CHILD'S PLAY:
PLAYGROUNDS AND CHILD DEVELOPMENT

BY

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THESIS

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ABSTRACT

Nature-based play environments refer to children's playgrounds that are designed with an abundance of natural elements and materials. As evident in the work of numerous design firms throughout the United States and Europe, there is a growing interest in nature-based playgrounds in part because they are seen as supporting high levels of social and cognitive play.

Multiple studies demonstrate the importance of play in children's social and cognitive development and point to the play environment as a primary factor in stimulating or inhibiting developmental benefits. What we do not know, however, is the extent to which the purported benefits of nature-based play environments are actually realized. Are children in nature-based play settings engaging in more high-level social and cognitive play than children in similar, more traditional play settings?

Based on observations of children's play patterns in traditional and nature-based playgrounds and on surveys completed by the same children's teachers, I found no measurable differences in social play between the two types of playgrounds. With respect to cognitive play, however, I found higher levels of exploration and engagement in games with rules, two important measures of cognitive development, in nature-base playgrounds compared to traditional playgrounds.

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CHAPTER 1: INTRODUCTION

In the United States, over 63 percent of children under age 5 spend an average of 35 hours a week in some form of childcare arrangement (US Census, 2010; NACCRRA, 2012). In a weakened economy, families are forced to make difficult decisions regarding their children's care. Those that decide to enroll their children in full-time centers can incur a significant financial burden. In Mississippi, the parents of a 4 year-old child can expect to pay an average of $4,000 a year—over 10% of median annual household income—for childcare in a typical facility. The same childcare will cost a family $15,000 in the District of Colombia (US Census, 2010; NACCRRA, 2012).

Given the large percentage of US children in full-time daycare and the considerable financial commitment made to keep them there, childcare centers are under considerable pressure to offer children significant developmental advantages. Indeed, research shows that the quality of early childhood care can have a measurable impact on cognitive development and academic achievement at age 15 (Vandell et al., 2010). Concerns about the quality of the child's experience at these centers extend beyond the classroom and into the landscape. There is a growing notion that nature-based playgrounds can help children grow and develop because they promote more social and cognitive play than traditional playgrounds. This study explores the extent to which nature-based play settings promote these two kinds of play to a greater extent than traditional playgrounds.

The US General Services Administration's Child Care Center Design Guide outlines best practices for new facility construction and provides guidelines for the design of outdoor play spaces. For pre-school aged children, the GSA recommends outdoor play areas that support

dramatic, constructive and creative play and provide space for both high-energy activity and quiet reflection. In addition, the GSA stresses the importance of sand and water play as well as the necessity of allowing children opportunities to explore nature (p. 6-7). Despite clear recommendations, we do not know the percentage of new daycare centers that adopt best practices for outdoor play settings. However, a cursory look at new centers by popular daycare franchises indicates an emphasis on age-appropriate fixed equipment such as superstructures with slides and monkey bars, with very little emphasis on highly vegetated spaces or natural play elements. Given the importance of early childhood daycare centers, this trend may impact the social and cognitive development of the children in their care.

Nevertheless, as evident in the work of numerous design firms throughout the United States and Europe, there is a growing interest in nature-based playgrounds among municipalities and select early childhood educational franchises. As I define it, nature-based play environments promote physical activity, creativity, exploration and cooperative behavior through vegetation and play materials based on natural settings with significant plant life. Despite growing interest, we do not know the extent to which nature-based playgrounds facilitate high-level social and cognitive play, while keeping less developmentally valuable non-play behaviors to a minimum. Moreover, we do not know whether nature-based playgrounds offer more opportunities for children to engage in developmentally valuable play than traditional playgrounds with fixed equipment and limited vegetation. Without this knowledge, we lack the evidence necessary to more assertively promote nature-base playgrounds if they do indeed promote more developmentally beneficial forms of play.

1.1 A REVIEW OF PERTINENT LITERATURE

Play is the work of children (Taylor, Wiley, Kuo, & Sullivan 1998), yet in order to understand the importance of play, we need to begin by understanding the concept of play itself. Lester and Maudsley (2006) caution against attempting to define children's play with a single statement as this may potentially reduce and simplify one of the most critical and complex forms of behavior. Nevertheless, the authors cite a statement by Play Wales, a UK non-profit organization that promotes sound play environments, to describe the behavior as:

> A biological, psychological and social necessity that is fundamental to the healthy development and wellbeing of individuals and communities…[Children's] play is personally directed and intrinsically motivated. Children determine the content and intent of their play by following their own instincts, ideas and interests, in their own way for their own reasons (p. 8-9).

The Play Wales statement speaks to the inherent relationship between a child and play, stressing the significance of unstructured play opportunities. In Article 31 of the United Nation Convention on the Rights of the Child, play is defined as a fundamental right of all children and essential for their intellectual, physical, emotional and social development (Human Rights Directorate, 1991; Staempfli, 2009). Through play, children learn to express their thoughts and feelings, become aware of cultural diversity in their community and gain a genuine understanding of reality and the world around them (Staempfli, 2009).

1.2 EFFECT OF PLAY ON SOCIAL AND COGNITIVE DEVELOPMENT

A growing body of literature demonstrates that play is of vital importance to specific characteristics of children's social and cognitive development. Group imaginative play provides children opportunities for complex social and cognitive development (Rogers, 2005). From a social perspective, interactions during play facilitate the development and affirmation of social skills and pro-social behavior (Taylor et al., 1998). Frost (1997) identifies multiple benefits of play on cognitive development including heightened sense of discovery as well as improved reasoning skills and divergent thinking. In addition, studies have shown that play among young children is linked to acquisition and reinforcement of important cognitive skills such as language and problem solving techniques (Piaget, 1926, 1962; Vygotsky, 1978; Barnett, 1976; Taylor et al, 1998). Berk (2006) describes multiple benefits associated with dramatic play including sustained attention, memory, logical reasoning, language acquisition and understanding of emotions. Constructive play and exploration allow for experimentation and thus the development of problem solving techniques in young children (Barnett, 1976).

In short, there is considerable evidence demonstrating that play vitally impacts multiple measures of children's social and cognitive development.

1.3 THE PLAY SETTING

Although we know that children's play has important impacts on their social and cognitive development, we know less about the extent to which the play setting itself impacts these forms of development. According to Thomas and Thompson (2004), play in outdoor settings positively impacts children's learning capacity and emotional wellbeing. Their work

indicates that outdoor activities support multiple positive learning outcomes such as communication, curiosity and responsibility for others. With respect to emotional wellbeing, Thomas and Thompson show that explorative play in outdoor environments provides children with an appropriate setting for important activities such as shouting, running and quiet reflection.

In comparing the play of 5-7 year-old children in a traditional playground and adjacent woodland over the course of a year, Fjørtoft (2001) demonstrates that there is a relationship between play in the natural environment and motor strength. The study concluded that children who used the forest as a play setting performed better on measures of balance and coordination than those who played in the traditional playground. There is also evidence that loose natural materials in outdoor settings leads to more frequent and longer lasting dramatic play, even in the absence of additional props such as dress-up materials or plastic tea sets (Nedovic and Morrissey, 2013).

outdoor play settings thus provide multiple measurable developmental benefits, yet are there specific benefits associated with having a highly vegetated playground? Lester and Maudsley (2006) stress that direct contact with nature offers vital benefits to children, adding that unstructured play in green settings provides opportunities for restoration and thus greater wellbeing. Moreover, Spencer and Gee (2011) argue that there is compelling evidence for a link between green spaces and enhanced attentional capacity in children. Vews of vegetation has been shown to impact components of children's self-discipline such as concentration, impulse inhibition, and the ability to delay gratification (Taylor, Kuo, Sullivan, 2001). In addition, there is

evidence that for children, exposure to low levels of vegetation is related to behavioral conduct disorders, anxiety, and depression (Taylor & Kuo, 2006).

1.4 IDENTIFYING A VITAL AGE-GROUP

The 3-5 year age-group is a critical developmental period, during which vital physical behavior patterns are established (Sugiyama, 2012). Important developmental benchmarks for children in this age group are increased physical mobility, curiosity, imagination, memory and sociability (Harrington, 2006). Therefore, with the understanding of the developmental significance of play as well as outdoor natural play environments, observing the play patterns of 3-5 year old children can yield important information regarding the extent to which nature-based play environments support developmentally valuable play and how such settings compare to traditional playgrounds with common fixed equipment.

1.5 HYPOTHESIS

Given evidence demonstrating the importance of play on children's social and cognitive development as well as the significance of the play environment itself, I propose the following hypothesis. A greater proportion of children's play in nature-based playgrounds will be comprised of high level social and cognitive play and lesser proportions of non-play behaviors than children's play in traditional playgrounds with fixed equipment.

CHAPTER 2: METHODS

In this study, I measured the occurrence of social and cognitive play in nature-based play environments and traditional playgrounds. I conducted observations of children's play in two nature-based playgrounds in Chicago, Illinois and two traditional playgrounds in Urbana, Illinois. In addition, I administered a survey to teachers at the daycare centers in which I made my play behavior measurements in order to understand the perceptions and potential biases regarding nature-based playgrounds that teachers might have.

2.1 RESEARCH DESIGN

Prior to observation, I conducted a site inventory and analysis of each participating playground and developed base plans, which were later used for behavior mapping. During the initial site visit, I subdivided each playground into individual zones and marked them on the base maps. The zones demarcated areas that facilitated distinctly different play activities.

I made four separate observations in each of the four playgrounds. Each observation consisted of three components: social-cognitive play tracking, behavior mapping, and general field notes. In addition to observations, I administered surveys to teachers at all participating playgrounds asking them to respond to several spatial preference questions and then rate how their respective playgrounds perform with respect to defined social and cognitive play measures.

2.2 PLAYGROUNDS

The playgrounds observed in the study are located in Illinois and belong to childcare facilities. The New Trier Bright Horizons playground is located in north suburban Chicago and is 1/5 of an acre, and contains 9 distinct play zones. Zones 1 and 2 comprise the playground's primary open green space and a mature tree. Zone 2 provides the majority of shade in the playground. Zone 3 is an embankment slide, Zone 4 is an extensive sand play area and Zone 5 contains a large area of 4-foot tall switchgrass. Zone 6 is a concrete serpentine path that goes through the entire playground and a small bridge comprises Zone 7. Zone 8 is a maze area, which, according to the planting plan, is intended to have low growing shrubs planted in the void spaces on either side of the gravel path. Due to budget restrictions, however, the shrubs were not included in the built project. Finally, Zone 9 contains a semi-circular plaza area and a large boulder for climbing and sitting (see Figure 1).

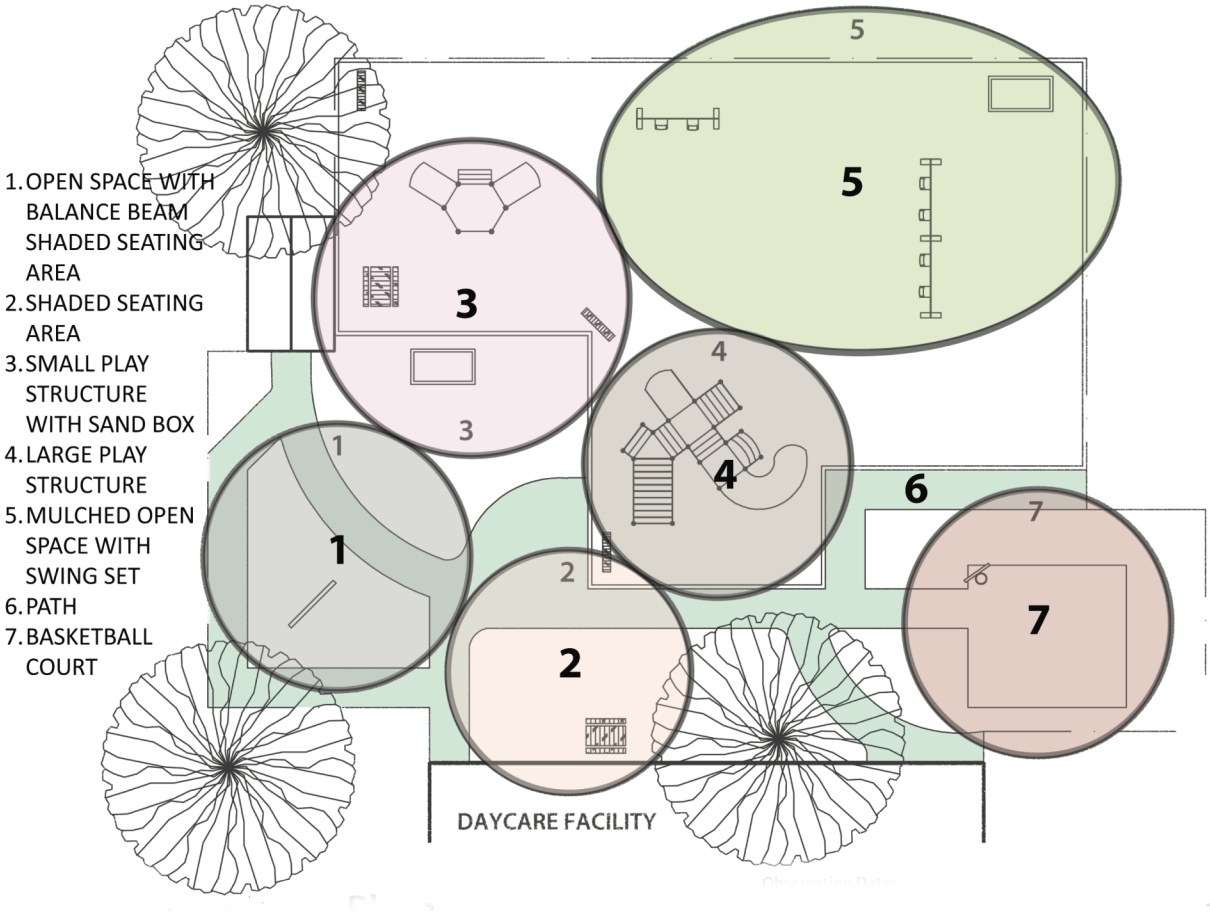

Figure 1. Nature-based playground at New Trier Bright Horizons.

The Paulo Freire Family Center playground is located on Chicago's southwest side and is 1/10 of an acre, containing 9 distinct play zones. Zone 1 is a concrete serpentine path that goes through the entire playground. Zone 2 is circular council ring with wood stumps of varying height placed along the outer edge. Zones 3, 5 and 6 comprise different, distinct, larger space. Zone 3 is an open green space, Zone 5 is a small stage and Zone 6 is a mulched open area with a large boulder on which kids can climb and sit. Zone 4 is a covered sitting area with stations containing blocks and other constructive equipment. Zone 7 is an embankment slide and the adjacent Zone 8 contains a mature tree, creating a shaded sitting area. Zone 9 has play equipment for younger children and is generally off limits to the 3-5 year-olds.

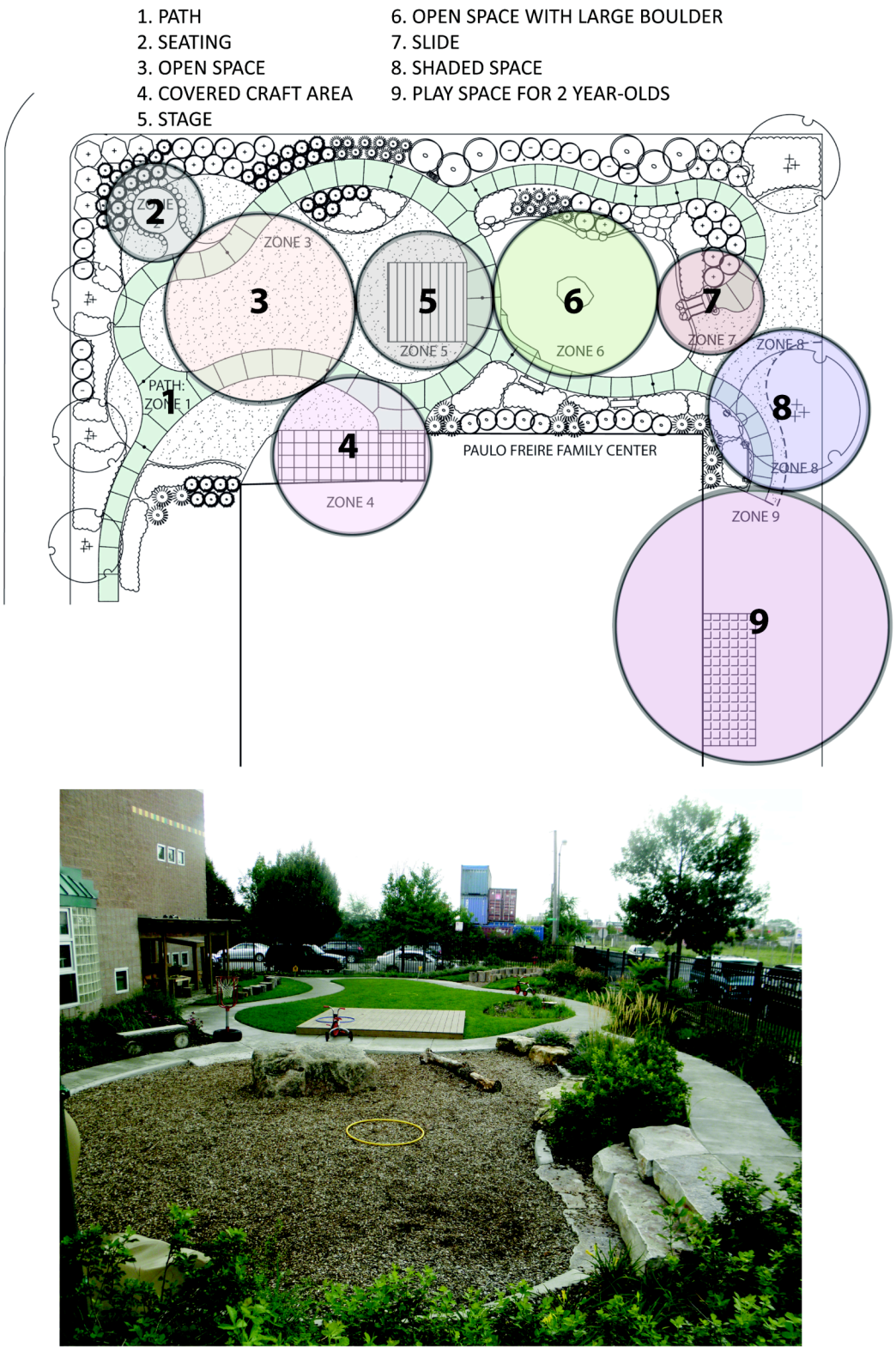

Figure 2. Nature-based playground at Paulo Freire Family Center.

The Caring Place playground is 1/5 of an acre, containing 7 distinct play zones. Zone 1 is an open space framed by the path and contains a wooden balancing beam. Zone 2 is an open area shaded by both a mature tree and the daycare center building and contains a picnic bench for seating. Zone 3 contains a 3’ x 7’ sandbox, a small play structure for younger children and an additional picnic table. Zone 4 contains a larger play structure with a jungle gym and two slides. Zone 5 is a mulched open area containing two separate swing sets and an additional 3’ x 7’ sandbox. Zone 6 is the concrete path that goes through the entire playground. Zone 7 is a 20’ x 18’ concrete pad with an adjustable basketball hoop.

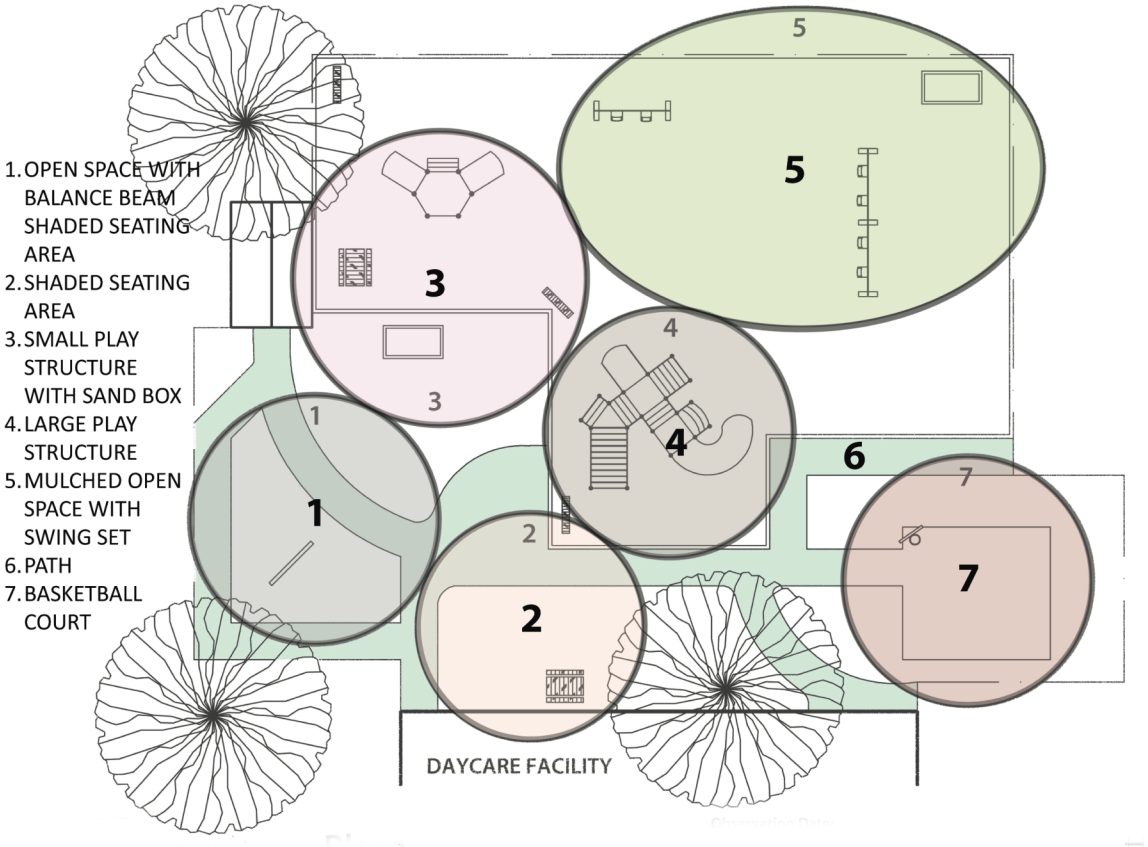

Figure 3. Traditional playground at the Caring Place.

The Child Development Lab playground is 1/10 of an acre, containing 6 play zones. Zone 1 is a covered area containing play tables and toys. Zone 2 contains a small ornamental tree and two 3’ x 6’ planter boxes. Zones 3, 4 and 5 essentially comprise one area, however Zone 3 contains a spinning seat and is visually distinct from Zone 4, which contains a large play structure with a jungle gym, several climbing structures and two slides. Zone 5 is a rubberized surface track, surrounding Zone 3 and 4. Zone 6 a concrete area containing a sandbox and toy drum set. Both traditional playgrounds are characterized by a lack of significant vegetation, each containing only one tree on their respective properties.

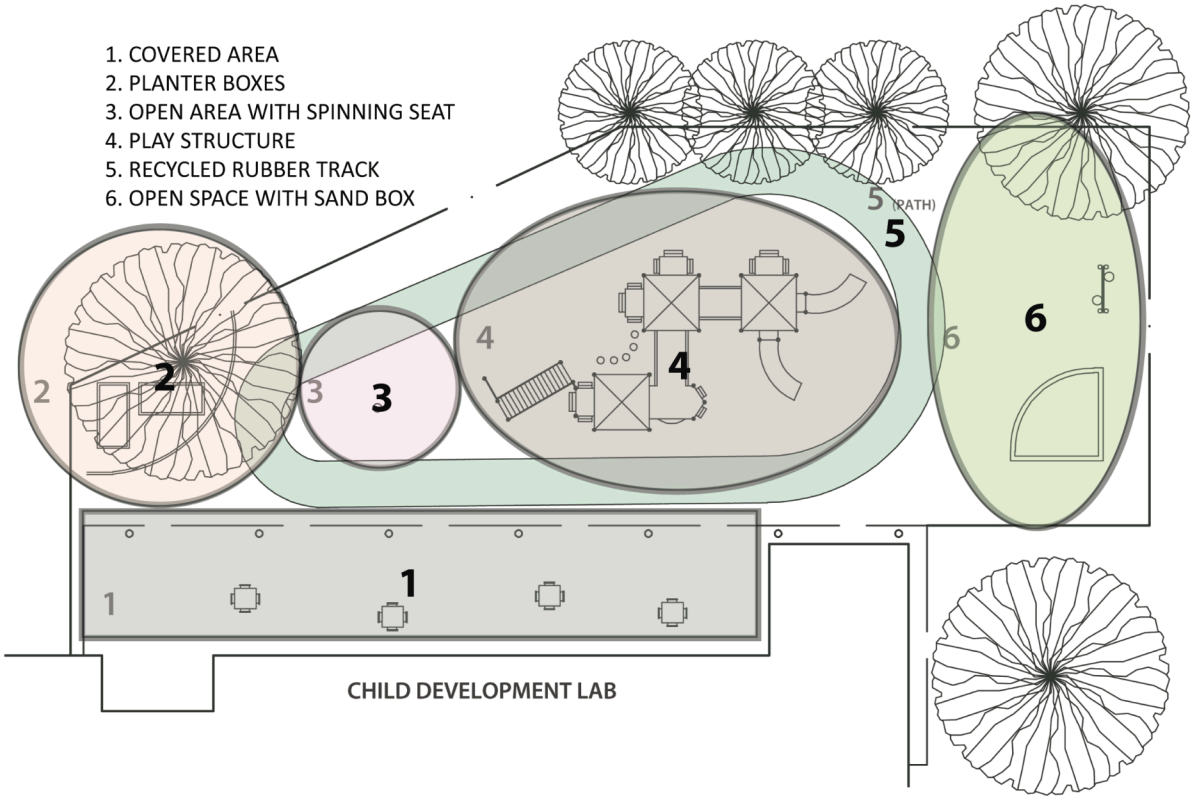

Figure 4. Traditional playground at the Child Development Lab.

2.3 PLAY OBSERVATION SCALE

I recorded my play observations using the Play Observation Scale (POS), originally developed in 1989 by University of Waterloo researcher, Kenneth Rubin to measure and interpret age, gender and social differences in play among children. In child development literature, the POS has become the authoritative method for analyzing play.

The POS is divided into three play categories: social, cognitive, and non-play. Social play is further subdivided into three categories: solitary, parallel, and group. Cognitive play is subdivided into five categories: functional, constructive, exploration, dramatic, and games with 9rules. The POS refers to non-play behaviors as: unoccupied, onlooker, active conversation, aggression, rough-and-tumble, hovering, and anxiety. In 3-5 year-old children, group constructive, explorative, dramatic and rule-based play are positive indicators of development. Environments that primarily facilitate solitary or parallel functional play are not considered as positive developmental indicators. Research shows that children who largely engage in solitary repetitive activities tend to become impulsive adolescents with difficulty regulating negative externalizing behavior (Berk, 2006).

The POS is typically conducted indoors and thus the rough and tumble category (playful physical activity such as play fighting) is relegated to a non-play behavior. However the literature indicates that rough and tumble play provides children with tangible benefits. Berk (2006) argues that rough and tumble play is good-natured and sociable and thus does not fall under the category of aggressive behavior. Pellegrini (2004) argues that children engage in rough and tumble play with peers with whom they feel close and continue interacting after the activity concludes rather than separating, as is the case after aggressive encounters. Therefore,

in a departure from the POS, in this study, I categorized rough and tumble play as a cognitive play activity falling just above functional play, as the literature shows that it serves an important role in children's development.

2.4 OBSERVATION PROCESS

Nature-based play observations were conducted in the summer of 2012 and traditional playground observations were conducted that fall. Each observation lasted approximately 40 minutes. Five minutes after the children entered the playground, the first social-cognitive play tracking documentation took place and was repeated every five minutes thereafter. I documented children's play on an observation worksheet by indicating the activities in which they were engaged and zone in which the activity occurred. Each documented activity consisted of social play notation qualified by a cognitive play notation. For example, if two children were observed passing a ball to each other, this would be documented as group functional play in Zone X. In some situations, when non-play behaviors were observed, the observation would be documented with a social play notation followed by a non-play behavior notation. For example, if a child was sitting alone on a bench while watching other children play, the observation would be documented as solitary non-play, onlooker in Zone Y.

Ten minutes after the children would enter the playground, the first behavior mapping documentation would take place and be repeated every ten minutes thereafter. I documented children's location and activity inside the playground by placing a check mark within the zones that they occupied with corresponding social-cognitive play notations. Since children move

from one location to another very quickly during play, I also indicated the direction of movement in each behavior map.

The behavior maps clearly illustrate activity patterns. At a quick glance, we are able to see which parts of the playground are used heavily and which are not. The behavior maps illustrate distinctly recognizable patterns allowing for comparisons to be made between nature-based and traditional playgrounds as well as among each individual play setting over time.

As part of the data collection process, I took field notes during each observation to record pertinent anecdotal and other qualitative information that did not fall under the rubric of social-cognitive play tracking or behavior mapping.

2.5 TEACHER SURVEYS

To support observation data and provide more comprehensive evidence for my eventual conclusions, I administered surveys to teachers at each of the four participating day care centers. The survey contained 22 questions and took teachers approximately fifteen minutes to complete. The survey began with four open ended questions, in which teachers were asked to list the parts of their playground that children appeared to like most and least, as well as what they would change about their playground. The survey also asked teachers to consider whether their playground offered more advantages or disadvantages compared to the alternative. For teachers in facilities with traditional playgrounds, the alternative refers to nature-based playgrounds and vice versa.

In the remaining set of questions, teachers were asked to rate the extent to which the children in their playgrounds exhibited the three types of social play, six types of cognitive play

and six types of non-play behaviors as outlined in the Play Observation Scale. In this section, each term was accompanied with a definition. For example, solitary play was defined as "children engage in activities entirely alone." The ratings were based on a five-point scale as presented in figure 5.

Based on your observations, to what extent do the children that you teach engage in the following social social patterns in the outdoor playground?

Solitary play	children engage in activities entirely alone.
Parallel play	children engage in activities beside, but not with each other.
Group play	two or more children engage in an activity together with shared play goals.

Based on your observations, to what extent do the children that you teach engage in the following cognitive play types in the outdoor playground?

Functional play	children experience sensory stimulation through simple, repetitive movements or actions.
Rough and tumble	child engages in playful physical activity, play fighting.
Constructive play	children build, create or put objects together.
Exploration	children seek visual or auditory information about different parts of the playground or specific objects.
Dramatic play	children dramatize life situations such as 'playing house' or bring life to inanimate objects.
Games with rules	children engage in competitive game type activities following pre-determined rules and limits.

Based on your observa.ons, to what extent does the average child that you teach exhibit the following non-play behavior in the outdoor playground?

Unoccupied	child exhibits a complete lack of goal or focus.
Onlooker	child watches or listens to other children without participating.
Hovering	child onlooks activity at close proximity.
Active conversation	child verbally communicates with others but particularly teacher.
Aggression	child expresses displeasure, anger or disapproval through hostile means.
Anxiety	child displays wary or fearful behavior.

1 Not at all
2 A litte
3 Somewhat
4 A lot
5 Very much

Figure 5. Teacher survey questions addressing social and cognitive play and non-play behaviors based on a five-point scale.

CHAPTER 3: RESULTS

Results are presented in two parts. I begin by presenting an analysis of survey data demonstrating teacher's preferences for the playgrounds in their respective daycare facilities. I also report on teachers' perceptions of the degree to which their playgrounds facilitate higher order social and cognitive play and mitigate non-play behavior. I then examine observational data, including both quantitative and qualitative measures, and report on areas where the data confirm or diverge from teacher perceptions.

3.1 DO TEACHERS FEEL THAT THEIR PLAYGROUND OFFERS MORE ADVANTAGES OR DISADVANTAGES THAN THE ALTERNATIVE?

With respect to preferences, I found that 90% of teachers in daycare facilities with traditional playgrounds considered that their playground offered more advantages than a nature-based alternative. However, only 50% of teachers in daycare facilities with nature-based play environments felt that their playground offered more advantages than the traditional alternative.

Typical responses from teachers in daycare facilities with traditional playgrounds included that the play settings offer children age-appropriate climbing materials and support a variety of activities, which cannot be accomplished in what some referred to nature-based playgrounds as "open fields." Others, however, conceded that their playground does not offer opportunities for children to explore and would benefit from greater vegetation and open space. Teachers with nature-based playgrounds generally felt that, although their play settings allow children to explore nature, they do not support climbing, swinging and balancing and are

therefore unable to facilitate development of fine motor skills. The preference data indicates that there is a perceptional bias against nature-based playgrounds among teachers.

3.2 WHAT DO TEACHERS PERCEIVE TO BE THE MOST PREVALENT SOCIAL PLAY TYPES IN THEIR RESPECTIVE PLAYGROUNDS?

Table 1 describes teacher reports regarding the extent to which children in the playground of their respective day care center exhibit the three components of social play. Average ratings are presented for each playground typology based on a five-point scale with (1) indicating that the particular play type is never exhibited and (5) indicating that it is very commonly observed. Among 3-5 year-olds, group play is considered the highest order social play type. Teacher responses to the survey indicate that group play is the most prevalent social play type in both traditional and nature based playgrounds, both of which scored a 4.2 average rating. Though solitary play is the least prevalent social play type in both playgrounds, according to teacher responses, there is a slightly higher occurrence in nature-based play environments. Therefore, with respect to social play, teacher responses indicate that there are no clear measurable differences among the two playground typologies.

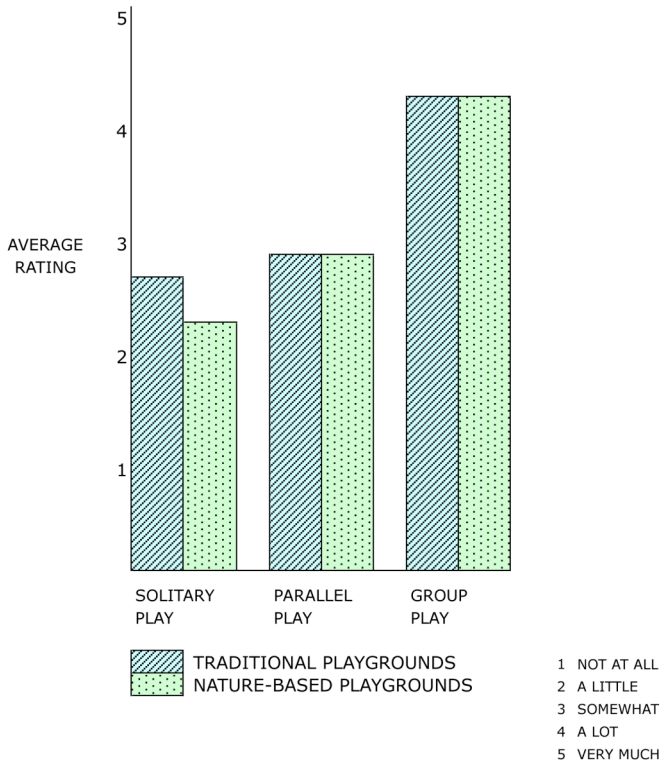

Table 1. Comparison of social play types per playground typology according to teacher reporting.

3.3 WHAT DO TEACHERS PERCEIVE TO BE THE MOST PREVALENT COGNITIVE PLAY TYPES IN THEIR RESPECTIVE PLAYGROUNDS?

Among 3-5 year-olds, exploration, dramatic play and games with rules are considered the highest order cognitive play types. Similar to the social play section of the survey, teachers rated the extent to which their students exhibit the six play types comprising cognitive play in their day care facility's playground on the same five-point scale used for social play. Table 2 describes teacher reports regarding the extent to which children in the playground of their respective day care center exhibit the six components of cognitive play. Teacher responses indicate that functional play is the most prevalent cognitive play type in both playground typologies. According to the teachers, exploration and dramatic play are more supported by

traditional playgrounds. However, constructive play is more supported by nature-based playgrounds. With respect to games with rules and rough and tumble play, teachers reported similar levels of involvement for the traditional and nature-based playgrounds. Overall, survey responses indicate that teachers perceive traditional playgrounds to be more supportive of high-level cognitive play than nature-based playgrounds, as evident in exploration and dramatic play.

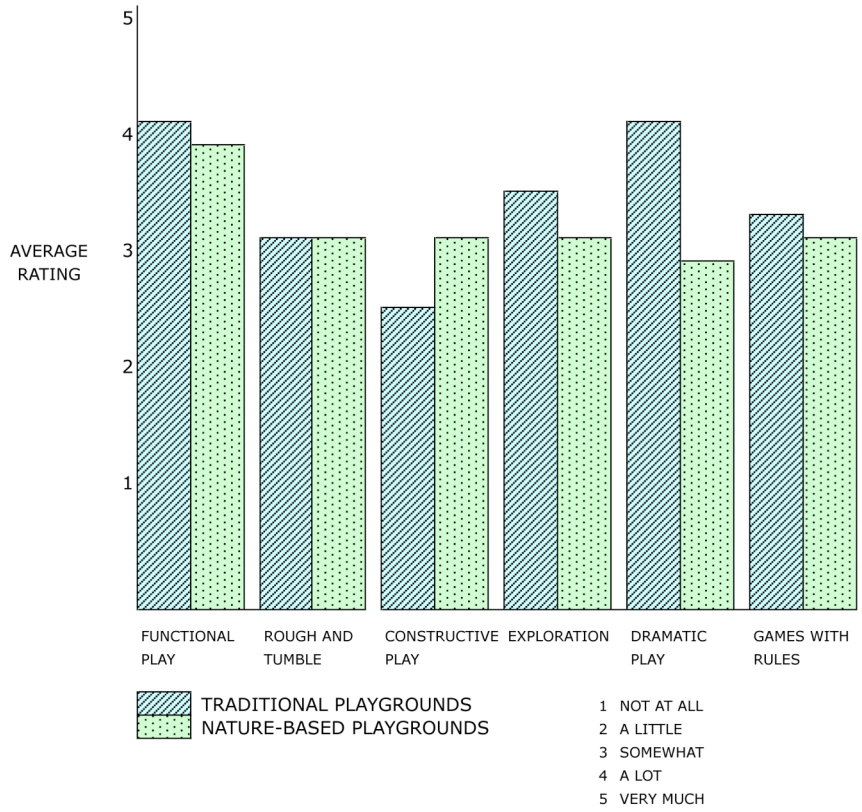

Table 2. Comparison of cognitive play types per playground typology according to teacher reporting.

3.4 HOW DOES OBSERVATIONAL DATA COMPARE TO TEACHER PERCEPTIONS?

I reviewed play tracking observation worksheets, isolating every social, cognitive and non-play notation, in order to calculate the total occurrence of different play types in traditional and nature-based playgrounds.

SOCIAL PLAY

I observed a total of 248 social play occurrences in traditional playgrounds and 208 occurrences in nature-based play environments. In both playground typologies, group play comprised the majority of total social play observations, confirming teacher perceptions. In traditional playgrounds, I identified 133 occurrences of group play, or 54% of total social play observations. I identified 104 occurrences of group play, or 50% of total observations in nature-based playgrounds. Solitary play was the least represented social play type in both playground typologies. I identified 27 occurrences of solitary play, or 11% of all social play observations in traditional playgrounds and 23 occurrences, or 11% in nature-based playgrounds.

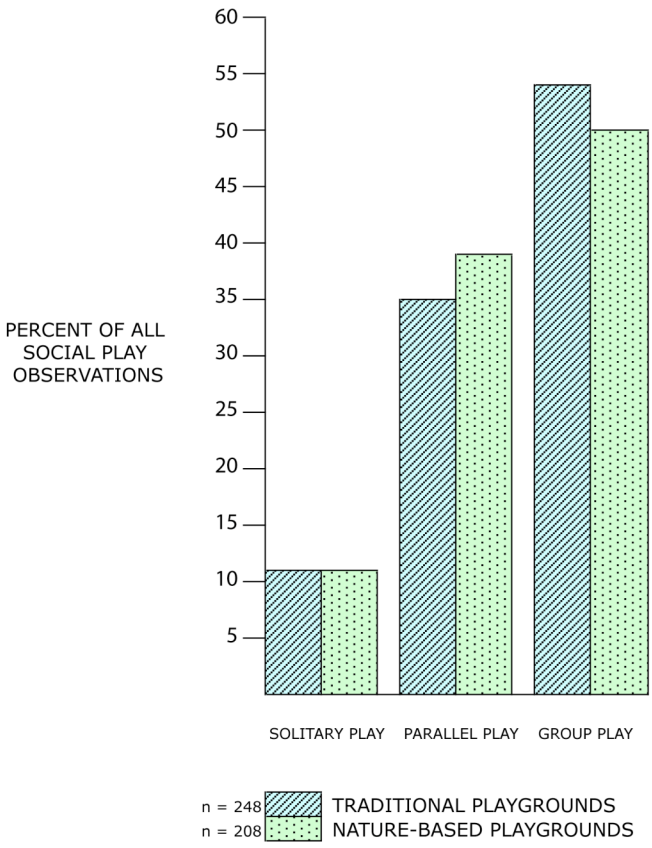

Table 3. Comparison of social play types per playground typology based on observations.

Overall, observations confirm my initial assumptions, specifically that significantly more group play occurs in the playgrounds, as this is the most age-appropriate form of social play for 3-5 year-old children. In addition the observations confirm teacher perceptions both with respect to the predominance of group play in both playgrounds and the lack of measurable differences between traditional and nature-based playgrounds. A chi-squared test confirmed that the current data show no differences in the amount of social play observed in nature-based and traditional: $\underline{X^2} = 0.66$, n.s.

COGNITIVE PLAY

I observed a total of 286 cognitive play occurrences in traditional playgrounds and 269 in nature-based play environments. These observations (see table 4) confirmed teacher perceptions: I found that functional play comprised the largest proportion of all cognitive play types in both traditional and nature-based playgrounds. I identified 118 occurrences of functional play, or 41% of all cognitive play observations in traditional playgrounds and 106 occurrences, or 39% in nature-based playgrounds.

In contrast to teacher responses, I found that nature-based playgrounds were more supportive of exploration and games with rules than traditional playgrounds. With respect to exploration, I identified 18 occurrences, or 6% of all cognitive play observations in traditional playgrounds and 37 occurrences, or 14% in nature-based playgrounds. For games with rules, I identified 8 occurrences, or 3% of all cognitive play observations in traditional playgrounds and 16 occurrences, or 6% in nature-based playgrounds.

Confirming teacher perceptions, I found that dramatic play comprised a greater proportion of total cognitive play in traditional than nature-based playgrounds. I identified 39 occurrences of dramatic play, or 14% of all cognitive play observations in traditional playgrounds and 22 occurrences, or 8% in nature-based playgrounds. However, I found no measurable differences among the playgrounds with respect to constructive and rough & tumble play and all non-play behavior.

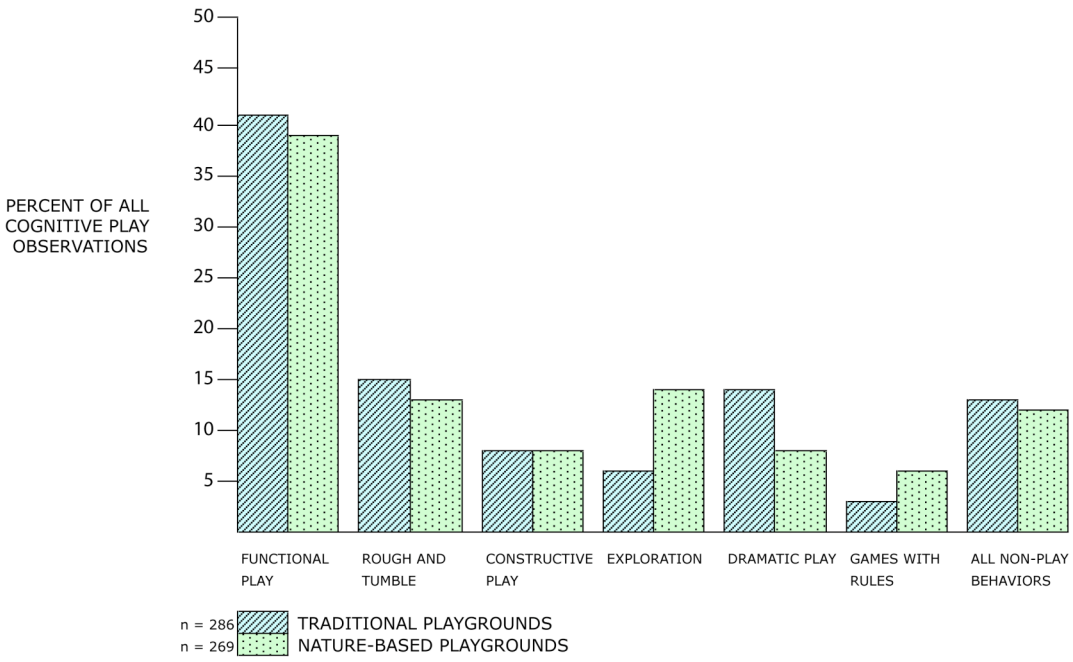

Table 4. Comparison of cognitive play types per playground typology based on observations.

A chi-square test confirmed that with respect to functional, rough and tumble, and constructive play as well as all non-play behavior there are no significant differences between there are no significant differences between traditional and nature-based playgrounds $\underline{X^2}$ = 0.15, n.s. There were, however, differences for exploration, dramatic play and games with rules between the two types of playgrounds. Nature-based playgrounds are more supportive of exploration ($\underline{X^2}$ = 18.27, $\underline{p} \leq 0.05$) and games with rules ($\underline{X^2}$ = 11.6, $\underline{p} \leq 0.05$). However, traditional playgrounds are more supportive of dramatic play ($\underline{X^2}$ = 24.1, $\underline{p} \leq 0.001$).

QUALITATIVE DATA

Qualitative observations from field notes demonstrate several key benefits of nature-based playgrounds. Accessible and interactive vegetation appears to play an important role in

facilitating group exploration and dramatic play. The playground at New Trier Bright Horizons contains an area of tall switchgrass near in its entrance, which is one of the most popular zones for group exploration and dramatic play. During one observation, a group of children spent nearly twenty minutes in the tall grass pretending to operate a restaurant. On another occasion, small groups of children repeatedly went into the grass to explore their surroundings over the course of the observation. It appears that the success of this simple element is due to the height and thus immersive quality of the grass, allowing a child to hide in it completely without needing to bend down. Since the tall grass is part of a controlled environment, there is no perception of danger, allowing children the freedom to explore or play without safety concerns.

Figure 6. Children pretend to operate a restaurant, an example of group dramatic play, in the tall grass at New Trier Bright Horizons.

My observations also illustrate the importance of open green space. In the summer, the central green space in both Bright Horizons and Paulo Freire offered children opportunities for shaded, flexible and non-prescriptive play, allowing them to adapt the physical environment to their imagination rather than having to adjust to the limitations of fixed play equipment. I observed a variety of diverse activities in the open green spaces including group exploration, games with rules and constructive and dramatic play.

I also found indications that children tend to seek out naturalized and vegetated areas, however limited, in traditional playgrounds. In a fall observation, almost all of the children in the Child Development Lab's playground spent the entire period searching for and making a large leaf pile. In this example of explorative and constructive group play, the children succeeded in actually redefining the playground's spatial composition, turning an otherwise poorly used area into an ad hoc center of activity.

Figure 7. Children construct and play in a leaf pile, an example of group constructive and dramatic play, at the Child Development Lab.

Taking teacher preference responses into consideration, it is important to note that the nature-based playgrounds observed in the study had no fixed equipment such as monkey bars and other climbing components, which can be supportive of gross motor development. Therefore, as more nature-based playgrounds are designed and implemented, it may be important to include some amount of fixed climbing equipment to facilitate more gross motor development as well as help address perceptional biases.

CHAPTER 4: DISCUSSION

This study provides some evidence for the assertion that nature-based playgrounds offer cognitive developmental benefits to children. Although there were no differences in the overall amount of cognitive play observed in the two types of playground, there was more exploratory play and games with rules in nature-base playgrounds than in traditional playgrounds. Still, even though exploration and games with rules comprise a greater proportion of overall cognitive play in nature-based than traditional playgrounds, these two play activities were some of the least observed categories in both playground types. The degree to which the proportional increases signify measurable benefits is unknown, thus necessitating further research. With respect to functional, rough and tumble and constructive play as well as all non-play behaviors, there are no measurable differences between traditional and nature-based playgrounds. Traditional playgrounds, however, appear to be more supportive of dramatic play than nature-based.

Qualitative observations offer further support for the benefits associated with nature-based play environments. For example, simple vegetative components such as the tall grass at New Trier Bright Horizons provide children with a dynamic and immersive play infrastructure that stimulates high levels of group exploration and dramatic play. Similarly, during several observations, children at Bright Horizons gathered grass, sand and twigs and pretended to make soup on the numerous large boulders, an example of group constructive and dramatic play.

Based on the data confirming teacher perceptions, I am not able to conclude that nature-based playgrounds offer measurable social play benefits over traditional playgrounds.

4.1 IMPLICATIONS

Although the literature provides a comprehensive analysis of the impacts of both play and the play environment on children's social and cognitive development, this is the first study to systematically compare the specific social and cognitive play patterns in traditional and nature-based playgrounds. Since the majority of US children between the ages of three and five spend the bulk of their waking hours in day care facilities, these settings have a responsibility to ensure that they offer the most suitable environment for high-level social and cognitive play. This study provides significant early evidence for the value of natural play environments and the importance for day care centers to provide children with accessible and immersive vegetation and open green spaces.

In addition, this study reveals a perceptional bias against nature-based playgrounds among teachers. This shows that despite demonstrated benefits, there may be impediments to a more universal adoption of nature-based play environments. One way to address potential obstacles is to carefully evaluate all of the components of nature-based playgrounds. The playgrounds observed in this study did not have climbing components such as monkey bars, which are important for gross motor development. Therefore, going forward, it would be important for typical nature-based playgrounds to also include age-appropriate climbing structures.

4.2 FUTURE RESEARCH

It is important to note that the information presented in this article is based on data collected in a pilot study conducted by a single researcher. Future attempts to replicate the

methodology should require a larger sample of traditional and nature-based playgrounds to evaluate data validity. Two or more researchers are needed to simultaneously conduct observations in playgrounds for greater coding accuracy and to allow an assessment of inter-observer reliability.

In addition, future work should specifically target social play to confirm my conclusion. Potential methodological or manpower limitations may have caused me to miss subtle yet measurable social play differences between traditional and nature-based playgrounds. Potential confounding variables such as differences between children, seasonal variation and teacher influence need to be addressed as well. How do we know that differences in playground typologies are responsible for the conclusions and how are we able to conclusively exclude other factors? A within-subjects experimental design in which children are randomly selected to play in both traditional and nature-based playgrounds may can address such confounding variables.

4.3 CONCLUSION

In this study, I examined play patterns of 3-5 year-olds in two traditional and two nature-based playgrounds. The data does not allow me to conclude that there are significant differences between the playgrounds with respect to social and low-level categories of cognitive play. However, the evidence indicates that natural, vegetated play settings offer more opportunities for exploration and games with rules than traditional playgrounds with limited vegetation. The qualitative findings from this study suggest a variety of benefits associated with nature-based playgrounds. Accessible and interactive vegetation appears to play an important

role in facilitating group exploration and dramatic play. Green open spaces provide opportunities for shaded, flexible and non-prescriptive play, facilitating group exploration, games with rules and constructive and dramatic play.

40% of pre-school age children in America spend the majority of their day in childcare. It If play is the work of children, then outdoor playgrounds are the settings in which vital social interactions and cognitively stimulating activities occur. Natural play settings with abundant vegetation offer children tremendous opportunities for engaging in high-level cognitive play, underscoring the necessity for administrators to incorporate more nature-based play components into their facilities' playgrounds.

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APPENDIX A: SAMPLE SURVEY

The survey that was administered to teachers at each of the four participating day care centers may be found in a supplemental file named SAMPLE_SURVEY.pdf.

APPENDIX B: OBSERVATION TRANSCRIPTS

Each observation period consisted of detailed social and cognitive play tracking notations, behavior mapping and field notes. A compilation of these observations, organized by date, may be found in a supplemental file named OBSERVATION_TRANSCRIPTS.pdf.