1	42.7	32.5	62.1	30.9		
Manufactured	Count	925	90	78	559	143	298	2093	224.863***
	% within zone	44.2	4.3	3.7	26.7	6.8	14.2	100	
	% within cognitive	37.3	23.6	12.3	27.3	25.7	42.7		

Note: degrees of freedom = 5, n = 6801.

Teachers considered the outdoors as an extension to the indoor curriculum, critical for children's social, physical and cognitive experience (Denham, 2006; Gehris, Gooze, & Whitaker, 2015). They perceived that each zone supported a certain area of development necessary for children's health and well-being. Teachers mentioned that the outdoor space created different educational opportunities for children, enabling them to learn about their bodies, their surroundings and science. This perception emerges in Gardner's (1993) theory of 'Multiple Intelligence,' suggesting that individuals have different learning styles in which they process and analyze information. Children also learn through hands-on experiences (touching, doing, moving) or observing and hearing. In contrast to the manufactured playground, the behavior mapping analysis demonstrates that the natural zone had the lowest percentage of non-play behavior. Accessible loose elements, seasonal variation, open and loosely designed qualities, and continuity of experiences (Fjortoft, 2000; Moore & Wong, 1997; Ouvry, 2003; Tai et al., 2006) encouraged a diverse spectrum of cognitive play that was not offered in the manufactured zone.

Children expressed their interest for the ranging cognitive play opportunities offered in natural settings within the natural and mixed zones. Teachers also confirmed children's preferences for diverse and constantly evolving play settings within the natural and mixed zones that support opportunities for hiding, imagining, creating games and playing in groups. Therefore, one possible explanation for the importance of natural zones for children's cognitive play is based on previous knowledge (Fjortoft, 2004; Fjortoft & Sageie, 2000; Staempfli, 2008) along with the results from this study, which indicate that the diversity of natural settings stimulates complex and exciting play opportunities for children with different learning styles. The diverse play options helped children develop new strengths and awareness that extended their understanding of the world. Teachers expressed that the natural zone enabled children to be independent and provide personal nooks and child-scaled spaces. The unstructured, creative play in the natural zone offered children chances to learn social abilities and administer emotions with peers (Denham, 2006; Gehris et al., 2015; Louv, 2005; Wells & Evans, 2003). Consistent with prior literature (Maynard et al., 2011), the teachers explained that the natural environment stimulated children's teamwork, imagination, social interaction, sense of responsibility and competence.

Teachers' and children's accounts reflected their enjoyment of functional play opportunities (jumping, rolling, biking, running) that were the most observed cognitive play in the three playgrounds. The behavior mapping results suggest that the manufactured zone and mixed zone respectively offered 13.5% and 7.7% more functional play than the natural zone (Table 2). Pursuant to previous literature (Barbour, 1999; Hestenes, Shim, & DeBord, 2007; Sandseter, 2009; Woolley & Lowe, 2013), this result relates to the account that the manufactured and mixed zones included features such as the climbing structure, slides, swinging ropes, swings or rockers that mainly support functional play and gross motor activities (Figure 3). In the manufactured zone, children engaged in a higher proportion of functional (37.3%) and non-play behaviors (42.7%), compared with the other zones (Table 3). This result is similar to Campbell and Frost's (1985) findings that indicated approximately 90% of play in a traditional playground was a combination of functional and non-play.

As suggested in prior studies (Moore & Cosco, 2007; Zamani, 2012), another quality that promoted functional play in the manufactured and mixed zones was the existence of hard-surfaced pathways. As teachers and children noted, pathways encouraged fast movement functional behaviors (biking, kicking balls, running, etc.) (Figure 4) that children enjoyed (Sandseter, 2007). Comparing different playgrounds, teachers also perceived that the manufactured zone offered more functional play chances and was more predictable and uninteresting for aging children. Some children expressed the tedious and unexciting quality in the manufactured zone or manufactured settings (such as swings) due to the lack of diverse play opportunities.

Congruent with prior literature (Hestenes et al., 2007), the behavior mapping demonstrated children to be less engaged in functional play in the natural zone, compared with the other zones. One possible explanation for this finding might be connected to the implementation of Rubin's

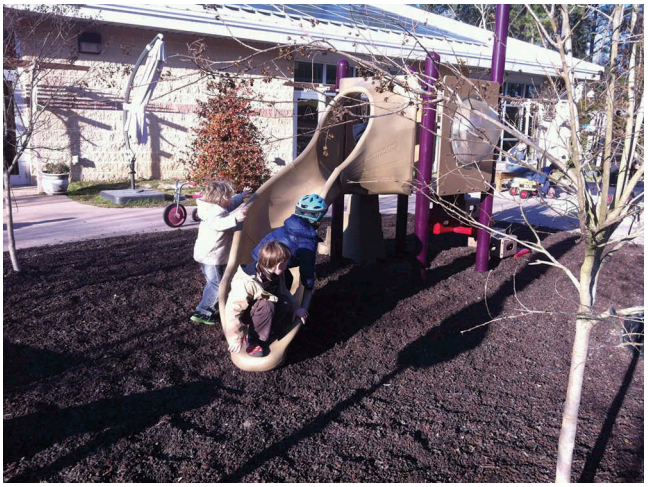

Figure 3. The play structure in the manufactured zone offered exciting and challenging functional play and look-out opportunities that children enjoyed.

Figure 4. Children enjoyed biking and running along the looped pathway in the manufactured zone. The image shows how the available loose material (buckets, shovels, mulch, sand) in this zone promoted dramatic play behaviors for children.

(2001) coding protocol, in which when more than one category of cognitive play behavior occur simultaneously, the theoretically higher category is coded. For instance, if a child was running during a game, it was coded for the games with rules (Figure 5). Highlighting the cognitive play value of natural settings, in many instances the natural zone offered higher levels of cognitive play, compared with the manufactured zone, and consequently provided fewer instance of functional play. In fact, Gehris et al. (2015) found that incorporating natural features into the design of outdoor playgrounds stimulated children's curiosity for exploring the environment and consequently stimulated their movement.

The natural zone provided almost twice as much constructive play as the manufactured zone, along with the most exploratory and dramatic play compared with the other zones. Consistent with prior studies (Maxwell, Mitchell, & Evans, 2008), children preferred loose or modifiable elements and noted that the abundant natural loose elements in natural and mixed zones inspired their

Figure 5. In the natural zone, children played games and chased each other along the trail, while engaged in high levels of physical movement.

constructive, dramatic and game with rules play (Figure 6). In agreement with previous research (Gehris et al., 2015; Norðdahl & Einarsdóttir, 2015; O'Brien & Murray, 2007; Ridgers et al., 2012), children enjoyed creating dens and fireplaces or decorating trees in the natural zone. This result draws upon Nicholson's (1973) theory of loose parts which asserts that the inclusion of loose parts in the environment offers many play chances and stimulates creativity that is unlikely to be found in settings with fixed elements. The availability of loose elements increased the chances of constructive play, dramatic play and games that have been shown in previous studies (Czalczynska-Podolska, 2014; Malone & Tranter, 2003; Maxwell et al., 2008; Norðdahl & Einarsdóttir, 2015; Woolley & Lowe, 2013; Zamani, 2012). Teachers also expressed how children enjoyed creating imaginary objects with loose elements. They also believed that loose elements increased children's play duration.

Recent literature is concerned with children's opportunities to explore their surroundings (Louv, 2005; Malone & Tranter, 2003). Evaluating the distribution of observed instances of exploratory play shows a similarity where natural zones accounted for 45% of the total and mixed zones accounted for 42.7%, while in contrast only 12.3% occurred within the manufactured zone (Table 3). Creatures, ecosystems, water, sand, dirt and trees in the natural settings that existed in natural (Figure 7) and mixed (Figure 8) zones fascinated children and inspired their exploratory play, which is consistent with previous literature (Fjortoft & Sageie, 2000; Lester & Maudsley, 2007; Norðdahl & Einarsdóttir, 2015; O'Brien & Murray, 2007; Ridgers et al., 2012; Titman, 1994). These exploratory experiences stimulated children's scientific curiosity to create realistic theories about the world (Ouvry, 2003; Waite, 2010). In contrast to the manufactured zone, teachers believed the seasonal change, variety of creatures and flexibility of natural features in both natural and mixed zones provided positive outcomes on children's knowledge about nature, supported hands-on learning experiences and promoted children's curiosity and sense of wonder (Fjortoft & Sageie, 2000; Gehris et al., 2015; Maynard et al., 2011; O'Brien & Murray, 2007; Ouvry, 2003; Ridgers et al., 2012; Waite, 2010).

In the natural zone, trees created a sense of mystery, change and ambiguity that inspired challenging and exciting games. Teachers surmised that the variety of plants and creatures in the natural zones inspired children's sense of curiosity and imagination, when in fact children's exploratory play within the mixed zone typically happened where the natural zone extended to the woods behavior setting. For instance, the stone-covered stream or trees in the mixed zones inspired children's curiosity to explore worms, bugs or plants. The mixed zones combined the

Figure 6. Children enjoyed collecting sticks and logs in the natural zone. These stick-pile settings promoted hiding, look-out and balancing, as well as dramatic and constructive play opportunities.

Figure 7. Children explored creatures, such as ants, worms or bugs, in the natural zone.

diverse quality of nature (Cosco, 2006; Fjortoft & Sageie, 2000) with the challenging characteristics of manufactured elements, thus stimulating various behaviors in children.

Cosco (2006) recommends integrating nature with manufactured components in children's playgrounds to encourage diverse play behaviors. In the mixed zone, children enjoyed collecting manufactured loose and natural loose elements and arranging them in these semi-enclosed, private spaces (such as the play houses). Similar to the natural zone, the existing trees in the mixed zone offered many natural props that children incorporated into their games and imaginative play (Figures 9 and 10). The open and loose design of the mixed zone with its available loose elements enabled this zone to provide most of the observed game with rules behaviors (62.1%), compared with the natural (12.2%) or manufactured (25.7%) zones (Table 3). In fact, the integration

Figure 8. Children explored for creatures under the dried rock-covered river setting in the mixed zone.

Figure 9. The 'woods' setting inside the mixed zone provided abundant natural and manufactured loose materials that inspired diverse spectrums of cognitive play and challenging behaviors.

of natural and manufactured settings and elements in the mixed zone supported a diverse and higher spectrum of cognitive play that was individually provided in natural or manufactured zones.

Another topic emerging from teachers' interviews and children's accounts was the children's preference for risky and challenging activities, especially involving heights, high speeds and playing without adult supervision (Sandseter, 2007). Risk-taking behavior can positively inspire children's learning through flexibility and mischievousness (Carr & Claxton, 2002; Little, 2006; Sandseter, 2009; Waters & Begley, 2007). As a result of adults' concerns on potential injuries, many playgrounds lack challenging and risky opportunities (Little, 2006; Waters & Begley, 2007). Corresponding with Sandseter's (2009) findings, children expressed interests for challenging and risky opportunities that were provided through diverse manufactured or natural features in different zones, such as tree-climbing or jumping off logs (Figures 6 and 9). Teachers also mentioned children's risky behavior in the natural zone that developed children's sense of

Figure 10. Play houses provided places to hide, imagine and collect loose materials in the mixed zone.

pride, knowledge about their bodies and self-confidence. Extending on previous findings (Fjortoft, 2000; Moore & Wong, 1997; Waters & Begley, 2007), the results indicate that the natural and mixed zones were more challenging and exciting for children, compared with the 'boring' manufactured zone. Thus, as suggested by previous investigators (Czalczynska-Podolska, 2014; Sandseter, 2009), the findings suggest the importance of creating a balance between features that encourage and permit children to try new things and risk, and simultaneously make certain they are safe.

Consistent with prior studies (Fjortoft & Sageie, 2000; Ihn, 1998; Norðdahl & Einarsdóttir, 2015; Sandseter, 2007; Tai et al., 2006), children pointed to their preferences for places to hide from adults, inspect and overlook the surroundings. Children imagined the hide-outs to be 'prisons,' a 'haunted house' or their 'home' (Figures 6 and 10). These opportunities simultaneously inspired children's risk-taking, dramatic and games with rules behaviors. Teachers perceived the hiding opportunity was mostly offered in the mixed and natural zones with a combination of open spaces, climbable fixed features (trees, play structure, ropes, etc.) and semi-private spaces (play houses, tubes, tire, etc.) (Figure 10).

Finally, the results emphasize the importance of the preschool's and teachers' pedagogical philosophy on young children's cognitive play experiences. According to previous studies, trained teachers are more responsive toward children's development and daily experiences in childcare settings (Gehris et al., 2015; Maynard & Waters, 2007; Maynard et al., 2011). In agreement with Maynard et al. (2011), teachers' visions and practical experience influenced their approach and control during outdoor learning experiences. The trained and educated teachers expressed and recognized the significance of outdoor environments for young children's educational experiences. Integrating the indoor curriculum with the outdoors, teachers provided diverse learning experiences. They also recognized that the educational opportunities within the outdoor preschool were mostly associated with the physical qualities, settings and elements within each zone.

This study contributes to the growing field of research with children and teachers about their ideas on outdoor preschool environments that are supportive for diverse cognitive play. The findings support much of the previous research, indicating children's preferences for diverse play opportunities in outdoor preschools that are inviting, exciting, challenging, changeable and inspiring. Extending the gap of research, the results confirm the cognitive play value of natural components in outdoor preschool zones.

Limitation and future research recommendations

There are some clear limitations to the study. This study involved a limited number of early childhood educators and children from one unique preschool. Therefore, their comments and perceptions may not be representative of other early childhood education programs. Secondly, verbal communication with some children was problematic, as they were not comfortable or patient to converse with the researcher. Subsequently, in some instances the researcher was not able to conduct in-depth interviews to understand the reasons for selecting particular photographs. Thirdly, some children had shorter memory spans for recalling past events. Fourthly, the children participating in this research were mostly Caucasians with high socio-economic backgrounds. To fulfill the gap of knowledge, future research is suggested to explore how young children from different ages, ethnicities, cultures, family background, parent education and economic level display or prefer various cognitive play behaviors.

Finally, considering this study's focus on a single case, the comparisons of the three zones are too weak for generalizations. This drawback was addressed by collecting more than 2000 observational data points in each zone and considering the teachers and children's viewpoints. Further research on diverse outdoor preschools is needed to complement these results. For future studies, it is recommended to control for children's cognitive development level and to record for children's play duration, social interactions and physical activity levels. This knowledge proposes a more comprehensive understanding of children's environment and behavior interactions in outdoor preschools.

Conclusion

Despite the limitations mentioned, this study can fill a gap in the area of children's play and playground research. This article shows the importance of natural and mixed playgrounds from the perspectives of preschool children and early childhood educators. These playgrounds provided an open-ended spectrum of cognitive play, challenging experiences and evolving knowledge of the environment. Nevertheless, the manufactured zone mainly offered functional play that, over time, developed a tedious, uninteresting and less challenging experience for some children. The results highlight the value of the mixed zone that combined the qualities of manufactured and natural playgrounds. In contrast with the mostly prevalent concrete outdoor preschool playgrounds that offer no direct contact with natural phenomena, the results of this study emphasize the importance of accessible natural elements in natural and mixed zones for children's science learning, exploratory and dramatic plays. Children preferred the complex, variable and explorative qualities in the natural zone that inspired their games, teamwork, creativity and imagination.

The results provide some guidance for investigators, practitioners, landscape designers, school communities and policy-makers on the possibility for nature-friendly initiatives to address and hopefully amplify children's cognitive play levels in outdoor preschools. The findings suggest supportive outdoor preschool playgrounds for cognitive play behaviors to include: accessible natural and manufactured loose elements; a number of natural settings, in the context of human-built features, that develop ecosystems, provide direct contact with nature, support different learning styles and satisfy children's curiosity to learn about nature; and implications for a balance between risk-taking and safe features in playgrounds that promote children's sense of excitement and enjoyment during free play in outdoor preschools. With the multiple cognitive play opportunities provided in natural and mixed zones, the results encourage pedagogical approaches that emphasize the educational value of outdoor preschools, integrate outdoor classrooms into the curriculum and ensure children's direct access and interaction with natural environments during free play.

Disclosure statement

No potential conflict of interest was reported by the author.

Author biography

Dr Zahra Zamani is a postdoctoral research associate in the School of Architecture of the Center for Health Facilities Design and Testing at Clemson University. With a multi-disciplinary architecture and landscape architecture design background, she holds her PhD in Design from the College of Design, Raleigh, NC, USA. She is interested in evidence-based design topics that focus on health, learning, safety and development outcomes. Her areas of proficiencies include healthcare design research, children's outdoor learning environments, health-promoting urban settings and qualitative–quantitative research methods. She is a regular speaker at many national conferences such as those of the Environmental Design Research Association and the Council of Educators in Landscape Architecture, and the Healthcare Design Conference.

References

Barbour, A. C. (1999). The impact of playground design on the play behaviors of children with differing levels of physical competence. *Early Childhood Research Quarterly*, *14*(1), 75–98. doi:10.1016/S0885-2006(99)80007-6

Berto, R. (2005). Exposure to restorative environments helps restore attentional capacity. *Journal of Environmental Psychology*, *25*(3), 249–259. doi:10.1016/j.jenvp.2005.07.001

Burdette, H. L., & Whitaker, R. C. (2005). Resurrecting free play in young children: Looking beyond fitness and fatness to attention, affiliation, and affect. *Archives of Pediatrics & Adolescent Medicine*, *159*(1), 46. doi:10.1001/archpedi.159.1.46

Campbell, S., & Frost, J. (1985). The effects of a playground type on the cognitive and social play behaviors of grade two children. In J. Frost & S. Sunderlin (Eds.), *When children play: Proceedings of the international conference on play and play environments* (pp. 81–87). Wheaton, MD: Association for Childhood Education International.

Carr, M., & Claxton, G. (2002). Tracking the development of learning dispositions. *Assessment in Education: Principles, Policy & Practice*, *9*(1), 9–37. doi:10.1080/09695940220119148

Corraliza, J. A., Collado, S., & Bethelmy, L. (2011). Effects of nearby nature on urban childrens' stress. *Asian Journal of Environment-Behaviour Studies*, *2*(4), 27–38.

Cosco, N. G. (2006). *Motivation to move: Physical activity affordances in preschool play areas* (dissertation). Edinburg College of Art (Scotland): School of Landscape Architecture, Heriot Watt University, Edinburg.

Czalczynska-Podolska, M. (2014). The impact of playground spatial features on children's play and activity forms: An evaluation of contemporary playgrounds' play and social value. *Journal of Environmental Psychology*, *38*, 132–142. doi:10.1016/j.jenvp.2014.01.006

Denham, S. A. (2006). Social-emotional competence as support for school readiness: What is it and how do we assess it? *Early Education and Development*, *17*, 57–89. doi:10.1207/s15566935eed1701_4

Farmer-Dougan, V., & Kaszuba, T. (1999). Reliability and validity of play-based observations: Relationship *between* the PLAY behaviour observation system and standardised measures of cognitive and social skills. *Educational Psychology*, *19*(4), 429–440. doi:10.1080/0144341990190404

Fjortoft, I. (2000). *Landscape as playscape: Learning effects from playing in a natural environment on motor development in children*. Doctoral Dissertation. Oslo: Norwegian University of Sport and Physical Education.

Fjortoft, I. (2004). Landscape as playscape: The effects of natural environments on children's play and motor development. *Children, Youth and Environments*, *14*(2), 21–44.

Fjortoft, I., & Sageie, J. (2000). The natural environment as a playground for children: Landscape description and analyses of a natural playscape. *Landscape and Urban Planning*, *48*(1–2), 83–97. doi:10.1016/S0169-2046(00)00045-1

Gardner, H. (1993). *Multiple intelligences: The theory in practice*. New York, NY: BasicBooks.

Gehris, J. S., Gooze, R. A., & Whitaker, R. C. (2015). Teachers' perceptions about children's movement and learning in early childhood education programmes. *Child: Care, Health and Development*, *41*(1), 122–131.

Hestenes, L., Shim, J., & DeBord, K. (2007). *The measurement and influence of outdoor child care quality on preschool children's experience*. Paper presented at the Biennial Conference for the Society for Research in Child Development, Boston, UK.

Ihn, H. (1998). Analysis of children's equipment choices and play behaviors in outdoor environments. *Early Childhood News*, *10*(4), 20e24.

Lester, S., & Maudsley, M. (2007). *Play, naturally: A review of children's natural play*. London: National Children's Bureau.

Little, H. (2006). Children's risk-taking behaviour: Implications for early childhood policy and practice. *International Journal of Early Years Education*, *14*(2), 141–154. doi:10.1080/09669760600661427

Louv, R. (2005). *Last child in the woods* (2nd ed.). Chapel Hill, NC: Algonquin Books of Chapel Hill.

Malone, K., & Tranter, P. (2003). Children's environmental learning and the use, design and management of school-grounds. *Children, Youth and Environments*, *13*(2), 87–137.

Maxwell, L., Mitchell, M., & Evans, G. (2008). Effects of play equipment and loose parts on preschool children's outdoor play behavior: An observational study and design intervention. *Children, Youth and Environments*, *18*(2), 37–63.

Maynard, T., & Waters, J. (2007). Learning in the outdoor environment: A missed opportunity?. *Early Years*, *27*(3), 255–265. doi:10.1080/09575140701594400

Maynard, T., Waters, J., & Clement, J. (2011). Moving outdoors: Further explorations of 'child-initiated' learning in the outdoor environment. *Education 3-13*, *41*(3), 1–18.

Moore, R., & Cosco, N. (2007). What makes a park inclusive and universally designed? In P. C. a. T. Ward Thompson (Ed.), *Open spaces people space* (pp. 85–110). London: Taylor & Francis.

Moore, R., & Cosco, N. (2010). Using behaviour mapping to investigate healthy outdoor environments for children and families: Conceptual framework, procedures and applications. In C. W. Thompson, P. Aspinall, & S. Bell (Eds.), *Innovative approaches to researching landscape and health* (pp. 33–72). London: Taylor & Francis.

Moore, R. C., & Wong, H. (1997). *Natural learning: The life history of an environmental schoolyard: Creating environments for rediscovering nature's way of teaching*. Berkeley, CA: MIG Communications.

Nicholson, S. (1973). The theory of loose parts. *Man/Society/Technology – A Journal of Industrial Arts Education*, *32*(4), 172–175.

Norðdahl, K., & Einarsdóttir, J. (2015). Children's views and preferences regarding their outdoor environment. *Journal of Adventure Education and Outdoor Learning*, *15*(2), 152–167. doi:10.1080/14729679.2014.896746

O'Brien, L. (2009). Learning outdoors: The Forest School approach. *Education 3–13*, *37*(1), 45–60.

O'Brien, L., & Murray, R. (2007). Forest School and its impacts on young children: Case studies in Britain. *Urban Forestry & Urban Greening*, *6*(4), 249–265. doi:10.1016/j.ufug.2007.03.006

Ouvry, M. (2003). *Exercising muscles and minds: Outdoor play and the early years curriculum*. London: National Early Years Network.

Pack, A. R., & Michael, W. B. (1995). *A comparison of two methods of data collection in analyzing social and cognitive play behavior*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.

Ridgers, N. D., Knowles, Z. R., & Sayers, J. (2012). Encouraging play in the natural environment: A child-focused case study of Forest School. *Children's Geographies*, *10*(1), 49–65. doi:10.1080/14733285.2011.638176

Rubin, K. H. (2001). *The play observation scale (POS)*. College Park, MD: University of Maryland, Center for Children, Relationships, and Culture.

Sandseter, E. B. H. (2007). Categorising risky play—how can we identify risk-taking in children's play?. *European Early Childhood Education Research Journal*, *15*(2), 237–252. doi:10.1080/13502930701321733

Sandseter, E. B. H. (2009). Affordances for risky play in preschool: The importance of features in the play environment. *Early Childhood Education Journal*, *36*(5), 439–446. doi:10.1007/s10643-009-0307-2

Staempfli, M. B. (2008). Reintroducing adventure into children's outdoor play environments. *Environment and Behavior*, *41*(2), 268–280. doi:10.1177/0013916508315000

Tai, L., Haque, M. T., McLellan, G., & Knight, E. J. (2006). *Designing outdoor environments for children: Landscaping schoolyards, gardens, and playgrounds*. New York, NY: Mc Graw-Hill.

Titman, W. (1994). *Places; special people: The hidden curriculum of school grounds*. London: World Wildlife Fund for Nature/Learning Though Landscapes.

van den Berg, A. E., Hartig, T., & Staats, H. (2007). Preference for nature in urbanized societies: Stress, restoration, and the pursuit of sustainability. *Journal of Social Issues*, *63*(1), 79–96. doi:10.1111/josi.2007.63.issue-1

Waite, S. (2010). Losing our way? The downward path for outdoor learning for children aged 2–11 years. *Journal of Adventure Education & Outdoor Learning*, *10*(2), 111–126. doi:10.1080/14729679.2010.531087

Waters, J., & Begley, S. (2007). Supporting the development of risk-taking behaviours in the early years: An exploratory study. *Education 3–13*, *35*(4), 365–377.

Wells, N., & Evans, G. W. (2003). Nearby nature: A buffer of life stress among rural children. *Environment and Behavior*, *35*, 311–330. doi:10.1177/0013916503035003001

Woolley, H., & Lowe, A. (2013). Exploring the relationship between design approach and play value of outdoor play spaces. *Landscape Research*, *38*(1), 53–74.

Zamani, Z. (2012). *The comparison of cognitive play affordances within natural and manufactured preschool settings*. Paper presented at the EDRA: May 2012 Emergent Placemaking, Providence Rhode Island.

Zamani, Z., & Moore, R. (2013). The cognitive play behavior affordances of natural and manufactured elements within outdoor preschool settings. *Landscape Research*, *1*, 268–278.