YOUNG CHILDREN’S COGNITIVE PLAY PREFERENCES FOR NATURAL, MIXED, OR MANUFACTURED SETTINGS IN OUTDOOR PRESCHOOL

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1 ABSTRACT

Emphasizing the value of hearing children’s voices, this study combined drawings, photo preferences, and interviews to understand the perspectives and experiences of four- to five-year-old children. Children were enrolled in a preschool with diverse manufactured, mixed, and natural settings. After identifying and illustrating their preferred spaces, children were asked about their favorite play spaces, kinds of play they enjoy, and the reasons for drawing or selecting certain photos. The data was coded for different settings (natural, mixed, manufactured) and cognitive play behaviors (functional, constructive, exploratory, dramatic, and games with rules). Children mainly preferred settings that offered challenging, diverse experiences, and learning opportunities, such as the trees, sand, or hill. They enjoyed height alterations, hideouts, complexity, adaptability, and changeable qualities in mixed settings that were composed of natural and manufactured features. Children emphasized how mixed settings provide opportunities for functional, constructive, dramatic, and games with rules play behaviors. In addition, children expressed their interest for exploring creatures and natural cycles in natural settings. Natural loose parts expanded the ranges of cognitive play in mixed and natural settings. The findings suggest landscape architects incorporate natural and mixed settings for encouraging a diverse spectrum of cognitive play, as well as exciting hands-on learning opportunities for young children.

1.1 Keywords

Behavior settings, outdoor preschool, challenging play, young children, cognitive play
2 INTRODUCTION

Play promotes children’s physical abilities and stimulates them to practice communication, thus contributing to their physical, social, and cognitive development (e.g., Burdette, & Whitaker, 2005; Piaget 2007; Pellegrini 2009). Enhancing children’s play behavior requires certain interactions and experiences that are provided through complex and diverse environmental qualities (Little & Sweller, 2015; Storli & Hagen, 2010). Research indicates that outdoor natural environments provide flexible and diverse learning and play opportunities (Storli & Hagen, 2010; Fjortoft & Sageie 2000; Fjortoft, 2004; Moore & Cosco, 2007) that promote children’s creativity, discovery, and motivation to play (Thomas & Harding, 2011; Waters & Maynard, 2010). Sensory experiences in natural environments support children’s hands-on learning (such as, touching, smelling, hearing), risk-taking, and self-managed behaviors (Fjortoft & Sageie, 2000; Magraw, 2011; Sandseter, 2009; Thomas & Harding, 2011).

Tracing children’s development through play behavior observation assessments (Farmer-Dougan & Kazuba, 1999), some forms of play have been termed as “cognitive play” that is associated with children’s neurological and psychological development in terms of information processing, conceptual resources, language acquisition, or other areas of brain development (Farmer-Dougan & Kazuba, 1999; Flavell, 1992). Rubin (2001) classifies cognitive play behaviors into:

1) **Functional.** Involves simple or repetitive motor behavior, such as jumping, climbing, etc.
2) **Constructive.** This behavior is recognized when children manipulate and shape an already familiar material with a direct goal in mind.
3) **Exploratory.** Identified when children examine the qualities of objects to gather visual data about physical features.
4) **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.
5) **Games with rules.** Identified when children employ a sense of competence with peers while creating regulations for games.

The characteristics of outdoor preschools may provide varying degrees of cognitive play opportunities. The concept of behavior settings provides a theoretical base for measuring behavioral connections between designed physical settings and cognitive play behaviors. Barker (1976) identified behavior setting as subspaces with distinguishable spatial and temporal boundaries that predict behavioral opportunities. Cosco (2006) classifies behavior settings into:

1) **Natural:** These settings primarily compromise of vegetation, trees, gardens, and wild play spaces defined by plants. 2) **Mixed:** These settings encompass a balanced proportion of natural and manufactured environments (pathway, sand-climber, etc.). 3) **Manufactured:** These settings mostly include fixed and human-built elements (play equipment, shade structures, etc.).

In 2012, almost 53.5% of three to four years old U.S. children spent their time in preschools or structured childcare programs (Snyder & Dillow, 2015). Nevertheless, inadequate attention is given to the cognitive play opportunities in outdoor childcare centers. Further, it is essential for research on children’s environments to regard children as individuals with a right to express opinions (Clark & Statham, 2005). Therefore, the aim of this study is to identify the preferences of young children for cognitive play behaviors and settings in an outdoor preschool environment. Identification of these settings and attributed cognitive play behavior opportunities could be included in the design and provision of future preschool outdoor play areas.

3 SITE SELECTION

Consulting with experts in the field of nature-play, twenty existing outdoor learning environments in North Carolina were evaluated for their diversity in behavior settings. Outdoor preschools were compared based on the availability of natural, mixed, and manufactured settings. The study aimed for a site that had plenty and comparatively balanced types of settings. The evaluation found many outdoor preschools with mixed and manufactured settings, yet without any natural settings. Consulting with experts in the field revealed an exceptional outdoor preschool environment in a suburban area of Durham, North Carolina. The site consisted of three natural (0.11 acres), mixed (0.48 acres) and manufactured (0.4 acres) playgrounds (Figure 1).
4 DATA GATHERING

Data gathering combined photo preference (N=22, 13 female and 11 male), drawings (N=24, 13 female and 9 male), and interviews (N= 21, 13 female and 8 male) to understand children's perspectives about their experiences in the outdoor preschool. The photo preference and drawing methods were employed to sharpen children's memory and communication skills. Reviewing twenty-two pictures, children were asked to select three of their favorite areas in the outdoor preschool. Afterwards, they were interviewed about the reasons for selecting each of the photos and the type of play they usually engage in the associated settings.

Figure 1. The outdoor preschool and diverse settings. Diagram by the author.
Once children had selected their favorite photos, they were asked if they wanted to draw their favorite play places within the outdoor preschool. Subsequently, children were asked about what each illustrated feature represents and their favorite play in the associated setting. In the meanwhile notes were documented on the drawing. The open-ended interviews immediately followed the photo preference and drawings sessions, using the previous methods as starting points to sharpen children’s memories. If the child was willing to continue participating in the data collection, they were asked to further describe their experiences and interesting memories during outdoor play.

5 ANALYSIS AND RESULTS

5.1 Photo Preferences

Children were energetic and engaged when asked to choose the photos of their favorite play spaces. Data analysis involved coding choices based on preferred cognitive play behaviors and behavior settings associated with each photo (Table 1).

<table>
<thead>
<tr>
<th>Behavior Setting</th>
<th>Explanation</th>
<th>Cognitive Play Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Green</td>
<td>1- I play animals in the tire</td>
<td>1- Dramatic</td>
</tr>
<tr>
<td>Patches</td>
<td>2- We play dinosaurs in the back woods.</td>
<td>2- Dramatic</td>
</tr>
<tr>
<td>2- Trees</td>
<td>3- We play ‘people’ on the top of the structure, and princess over there.</td>
<td>3- Dramatic</td>
</tr>
<tr>
<td>3- Structure</td>
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Specifically, children mostly chose the green tube, swings, play structure, and trees as settings they primarily enjoyed playing within. The findings suggest children’s preferences for mixed settings (58%, n=43, total number of codes, N=74), and then manufactured settings (28%). They mentioned functional (41%, n=31, N=75) and dramatic play (40%, n=30, N=74) as the most preferred cognitive play in settings.

The crosstab analysis indicated children’s preference for natural settings that provided opportunities for dramatic (41.7%, n=12) and games with rules (25%, n=3) play. Mixed settings were favored for functional (41.9%, n=18) and dramatic play opportunities (39.5%, n=17). Children predominately appreciated manufactured settings for their functional (52.4%, n=11) and dramatic play opportunities (38.1%, n=8).

5.2 Interviews

Drawings and photos served as starting points for interviews. Instances of children’s accounts, coded behavior settings, and cognitive play behaviors are displayed in Table 2.

<table>
<thead>
<tr>
<th>Children’s Explanation</th>
<th>Behavior Settings</th>
<th>Cognitive Play Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Ball: I like to kick balls and run around the pathway, and pretend games such as ‘Star wars’ or ‘princesses’.</td>
<td>1- Pathway</td>
<td>1- Functional, dramatic</td>
</tr>
<tr>
<td>2- Grass: I like playing princess. We pretend to have a fancy dress.</td>
<td>2- Green patches</td>
<td>2- Dramatic</td>
</tr>
</tbody>
</table>

The crosstab analyses of interviews suggest that children preferred mixed (40%, n=58, N=144) and natural settings (38%, n=55, N=144), as well as, dramatic (34%, N=144) and functional play (33%, N=144). Natural settings were favored for functional (38%, n=21) and dramatic play (22%, n=12); mixed settings for their dramatic play (50%, n=29); and manufactured settings for their functional (32.3%, n=10), and dramatic
play (25.8%, n=8) experiences. Comparing the three settings, natural settings were the most favored for functional (44.7%), exploratory (77.8%), and games with rules (50%) opportunities. Children preferred mixed settings for their constructive (47.1%) and dramatic play (59.2%) opportunities, when compared to natural and manufactured settings. The next level of analysis for interviews involved synthesizing the data that included connecting the categories into themes to account for the most important perceptions that captured the main findings (Table 3). This analysis mostly aimed to identify important meanings and experiences in children’s accounts.

**Table 3.** Examples of themes collected from the interviews.

1. **Children enjoyed fast movement and functional play opportunities in mixed and manufactured settings**
   - I like the scooters because I like riding on them. Because they go super-fast!
   - I like running down the hill.
   - 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.

2. **Children enjoyed challenging experiences that inspired dramatic play.**
   - I run down this hill and there is a big tire, I pretend to be an animal in the tire.
   - I hide in the sand structure and we play “snowy wolves” where we hide.
   - We go inside the house and I pretend to the ‘Iron man’.

3. **Natural and mixed settings inspired exploratory play**
   - I like the trail in back woods: I play running to find a baby cheetah.
   - 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 dig and die or live.
   - We scooped the bucket and put worms in it. But I didn’t touch it because I don’t like touching the worms. Then we dumped them out so we could see if they would die.

4. **Natural settings promoted dramatic and game with rules combined with challenge.**
   - You have to look for the caves in the back woods; there is just one cave that is really a house.
   - I like to run in the woods and play “Ninja Turtles”.
   - We usually play in one of the wood houses [stick piles] and you think you are a “kiddy” and you live in the house.

5. **Children enjoyed playing with loose materials**
   - We make a big mountain, with lava coming out or make sand castles.
   - I just mix stuff and pretend to make cakes and sometimes pretend to make food.
   - My friends and I collect sand and pretend it is pixy dust.

6. **Natural environments inspired different senses.**
   - I like to feel [touch] the trees.
   - I love to take the bark off the trees. Because sometimes we use the bark to make something.

**5.3 Drawings**

Most children were capable of illustrating their favorite play settings (Figure 2). The drawing analysis included grouping the documented codes that had emerged during data collection to behavior setting and cognitive play categories. The findings suggest that children were mostly interested to play in the sand, pathway, woods, and swings settings. In general, children mostly depicted mixed (41%, n= 59 N=145) and manufactured (34%, N, n= 49, =145) settings as their favorite.
6 DISCUSSION

Little research has examined children’s declared and drawn opinions of an enjoyable experience within behavior settings. Given the potential impact of outdoor preschools in supporting or enhancing children’s cognitive development, this is a critical gap to explore. Adding to the body of knowledge about learning and children’s accounts, the following sub-section examines children’s cognitive play experience in natural, mixed, and manufactured play settings in their outdoor preschool.

6.1 Natural settings and cognitive play behavior opportunities

Access to natural settings developed children’s imaginations and transformative learning about the world (Fjortoft & Sageie, 2000; Lester & Maudsley, 2007; More & Wong, 1997; Tai, Haque, McLellan, & Knight, 2006; Thomas & Harding, 2011). Consistent with prior studies (Norodahl & Einarsdottir, 2015; Waters & Maynard, 2010), the findings demonstrate that the alternating and diversity of natural settings presented complex and exciting interactions. The available natural loose elements, such as barks, seeds, or leaves, offered flexible and unique play props for diverse cognitive play opportunities, as mentioned in prior studies (Bilton, 2010; McClintic & Petty, 2015; Wilson, 2008). Consistent with prior findings (Tranter & Malone, 2004; Waters & Maynard, 2010; Waters et al., 2010; Zamani & Moore, 2013), children expressed enthusiasm and eagerness for experiencing, learning, and watching natural transitions and cycles. The following discusses children’s experiences in natural settings.

1) Hill: Large areas of grass and hills offer opportunities for gross motor skill, such as rolling, running down, or sliding (Fjortoft and Sageie, 2000; Mc Clintic & Petty, 2015; Woolley & Lowe, 2012). Consistent with previous studies (McClintic & Petty, 2015; Jansson, 2015; Ozdemir & Yilmaz, 2008), children enjoyed chasing and group play opportunities on the wide-open grassy hill, such as “tag” or “Frisbee”. The topographic variations of the hill inspired dramatic play and games with rules that has also been found in previous studies (Fjortoft and Sageie, 2000; Fjortoft, 2004; Norodahl & Einarsdottir, 2015).

2) Camp: This behavior setting consisted of tree logs and trunks arranged in a circle for gathering purposes. Consistent with prior studies (Bilton, 2010; Magraw, 2011; Wilson, 2008), children created imaginative representations with natural loose props in this setting, such as “fire,” “poison,” or “food.” They occasionally balanced on the rocks or logs, demonstrating functional play behavior.

3) Stone-lined River: The stone-lined river setting was covered with rocks and dirt and included three small bridges. Children enjoyed walking on the bridges, as well as balancing, running, or jumping on the rocks. Combining rocks, dirt, mud (after rain), and vegetation in this setting stimulated children’s
explorative and imaginative play. Consistent with previous literature (Fjortoft & Sageie, 2000; Lester & Maudsley, 2007; Norodahl & Einarsdottir, 2015; Riders et al., 2012), children expressed their fascination about natural ecosystems, cycles, and creatures in this natural setting. Current findings are consistent with recent evidence suggesting the uneven and sloping surface of the rocks to be stimulating children's functional, and game with rules behavior (Little & Sweller, 2015; Sandseter, 2009).

4) Stick pile: Children enjoyed collecting sticks and logs and stacking them, indicative of their constructive play behavior. Teachers sometimes helped children in their construction. Consistent with previous studies (Norodahl & Einarsdottir, 2015; Tranter & Malone, 2004), children enjoyed the ‘to-be continued’ activity of building a “fort” or a “house” over the course of several days that developed their environmental learning and sense of place. This spontaneously created space allowed children to hide from adult supervision and imagine being in a “prison,” “haunted house,” or their “home”, consistent with prior studies (Norodahl & Einarsdottir, 2015; Tail et al., 2006).

5) Trail: Along the trail setting, children enjoyed running, chasing each other, and jumping over the logs. The trail inspired functional play opportunities as a result of its flat surface (Fjortoft & Sageie, 2000; Little & Sweller, 2015). While the trail also provided exploratory play opportunities, children occasionally explored plants, tree barks, and creatures. The trees around the trail also stimulated children to engage in dramatic play behaviors, such as “cheetahs” or “dinosaurs.” Consistent with prior studies (Little & Sweller, 2015; Sandseter, 2009), the existing tree trunks, logs, trees, and trail provided challenging opportunities that children incorporated into their games.

6) Trees: The loosely designed natural tree settings and habitats offered outdoor classrooms that motivated children to learn through play, enhance their imagination and curiosity, as mentioned in previous studies (Bilton, 2010; Wilson, 2008; McClintic & Petty, 2015). The trees provided dramatic and game with rules opportunities by providing loose props, including sticks, leaves, or fruits (Gehris, Gooze, & Whitaker, 2015; Jansson, 2015; Norodahl & Einarsdottir, 2015). As mentioned in previous studies (Fjortoft, 2004; Kernan, 2007; Norodahl & Einarsdottir, 2015; Waller, 2006), the existing trees created ecosystems that supported the existence of creatures and animals for children’s exploratory play. Children preferred challenging and functional play opportunities in natural settings, such as “jumping over the logs,” “moving the rocks,” “balance over the rocks,” or “swinging with the ropes”, as reported in prior studies (Little & Sweller, 2015; Sandseter, 2009; Fjortoft & Sageie, 2000).

6.2 Mixed settings and cognitive play behavior opportunities

Mixed settings provided flat areas, diverse height levels, slopes, secluded spaces, challenging play structures, and loose elements that triggered a diverse spectrum of cognitive play behaviors that children enjoyed. Children preferred the complex, challenging, and diverse aspects of mixed settings as they offered more play options (Little & Sweller, 2015; Norodahl & Einarsdottir, 2015). Children expressed interest for collecting accessible manufactured loose and natural loose elements in mixed settings and incorporating them into their games or dramatic play, as documented in previous studies (Fjortoft & Sageie, 2000; Jansson, 2015; Maxwell et al., 2008). The following explores children’s experiences in the main mixed settings.

1) Pathway: In line with prior studies (Little & Sweller, 2015; Moore & Cosco, 2007; Sandseter, 2009), children enjoyed the functional play (such as cycling or running), along with the challenging and fast movement opportunities, provided by the hard and smooth surface of pathways. The pathways also offered chasing and running opportunities that children incorporated into their games.

2) Ropes: Little & Sweller (2015) recognize rope swings as play resources that provide moderate to vigorous physical activity opportunities. Consistent with the previous studies (Fjortoft & Sageie, 2000; Little & Sweller, 2015; Sandseter, 2009), children described their preference for ropes tied to trees as they challenged themselves to balance, climb, jump, and swing, promoting functional and game play. Fjortoft and Sageie (2000) found that children enjoyed climbing ropes and looking over the adjacent space.

3) Tube: The existing tube in the natural playground provided a play setting where children enjoyed climbing, disappearing, hiding, and secluding themselves from peers or teachers. These characteristics have been associated with risk taking and challenging opportunities that children enjoy (Little & Sweller, 2015; Sandseter, 2009; Tai et al., 2006). In addition to the hiding and climbing opportunities, the existing natural loose props at the perimeter of the tube inspired children’s imagination and creativity, as suggested
by previous studies (e.g., Gehris et al., 2015; Norodahl & Einarsdottir, 2015). For example, children mentioned how they enjoy playing “Star Wars,” “cheetahs,” or “dinosaurs” inside or around the tube.

4) **Play Houses:** Similar to prior studies or design suggestions (Norodahl & Einarsdottir, 2015), children most enjoyed the playhouses for their dramatic play opportunities. The availability of loose props in these settings inspired dramatic play behaviors, such as “houses,” “forts,” or “ice-cream shop” that has also been recognized in prior studies (Fjortoft, 2004; Jansson, 2015; McGinnis, 2002; Norodahl & Einarsdottir, 2015; Woolley & Lowe, 2012). The hiding and secluded qualities of playhouses inspired risk taking and games with rules behaviors, as suggested by prior studies (Little & Sweller, 2015; Norodahl & Einarsdottir, 2015).

5) **Tires in the Green Patches:** As mentioned in previous findings (e.g. Norodahl & Einarsdottir, 2015; Little & Sweller, 2015), children enjoyed the enclosed and child-scaled spaces of the tires where they imagined being “warriors,” or “cats” or the tire to be a “home,” or a “ship”. Sometimes, children transferred loose elements into the tire and prepared “food”. Children also preferred to balance, walk, or jump from tires, as suggested by previous studies (Little & Sweller, 2015).

7) **Sand:** Consistent with recent review of evidence (McClintic & Petty, 2015; Woolley & Lowe, 2012), the shapeable, adaptable, and soft characteristics of sand inspired children's dramatic and constructive play. Children mentioned their enjoyment for combining sand with other loose elements to create symbolic representations, such as “ships,” “boats,” or “fish”. Similar to previous research (Little & Sweller, 2015; Woolley & Lowe, 2012), children expressed interest for challenging and functional play opportunities, such as climbing, jumping, or swinging, provided by the climber or pots in sand settings. The climber also provided refuge or hiding opportunities that inspired children’s dramatic play behaviors, as found by previous studies (Little & Sweller, 2015; Sandseter, 2009; Tai et al., 2006).

### 6.3 Manufactured settings and cognitive play behavior opportunities

The results from this study indicate children's preference for manufactured settings for their challenging behaviors and functional play opportunities, as mentioned by previous literature (Little & Sweller, 2015; Sandseter, 2009). While dramatic play was more prevalent in other settings, manufactured setting coupled with the accessible loose elements inspired dramatic play. The following explores children’s experiences in manufactured settings.

1) **Tables:** Consistent with previous literature (Ozdemir & Yilmaz, 2008; Woolley and Lowe 2012), tables and seating settings were important spaces to stimulate imaginative play behavior. Children described their preference for employing the available loose elements (Jansson, 2015; Kernan, 2007; Norodahl & Einarsdottir, 2015), such as sand, mulch, or buckets to engage in dramatic play, such as “house”, “making ice cream”, or making food.

2) **Swing:** The swing settings offered children enjoyable opportunities to experience heights, as well as the sensation of speed, as found in previous studies (Sandseter, 2009; Little & Sweller, 2015; Woolley & Lowe, 2012). As described by children, swinging supported risky and functional play that supported moderate-vigorous physical activity levels, such as swinging, balancing, or jumping.

3) **Rockers:** The rocking equipment inspired challenging, fast movement functional play (Little & Sweller, 2015; Sandseter, 20009), such as rocking, swinging, and balancing. Emphasizing on the value of loose material in manufactured settings (Gehris et al., 2015; Jansson, 2015; Norodahl & Einarsdottir, 2015), children also mentioned how they enjoyed combining the ground-cover mulch for their dramatic play activities, such as making “food”, “poison”, or “magic dust”.

4) **Play structure:** In agreement with prior studies (McClintic & Petty, 2015; Little & Sweller, 2015; Zamani & Moore, 2013) the play structure setting mostly offered functional play opportunities, such as balancing, climbing, or jumping. As suggested by other literature (Kernan, 2007; Little & Sweller, 2015; Sandseter, 2009), the different height levels and secluded spaces of the play structure offered challenging opportunities for hiding and pretending. The available loose elements, such as mulch or dirt, encouraged children’s dramatic play, which is consistent with previous studies (Gehris et al., 2015; Norodahl & Einarsdottir, 2015; O’Brien & Murray, 2007; Ridgers, Knowles, & Sayers, 2012).

5) **Platform:** Children preferred platform settings surrounded by trees that provided different visual exposures and flat surfaces for dramatic play, which is similar to design suggestions (Little & Sweller, 2015; Tai et al., 2006; Sandseter, 2009). Children described how they imagined platforms to represent “ships” or
“performance stages”. Furthermore, platforms encouraged children to sit, gather, and discuss their game strategies, as well as engage in constructive play for “building” or “mixing” play props.

7 CONCLUSION

The current study addressed the gaps in the literature by sampling young children and examining their preferences and perceptions of outdoor behavior settings that promoted their cognitive play behaviors. Children enjoyed settings that offered challenging movements, overview of their surroundings, privacy, and topographical variation. The diverse and changing quality of nature inspired a wide spectrum of cognitive play and enhanced children’s imagination, games, and understanding about natural phenomenon. Further, shapeable, movable, and changeable qualities of loose elements in different settings inspired higher levels of cognitive play. Possible topics for design implication revealed in the case study analysis included:

a) Enhancing the complexity and diversity of the outdoor preschool environment by including different play options through natural, mixed, and manufactured settings.

b) Provide loose elements to inspire children’s building, imaginative and self-initiated games.

c) Including wide, topographic, open natural and mixed settings for children’s games with rules behavior.

d) Providing challenging, yet safe, opportunities for children through features that offer climbing, hiding, and fast-movement opportunities.

The present study has been limited, particularly concerning the number of participants. Future research might want to study children’s behavior and preferences from different ages, genders, and socio-economic status. Another limitation was concluding based on observing a single outdoor preschool in a suburban area. More studies are needed to compare diverse settings in different outdoor preschools within urban, suburban, or rural areas and children’s cognitive play opportunities. Future longitudinal research is also suggested to children’s different preferences and interactions over longer time spans and seasonal variations.

8 REFERENCES


