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How Does a Manmade Outdoor Area in a Large, Urban Kindergarten Afford Physical Activity to 5-Year-Old Children?

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Abstract

Based on qualitative data gathered from observations, we investigate what opportunities for physical activity kindergarten children utilize in outdoor areas that are manmade and contain only artificial playground equipment. The findings show that much self-chosen physical activity play took place in the outdoor area. Open surfaces are utilized in games that include walking and running. Places with graspable holds and standable steps are popular climbing areas. Loose and moveable equipment and substances increase the variety of activity. Based on these findings, we consider the outdoor area to be suitable for the observed 5-year olds with regard to promoting physical activity.

Keywords: kindergarten, manmade playground, artificial equipment, physical activity, play

Introduction

Among many other qualities, good opportunities for physical activity during outdoor play might contribute to an environment's child-friendliness (UNICEF 2012). In the same vein, Karsten and van Vliet-- (2006) state that children's outdoor play should matter in city authorities' efforts to create child-friendly urban environments. In this paper, we focus on a manmade outdoor area in a large, urban kindergarten in Oslo, Norway. We investigate whether or not we can consider the area suitable with regard to promotion of physical activity. To our knowledge, no previous studies in Scandinavia have investigated this aspect in such a kindergarten.

In Norway, kindergarten is a voluntary program for children aged 1 to 5 years. As many as 96.5 percent of 3-5-year-old children in Oslo attend kindergarten (Statistics Norway 2013). According to the authorities, kindergartens are therefore suitable arenas for promotion of development and learning goals and for laying good foundations for future health (Kindergarten Act 2005; Public Health Report 2013). A strategy in this context is to give children good opportunities for physical activity and play (Blair et al. 1989; Pellegrini and Smith 1998). Norway's "Kindergarten Act" (2005) states that children have the right to play because of autotelic values and that they should have rich opportunities to play in kindergarten.

Whether or not institutions are likely to promote physical activity and play depends on the social and physical environment (Bower et al. 2008). In this paper we concentrate on the physical environment's influence. Previous studies on playgrounds have shown that access to equipment, the size of the outdoor area, access to open spaces, and access to natural elements such as trees and shrubbery matter (Boldemann et al. 2011; Fjørtoft 2004; Hannon and Brown 2008; Maxwell, Mitchell and Evans 2008; Mårtensson 2004; Nielsen et al. 2012; Smith et al. 2014; Trost, Ward and Senso 2010; Woolley and Lowe 2013).

Similar to other European countries, Norway has an overall policy that includes urban growth through densification within existing urban boundaries (Report to the Storting 1993). The policy's justification is reduction of urban sprawl that contributes to increased use of private cars and thus increased CO₂ emissions, which are a major cause of climate change. In addition, this policy is important to reduce the loss of farmland and forested areas outside cities. However, the policy is also fraught with conflict because it often causes downsizing of outdoor space, natural areas, and parks inside cities, including children's play areas.

Outdoor Areas at Kindergartens

In 2005, the Norwegian government promised full kindergarten coverage, recognizing that all children aged 1-5 years have a right to a kindergarten, starting January 1, 2009 (Ministry of Education and Research 2008). According to Nilsen (2014), Oslo was already in critical need of new kindergarten locations in 2005 and available properties were scarce. This need combined with the densification policy have prompted reconsideration of traditional standpoints about the size and structure of kindergartens. For example, large kindergartens were constructed in existing buildings. A study conducted by Nilsen and Hägerhäll (2012) revealed that

the average amount of available outdoor area per child decreased significantly. In addition, some of the outdoor areas had few elements of a natural environment. Parents and professionals were concerned whether children's basic needs for development and learning were met in such institutions (Vassenden et al. 2011; Velle 2011; Vinding 2010).

Theoretical Perspectives

When we use the term "children's physical surroundings" in this paper, we draw on ecological psychology (Gibson 1986). Instead of only considering the geometric dimensions of the environment and mapping its objective dimensions, we also explore the children's activities there. Gibson (1986) describes the environment based on its meaning for the individual. He claims that a meaningful environment emerges in a dynamic interaction between the individual and the environment. We find Gibson's perspective suitable when describing and analyzing something in the environment that might have a particular function for children. According to Heft (1989), children perceive their surroundings' functions rather than their forms.

We find the terms "affordances" and "abilities" fruitful in describing the interaction between children and their physical surroundings (Gibson 1986; Greeno 1994). The term "affordances" describes conditions in the environment that contribute to the interaction: what actions the environment affords individuals. The term refers to meaningful conditions as individuals perceive them. Greeno (1994) proposes the term "abilities" when referring to qualities of the individual that contribute to the agent-environment interaction. According to Greeno, abilities are dependent on both species-specific conditions and the individual child's bodily attributes, size, developmental stage, and experience. How each individual child responds to affordances depends on the context, such as social and cultural factors (Heft 2003). Following Heft, we can use the concept "potential affordances" about affordances that are possible for the individual based on her/his abilities (Kyttä 2002). Whether and how an individual person responds with potential affordances, however, also depends on whether she/he *wants* to utilize them. The affordances actually *utilized* by someone might be described as the environment's *functionally significant* properties (Heft 1988). Hence, when we describe affordances in this paper, it involves descriptions of both the places in the environment and specification of the individual, active child and how she/he utilizes the places.

Gibson (1986) differentiates between medium, substances, and surfaces in the physical environment. Air is the medium people move through. Substances are solid, formable, or liquid and afford different opportunities for action. The surfaces separate medium and substances. All substances have a surface, and all surfaces have a certain layout. In *The Ecological Approach to Visual Perception*, Gibson (1986) describes the surface of the earth, "the ground," as a reference surface for other surfaces, and objects as concrete "things" on the ground. Objects might be loose or attached to something. Play equipment and toys are examples of loose objects in a playground (Hannon and Browns 2008; Maxwell, Mitchell and Evans 2008). Permanent play frames, tables, and chairs might be examples of attached objects. Landforms, along with vegetation, whether manmade or natural, constitute large and small places in the environment (Lorange 1984). Gibson (1986) describes

a place as a more or less extended surface or layout in the meaningful environment. Places emerge when humans perceive meaning in specific areas in their surroundings. Hence, a description of a place includes the interaction between the individual person and the actual location. On a playground, for instance, children often name places according to their function (Løndal 2013). This is how we utilize the concept of "place" in this paper.

Physical Activity and Play

Norwegian health authorities refer to international research and to the World Health Organization (WHO) when they recommend at least one hour of daily physical activity of moderate/vigorous intensity for children (Norwegian Directorate of Health 2014; WHO 2010). When used in research, the concept of "physical activity" is commonly defined as "bodily movement produced by skeletal muscles that results in energy expenditure" (Caspersen, Powell and Christenson 1985, 126) and is described by intensity, duration, frequency, and activity type (Ekelund 2002). Hence, physical activity is a complex form of human action that involves bodily movement. Gallahue and Ozmun (2006) separate discernible movements into three functional categories: *locomotory movements*, *manipulative movements*, and *stabilizing movements/postures*. Children's movements in play are combinations of these categories.

Discernible movements might also provide a picture of the children's *abilities*. Such movements can be habitual or in a process where they undergo change. Hence, it is possible to locate them on a continuum from *basic movements*, via *adaptive movements* and *personal skills and styles*, to *idiosyncratic adjusted movements* (Morris 2004). The individual child's body size, developmental stage, and previous movement experiences affect the location on this continuum and influence the child's abilities (Gallahue and Ozmun 2006; Greeno 1994). Movements that challenge the child's previous experiences lead him/her to change her/his abilities and to "push" the movements upward the continuum. Barriers are broken and abilities increase. Movements utilized in physical activity that increase the child's abilities in this way can be defined as *barrier-breaking movements* (Løndal 2010; Morris 2004). Previous research on children's play has shown that children seek challenging situations with barrier-breaking movements (Løndal 2013; Sandseter 2013). This seems to happen primarily because they find it exciting and amusing. From a pedagogical point of view, such challenging situations with barrier-breaking movements are considered favorable because they lead to development and learning and lay good foundations for future health (Gallahue and Ozmun 2006; Pellegrini and Smith 1998).

In kindergarten, physical activity can occur in play, physical education, and transition between places. In consideration of children's development/learning and future health, facilitation of pleasurable activities adapted to the relevant age group is recommended (Norwegian Directorate of Health 2014; Framework Plan 2011). Hence, attention is drawn to physical activity that occurs in play. Research conducted in Norway shows that most of the physical activity that occurs in kindergarten emerges during outdoor play (Giske, Tjensvoll and Dyrstad 2010; Lundhaug 2010). This is consistent with international research showing that "time

spent outdoors [is] positively and consistently related to children's physical activity" (Sallis, Prochaska and Taylor 2000, 965). Because of its dependency on context, the phenomenon of "play" is difficult to define (Sutton-Smith 2001). However, theorists describing the phenomenon agree on some aspects: play is a typical way of being among children, children play because it is valued for its intrinsic meaning, play leads to joy and engagement in children, and play is an important cultural phenomenon (Lillemyr 2009; Sutton-Smith 2001). In this paper, the focus is on *physical activity play*. The most important defining characteristics of such play is that it comprises discernible physical activity with a dimension of physical vigor, it emphasizes meaning over objectives, and it is non-functional behavior in the observed context (Pellegrini and Smith 1998). In a pedagogical situation, however, it is important to note that play may also serve functions of which players are unaware.

Aim and Research Question

Based on the theoretical perspective described above, we assume that physical activity emerges in meaningful interaction between children and places in the environment. Discernible movements will provide information on whether or not the environment has affordances that are functional in relation to the child's abilities, and whether or not the child utilizes them in varied habituated or barrier-breaking movements. The aim of this paper is to investigate if and how a manmade outdoor area at a large, urban kindergarten affords physical activity for five-year-old children. We have formulated the research question in the following manner: How does the manmade outdoor playground, with mainly artificial play frames and equipment, afford varied movements through physical activity among five-year old children?

Method

Following our theoretical perspective, we want to describe the environment, the children who play there, and how these children utilize affordances at particular places in the environment. Researchers can gather information about an individual's affordances and abilities by asking or observing them (Heft 1988; 1989). We chose to enter the research field with a qualitative life-world approach, which implies that the researchers explore the subjects in concrete real-life situations (Bengtsson 2006). We conducted fieldwork at one kindergarten with properties relevant for our study. Following Fangen (2010), we mainly based the fieldwork on observation, but in order to deepen our understanding of particular situations, we utilized conversations with participating children and staff members on some occasions. Additionally, we gathered maps, pictures, and descriptions of the kindergarten's outdoor area.

The Participating Children

The study includes one single age group of children attending the kindergarten: the five-year olds. Based on information from a preliminary observation week following the entire group and conversations with the group's leading kindergarten teacher, we strategically chose children for individual observation. We tried to select children who represented a variety of preferred activities and places, and who were expected to give information related to the research question. The number of

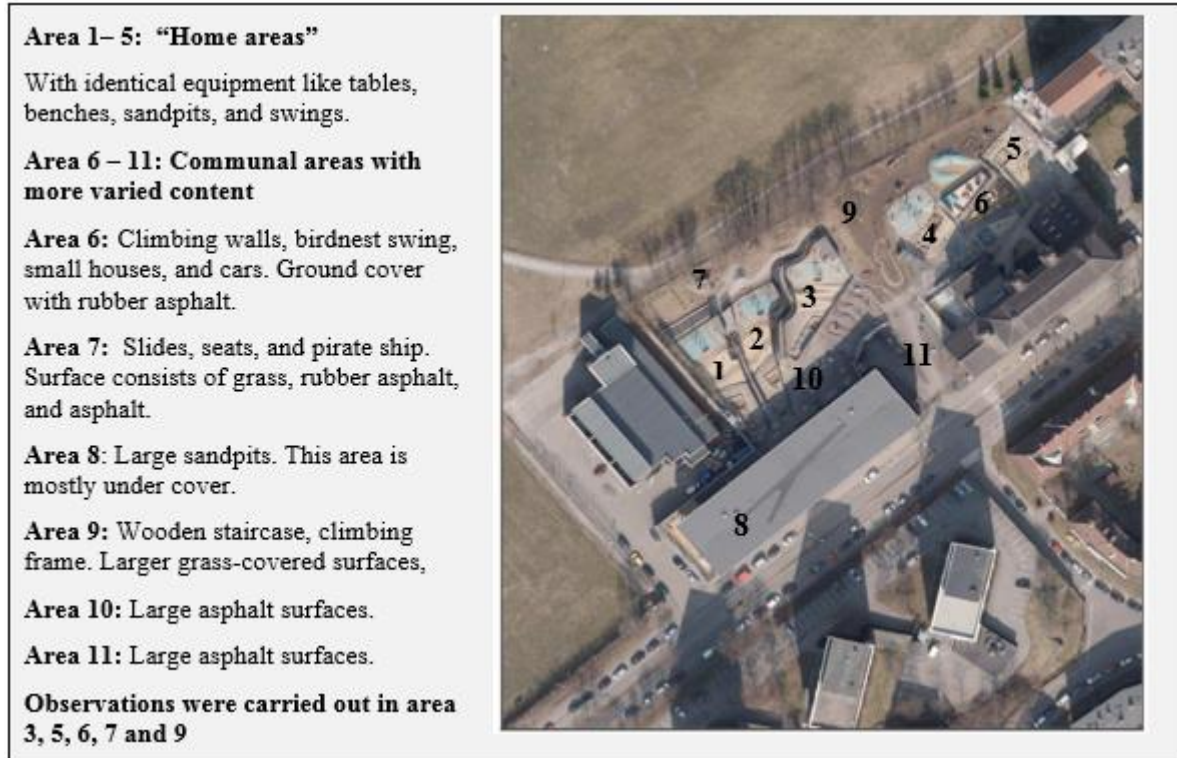
individually observed children, four boys and three girls, was decided based on considerations of sufficient saturation in the data (Fangen, 2010). Prior to the fieldwork, we obtained formal consent from the kindergarten's administration and sent a notification about the project to the Norwegian Social Science Data Services. We also informed staff members about the study, and we obtained informed consent from the guardians of participating children. Prior to the observation sessions, we obtained verbal consent from the observed children. Following the recommendations of Backe-Hansen and Frønes (2012), the observer asked the children whether or not she was allowed to watch them playing.

The Kindergarten

As mentioned, Norwegian urban planning policy aims for densification within existing built-up areas, and there is strong emphasis on utilizing urban areas effectively. This influences children's outdoor environments, including kindergartens, and may have an impact on children's play. We chose to study what Flyvbjerg (2006) calls a critical case: a kindergarten with a manmade outdoor area where area per child is far below the recommendations of Norwegian authorities.¹

The kindergarten's playground has 11 subareas with few elements of natural environment, altogether having an average of 9.9 m² per child (see Figure 1). The subareas are equipped with artificial play frames such as climbing frames, swings, slides, small rooms, models of ships and cars, sandpits, an asphalt path for cycling, large asphalt surfaces, and tables and benches. Parts of the outdoor area are roofed. Subareas are located at different terrain levels that are connected by wooden stairs and slopes covered with rubber asphalt. The observed kindergarten group was outdoors at least once a day, and often in both the morning and the afternoon. Since different kindergarten groups alternate between which areas they use and when they are outdoors, area per child is dynamic. The staff determines a plan that regulates what subareas each group might play in each day. The observed group was sometimes alone at one of the largest subareas, and at other times was together with other groups at small sites.

¹24 m² per child below 3 years of age, and 33 m² per child aged 3-5 years (Ministry of Education and Research 2006).

Figure 1. Overview of the outdoor area in the selected kindergarten

Source: Skog og landskap, Statens vegvesen og Statens kartverk 2015. Processed according to Norbeck 2013, 22.

Gathering Qualitative Material

Prior to the fieldwork we prepared an observation guide and placed particular emphasis on the questions “Where in the outdoor area is the child?” and “What is she/he doing there?” One of the authors, Karoline B. Norbeck, completed the fieldwork in the autumn of 2012. During the mentioned preliminary week, she observed the whole kindergarten group, and thereafter one individual child each day for one hour each time. During the observation period, the group followed their regular routines. The observer followed the selected child to the places where she/he wanted to be and made field notes about the activities and the places where the activities occurred. To provide rich data, she noted the events as they happened, without using predetermined categories for type of activity (Merriam 2009). Based on conversations with the landscape architect who designed the outdoor area, maps of the area, our own photos, and inspection of the area outside the kindergarten’s opening hours, Norbeck completed form-based descriptions of places in the outdoor area prior to the observations. She specified the descriptions further during the observation period. To maintain proximity to the data, the observer rewrote the field notes on the same day she performed the observations (Patton 2002). She wrote the notes in a document consisting of four parts: first, a main section containing rich descriptions of the activities; second, systematic assessments of the activities’ duration and intensity; third, detailed descriptions of maps and pictures of where the children were; and fourth, descriptions of practical

issues such as weather conditions, time of day, and how the observer's presence influenced the children's activities (Malterud 2011). All these parts were included in the analyzing process.

Analyses

We conducted the analysis in a stepwise process where we aimed to build bridges between raw data and findings by organizing, interpreting, and summarizing the qualitative material (Malterud 2011). First, we obtained an overall impression of the material and identified meaningful units that illuminated the research question. Based on the field notes, we described the children's movements and marked their locations on a map. This gave us a structured overview of where the children had been during the observation and what they did there. In particular, we searched for affordances children utilized at particular places in the environment. Hence, we provided a *functional description* of the environment. On this basis, we reflected on the findings from a theoretical perspective and wrote them into a consistent text where the phenomena studied emerged.

Trustworthiness

We have emphasized providing thorough descriptions of all steps in the research process as well as referring to the field notes during presentation of findings (Merriam 2009). We also refer to theories, methods, and concepts used in previous studies of children's activities in physical environments. These factors contribute to strengthen the study's trustworthiness. We are aware that our subjective interpretations have influenced the observations and analyses. Although one researcher conducted the observation, all of the researchers thoroughly discussed the process. All authors participated actively in the analysis. We attempted to bracket our own pre-conceptions, and we focused on discovering and including situations and interpretations that did not conform to our expectations (Johnson 1997).

Findings and Discussion

We will present findings about how particular places in the outdoor area afforded physical activity for the children and discuss whether or not the activity promoted varied movements. We refer to situations that collectively describe the totality of the material. Children mentioned in the presentation are anonymized. The analysis shows that spontaneous physical activity occurs in many places in the area. Most of the activities appear as physical activity play characterized by joy and engagement; they seem to be self-chosen and child-managed and do not fill a specific function beyond the activity itself. The activity emerges as play in the many specific, constructed places at this playground, and as transition between these places. This is in line with Danish research showing that a high number of play structures increase physical activity among children (Nielsen et al. 2012). We separate three main categories of places: *places on the ground*, *climbable places*, and *places with loose parts and/or substances*. These categories represent places that are widely used during the children's outdoor time, places where activities can last over time. Our study, with a small sample of observed children, does not give grounds to conclude on what places in the outdoor area five-year-olds use most or least. What we *have* seen, however, is that all children utilize open spaces that in different

ways afford running and walking. In such spaces, we have seen both long-lasting social activities *in* the place and in transition *between* other places. When it comes to smaller, more specialized places, there are large variations with regard to individual preferences. A single place might be widely used by some children, but not at all by others. However, all observed children have *some* preferred specialized places. Below we present and discuss some examples from the three main categories.

Places on the Ground

This category includes surfaces covered with soft-fall rubber, asphalt, concrete, wood, or grass. Based on the analyses, we have separated the category into three subcategories: *large, open surfaces*; *small, well-defined places*; and *"tracks."*

Large, Open Surfaces

The following example shows a situation where a teacher initiates activity (Figure 2).

Figure 2. A large open surface (see Figure 1, area 5)



Source: Norbeck 2013, 25

A teacher shouts that the children can play a game called "hawk and dove." Henrik enters the asphalt place where the teacher is located. She stands in the middle of the place and explains the rules. After a while, the game starts. Henrik is "a dove" and sprints toward the free area by one of the walls. He stands still and jumps up and down a few times. When it is time to run again, he sprints towards the other free area. "A hawk" manages to catch him. He has to stop where the teacher stands.

The area is about 250 m² and has no permanent obstacles. Hence, it is possible to run crisscross. Other children function as moving obstacles, especially those who pretend to be “hawks.” They run after the “doves,” trying to catch them before they reach the free area by the wall. This game is an example of how large, open surfaces afford running. Physical activity play is common on such surfaces; children use the openness of the place to move freely. This finding is consistent with previous research (Mårtensson 2004; Smith et al. 2014; Trost, Ward and Senso 2010). The activities cause locomotory movements of relatively high intensity. In line with previous research, our observations also suggest that large, open surfaces are well suited for social play (Løndal 2013). When staff members initiate and manage activities at these places, they often last for a long time. Child-managed activities on large, open surfaces are characterized by transition between other places.

Large, open surfaces can also be sloped. The following example shows Ida’s activity in a rubber-covered slope between two terrain-levels (Figure 3):

Figure 3. A slope covered with rubber asphalt (see Figure 1, area 3)



Source: Norbeck 2013, 29-30

Ida is playing in the sandpit with some other girls. She tells that she will make “disgusting slime.” She runs from the sandpit down the slope and out of the gate. After a while, she comes back with a bottle full of water. With the bottle in her hand, she runs up the slope. When she gets halfway she goes a few steps, and then she runs the rest of the way. When she comes up, she smiles; it is obvious that she is looking forward to making “slime.”

Like other large, open surfaces, slopes afford running. Additionally, the slope is a place between other places. Ida runs across the slope because of her intention to

make "slime." She is heading toward another place, and the activity that this place affords creates a desire to run. In this way, movements that occur in play become an interactive tool to explore the surroundings. The fact that it is exhausting to run uphill does not seem to bother Ida. The running is necessary to bring water to the sandpit and, according to Ida, is required in order to make "slime." What the children want to perform and experience thus helps determine what affordances they utilize (Heft 2003). The water tap invites Ida to run down to the lower level, while the sandpit at the top of the slope affords running upwards. The duration of each transition is short, but the intensity and the frequency is high. Previous research has shown that children also play on slopes for the autotelic value. They seek the speed of running downhill; it affords a sense of excitement (Frost et al. 2004; Mårtensson 2004). We have seen similar examples in our observations, on both the slope shown in Figure 3 and on another uneven, rubber-covered slope in the area. A boy named Marcus is often seen running around on these slopes, sometimes alone and sometimes in catching and following games with another boy. It is apparent that he enjoys such activity. The uneven shape of the slopes seems to make running more challenging than a smoothly sloping surface. Perhaps this promotes a more exciting experience for the playing child.

Small, Well-Defined Places

In our material, only self-chosen and child-managed play appeared at the small, well-defined places; the children play alone or in small groups. Emil was observed playing alone in a small place defined by permanent play frames and buildings (Figure 4):

Figure 4. A place between buildings and play frames (see Figure 1, area 6)



Source Norbeck 2013, 27

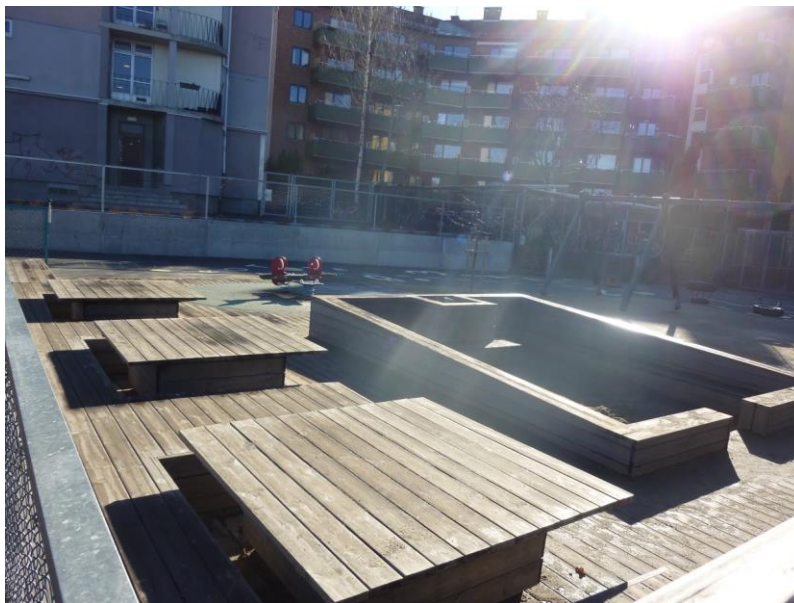
Emil was constantly in motion, and his play involved moving between the walls. Since the movement mostly occurred as walking, the intensity remained relatively

low. In our material, this is typical for physical activity play in such small, well-defined places. However, Emil's play was long-lasting, which also seemed to be typical for play in such places. These are places where children can dwell, even when they are alone. Small, well-defined places afford hiding. Previous research has shown that children are attracted to quiet places and places to hide (Green 2013; Hart 1979; Skånfors, Löfdahl and Hägglund 2009). The observed outdoor area in our study has several places the children seek when they want to be alone or when they want to play together with a few friends. This is in line with the results of a study conducted in a kindergarten in Sweden that revealed that the children seek and protect small, hidden places where they can withdraw and play together with selected friends (Skånfors, Löfdahl and Hägglund 2009).

"Tracks"

"Tracks" are routes that the children often choose when they move between places or when they play catching and following games. On such occasions, the children are following spatial structures created by outdoor furniture, play frames, etc. in the environment. The situation described below features a "track" (Figure 5). The location of the tables in relation to the fence shapes an imaginary track that affords a direction for running.

Figure 5. A "track" defined by the children (see Figure 1, area 5)



Source: Norbeck 2013, 28

Henrik runs after Lukas on the bench between the fence and the tables. They continue until the end of the fence. They turn, and now Henrik runs first. They run back halfway, then between the last two tables, and then up to the spring-rocker.

The benches on which Henrik and Lukas run are slightly higher than the ground and can easily be jumped onto and down from. They constitute the surface of the track,

and the tables and the fence serve as barriers preventing free choice of direction. Conversely, the tables and the fence afford running between and along them. The children seem to seek places where they can run zigzag between and around objects, such as tables, benches, sandpits, and spring-rockers. This agrees with Mårtensson's (2004) research, which shows how the landscape helps coordinate the direction of children's movements in play. Large objects serve as obstacles that block movement (Gibson 1986). The tracks formed between them afford running.

Climbable Places

This main category of places offers both horizontal and vertical transition and requires balance and coordination. Based on the analysis, we have distinguished between *climbing areas* and *stairs and ladders*.

Climbing Areas

The observed outdoor area has several play frames designed for climbing. The example below is such a place, the Climbing Pyramid (Figure 6).

Figure 6. The Climbing Pyramid (see Figure 1, area 9)



Source: Norbeck 2013, 36-37

Markus runs toward the Climbing Pyramid and starts to climb; he balances along one of the lower ropes. He climbs back and forth and hangs over a rope before he jumps down. Henrik is hanging by his legs from another rope. Markus pushes him. He puts his feet on the ground, leans forward, and lets Henrik hit him gently on the head. Then he spins forwards around the rope and falls to the ground, but stands up again quickly. Then he climbs up to the top of the pyramid, where he stands and scouts out over the kindergarten.

Markus utilizes the properties of the place to move around on the Climbing Pyramid. He balances, jumps, moves, and hangs in different positions. Together this can be described as a climbing activity composed of several types of movements, with distinct elements of locomotion and stabilizing postures that challenge his earlier movement experiences. An important property of climbable places is access to grabable and standable holds for hands and feet. There must be several such potential climbing affordances near each other (van Herrewegen, Molenbroek and Goossens 2004). Balance and coordination are essential for children's climbing skills, and challenging these motor abilities seems greatly to contribute to the effort that we have observed in climbing. The lowest ropes afford challenging movements where the children jump between ropes and spin around the transverse axis of their bodies. In the upper part of the pyramid, they balance stationarily, often while scouting the playground.

Conversations with the landscape architect revealed that some places in the outdoor area afford climbing though it was not her explicit intention during the planning process. Such places have elements that the children perceive as holds and steps, for example, handrails along stairways and protection stands around newly planted trees. The children intuitively grasp such elements and utilize them in climbing movements; it seems to fulfill intrinsic values for them. Previous research has shown that children up to six years of age are particularly motivated to climb (Frost et al. 2004). Climbing places that challenge the children's skills are most attractive (van Herrewegen, Molenbroek and Goossens 2004). This is likely due to the sense of mastery the children experience when they increase their climbing skills. We observed apparent examples of children utilizing barrier-breaking movements; they challenged their climbing skills during the play. We also saw children who fell down without hurting themselves. According to previous research, children are attracted to places that afford an experience of controlled danger (Frost et al. 2004; Sandseter 2013). This may explain why children spend so much time in places that afford diverse climbing activities. The current outdoor area has several climbing places with challenges that seem to fit the abilities of the observed five-year olds. Climbing involves a wide range of movements that are essential to acquire adaptive movement experiences (Gallahue and Ozmun 2006; Morris 2004). Since climbing appears attractive to children of preschool age, it is important that playgrounds afford this type of activity for children at all relevant levels of development and ability.

Stairs and Ladders

Stair and ladders have the same functions as "*tracks*"; they afford transition between places. The children utilize properties in the environment that afford grabbing with their hands and pushing with their legs. Holds and steps make it possible to climb up to the bridge that crosses over to the ship (Figure 7), and the children perform the climbing quickly. However, climbing involves a coordinated combination of locomotory and stabilizing movements that are challenging for kindergarten-age children. It is an example of barrier-breaking movements that contribute to the children's development and learning; there is an advancement along the continuum from basic to idiosyncratic movements (Gallahue and Ozmun 2006; Morris 2004).

Figure 7. A ladder with two steps (see Figure 1, area 7)

Source: Norbeck 2013, 33

The stairs and the ladders in the outdoor area are short; they usually consist of only a few steps. However, the children meet them many places. The duration of these climbing activities are short, but all of the observed children perform them many times throughout the day. Our observations suggest that an attractive place on the “other side” invites the children to climb the stairs and ladders. This seems to be related to how the children perceive the “flow of elements.” The fact that the ladder at Figure 7 is connected to the bridge, which in turn is connected with the ship, seems to lead to the climbing affordance being utilized more often than if it were an isolated element. This is in line with a recent study conducted by Smith and colleagues (2014) that shows that adjacency of play settings has a positive effect on physical activity play. Frost et al. (2004) explain repetitive climbing activity at such places as children seeking a goal at the top of the climbing equipment. Properties of the elements must, however, enable climbing; distance between holds and steps must fit the child’s size and the design must fit the child’s development and skill level. The child’s abilities have to be at such a level that they can utilize the affordances (Greeno 1994; van Herrewegen, Molenbroek and Goossens 2004). When we investigate the places related to the children’s abilities, it becomes apparent that many places at the playground require climbing. Where adults can step over the edge of the sandpit, children have to climb. Where an adult can sit down on a swing, children must climb up. All together, the observed outdoor

area has many small places that seem to fit 5-year-old children when it comes to climbing activity.

Places with Loose Parts and/or Substances

Much of the observed children's physical activity is related to loose/movable parts or substances. Loose/movable equipment is available both in specially designed places and in places where equipment is supplied when needed. Thus, we introduce the third movement type that Gallahue and Ozmun (2006) describe: manipulation. Loose parts and substances can be moved (Gibson 1986) and our observations suggest that they contribute to activities of different intensity and duration. Loose parts are often used in places on the ground, but almost never on the climbable places. This is consistent with previous research; children find that climbable places in themselves have what are needed to afford exciting activities (Løndal 2013). Based on the analysis, we distinguish between *places with loose equipment and/or moveable play frames* and *places with loose substances*.

Places with Loose Equipment and/or Moveable Play Frames

This category consists of loose equipment, such as balls, digging tools, and bicycles, and permanent frames that are movable, such as swings and spring-rockers. The swings are popular among the five-year olds, and we offer an example in Figure 8. Loose parts can be separated into equipment that the children can move, and equipment that the children can use to move themselves. Previous research has shown that supplying loose equipment in playgrounds is associated with increased physical activity, especially at open spaces (Hannon and Brown 2008; Maxwell, Mitchell and Evans 2008; Smith et al. 2014). It is shown that equipment that gives children an opportunity to move faster than they otherwise can is particularly popular (Frost et al. 2004; Sandseter 2013). In our material, the children's play with tricycles and scooters in open spaces is a typical example. When children use cycles, they stay on the hard, smooth asphalt. The combination of the physical characteristics of the asphalt and the rolling characteristics of the cycles function as affordances (Løndal 2013). By moving the pedals of the bicycles, the children move themselves around on the hard and smooth surface, and it seems as they challenge their previous movement experiences. We observed particularly high intensity during short cycling intervals while other children ran behind.

Smaller objects afford manipulation because they can be moved. The children are also afforded the opportunity to move themselves after the objects. When Lukas and Emil throw a ball to each other, for example, they move the ball. When they fail to grab it they have to run after and catch the ball. In addition, it often happens that the children "have to" bring equipment needed in play. A combination of affordances contributes to physical activity on such occasions: places on the ground allow movement, and the equipment's appealing properties motivates the children to bring it.

Figure 8. A birdnest swing (see Figure 1, area 6)

Source: Norbeck 2013, 48-49

Sophie pushes the birdnest swing that Emil, Lukas and Ida are sitting in, and it gets considerably high speed. The children shout with a joyful noise. Lukas says, "I was about to lose my heart," Emil says, "I was about to lose my brain," and Ida says, "I was about to lose my stomach." A little while later, a teacher passes by and shouts that it is time for food. It does not seem like the four children heard what she said; they continue to play.

Three children sit in the swing, so Sophie has to use considerable strength when she pushes. For the children being pushed, the birdnest swing affords two different emotions: *tranquility* and *excitement* (Frost et al. 2004). The activity appears to be influenced by the social context; our observations suggest that the opportunity for social contact in the swings was at least as attractive as the opportunity for physical activity. Thus, the social element reflects what Mårtensson (2004) describes as an evocative accompaniment to rest, conversation, and imagination. The swing generates excitement, joy, and social interaction, and the children's tool to achieve this is the physical activity required to create speed.

Places with Loose Substances

Sand is an example of a loose substance that creates activities in the outdoor area. The following situation takes place in a sandpit (see Figure 1, area 3):

Emil sits in the sandpit and digs with a large shovel. He says that he is looking for a treasure that has been there for thousands of years. He urges the small boys not to bury tractors in the sand, just to look for treasures.

Emil has dug a big hole in the sand. He pretends to fall into the hole and shouts; "oh no, I am falling!" Then he continues to dig.

The sand is moldable and firm at the same time. Emil moves sand with a shovel and uses its moldable qualities to dig a hole. He "falls" into the hole; he has created a form that he utilizes in his imaginary play. According to previous research, such types of activity are often seen in children's play with sand (Jarrett et al. 2010). The ability to discover new forms that can be used in activities is a popular element in children's surroundings and is relatively low in intensity (Cosco, Moore and Islam 2010). Children are characterized by tranquility during such play. Instead of searching intensive movement, they seem to be mentally immersed in exploration of the properties of the sand. We have seen examples of children mixing sand and water and then exploring the new properties of the sand using spades and various containers. The possibility of using several loose substances in combination with loose equipment appears to increase the children's fascination, which in turn influences the duration of the activity (Frost et al. 2004).

Concluding Remarks

Good opportunities for physical activity during outdoor play are considered important in the promotion of Norwegian kindergartens' aims for development and learning. The opportunity for physical activity play might also contribute to an environment's child-friendliness. In this paper, we have investigated this aspect in relation to a manmade outdoor area in a large kindergarten: does it afford good opportunities for physical activity play that include varied habituated and barrier-breaking movements for five-year-old children? We chose to study the outdoor area at the largest kindergarten in Oslo as a critical case. If this playground, with a totally artificial environment and an area per child far below the recommendations of Norwegian authorities, can afford valuable physical activity play for the seven children studied, it could potentially be possible for other children and at other such playgrounds too. To our knowledge, these aspects have not been investigated in this type of kindergarten in previous studies. The findings should be considered when planning playgrounds at large kindergartens, and when organizing time for the children there.

The small size of the playground relative to the total number of children limits the children's freedom to choose when and where to play. Each day, staff members have to regulate what subareas the different kindergarten groups might play in. This limits, of course, the free flow that is so characteristic of children's play. Nevertheless, our study shows children partaking in physical activity characterized by joy and engagement. Most activities at the predetermined subareas appear to be self-chosen and child-managed, and in the observed context they do not fill a specific function beyond the activity itself. Therefore, we define them within the concept of "physical activity play." The analysis revealed that the artificially created outdoor area has places with characteristics that make it suitable for varied physical activity through play for the observed five-year-olds. The children grasp affordances adapted to their own abilities, and they relate personalized movements to these. Most of the children seem to challenge their movements towards the limits of previous experiences. The variation in the movements that occur, with

combinations of locomotion, manipulation, and stabilization, seem to challenge the children's movement experiences. Hence, a barrier-breaking process that can change the children's abilities might occur; the process may change the movements' placement on the continuum from basic movements, via personalized movements and styles, to adjusted, idiosyncratic movements.

Our study has taught us something about good ways to design small outdoor spaces for optimal use for children in kindergartens. The designers should base their plans on analyses of relevant children's abilities and preferences. They should emphasize developing places where the children's locomotory, manipulative and stabilizing movements can be practiced, challenged and developed. Children have different preferences; therefore, it is important to build various places that together can reach them all. Our study suggests that an outdoor area containing a variety of places on the ground, climbable places, and places with loose parts and/or substances might be beneficial in this respect.

In summary, we consider the current outdoor area to be suitable for promotion of the national aims regarding physical activity among the observed children. Hence, it contributes to its child-friendliness in that area. However, more detailed studies should be carried out in order to make an overall evaluation of the area, including its effects on children's physical activity play at large in this setting. Many aspects were not investigated in our study. We cannot generalize with respect to the total child-friendliness of the environment or about the promotion of aims other than those related to physical activity. We are well aware of the large amount of research that has shown how exposure to nature and natural elements might positively influence children's mental, social, and spiritual health (see, e.g., Boldemann et al. 2011; Fjørtoft 2004; Mårtensson 2004; UNICEF 2012; Woolley and Lowe 2013), as well as their concentration, cognition and psychological well-being (Wells 2000). Based on our study, there is no basis to compare playgrounds with a density of natural elements and playgrounds to those with only artificially created elements. There is need for research with a diversity of theoretical and methodological approaches that can make such comparisons.

As mentioned, parents and professionals were concerned whether or not the large, newly constructed kindergartens in Oslo can meet children's basic needs for physical activity and play. Our study shows that they can if the outdoor area has places with affordances for combinations of locomotory, manipulative, and stabilizing movements that can challenge the children's movement experiences. To avoid a crowding effect with too many children in the same area at the same time, it is also necessary to schedule different groups' outdoor time and decide where they can play. It is important that these aspects are considered when playgrounds are planned and organized in such large kindergartens. In both these processes, there is a need for profound knowledge about the children in the relevant age group and about how they interact with their environment in play.

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