Nature Experience Areas: Rediscovering the Potential of Nature for Children's Development

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Abstract

Natural environments play a key role in childhood development, promoting mental, physical, and social competencies. However, children's presence and movement in open spaces, especially in urban areas, are becoming increasingly limited. This results in decreased opportunities to experience elements within a natural environment. One solution for this situation is to create safe natural environments within the neighborhood which allows children to have daily contact with natural environments and integrating it into their learning. We introduce the concept of nature experience areas, which consists of natural elements such as trees, shrubs, sticks, and few artificial playground elements. Nature experience areas provide open spaces for children to play freely with little or no assistance by adults. It is argued that children can playfully use their body and senses, thus providing a context for hands-on learning. The potential of natural environments for children's play and the effects of nature experience areas on children will be outlined in a brief review. Then the approach and findings from two studies are given: the first involved a quasi-experimental design including structured observations, while the second included in-depth interviews with children. Results show that activities on a conventional playground consist of primarily repetitive movements, compared to nature experience areas where a higher variety of play behavior appears. Favorite places of children within the nature experience area are characterized by a high degree of complexity and provide opportunities to climb and explore the area. The potential of natural experience areas for nature contact and free play is discussed.

Keywords

Nature experience · Child development · Urban nature · Play behavior · Action space

Introduction - The Meaning of Natural Environments in Childhood Development

Children experience their direct physical surroundings in a multisensory way. In this Chapter, we address the meaning of natural environments in the context of childhood development. Natural environments are defined as areas without or little built infrastructure. At first we will provide an overview of literature about the interaction between children and the natural environment. Then we introduce results of two empirical studies focusing on natural experience areas for children.

Recent Trends of Child Interaction with Natural Environments

Childhood conditions have been changing dramatically in the last few years. This affects children growing up in urban areas as well as children growing up in rural areas (Blinkert, 2016). A so-called modern childhood in industrialized countries can be characterized by the following trends.

1. Childhood is increasingly organized. Children are more involved in education and care institutions than they have been in former times, thus having less leisure time available (Bamler, Werner, & Wustmann, 2010). They spend most of their spare time apart from school in institutions or at organized spare time activities. At the same time, a tendency toward all-day schooling increases which leads into the same direction (Raith, 2015). Due to these developments, the opportunities for children to play freely and without supervision decrease substantially.
2. Furthermore, children are more and more influenced by increased media consumption. Often, spare time is spent using digital media such as television, computer, and smartphones (see ► Chap. 40, "The Child-Nature Relationship in Television for Children" by Pettersson). A lot of children have access to the internet at all times (Blinkert, 2016). However, at the same time, children miss physical activity and social interaction with peers.
3. The radius for autonomous actions of children has decreased drastically in the last decades (Blinkert, 2016). Besides the aspects given above, another reason is increased traffic. Traffic density can cause serious accidents, feeding the increased worry of parents for their children's safety.

Due to these developments, some authors are suggesting that children are developing a nature deficit disorder which can have drastic consequences for society nowadays. Louv (2011) argues that children who are not able to experience natural environments – in contrast to built environments – lack a connection to nature and develop a nature deficit disorder, characterized by physical and psychological deficits. This development is rather critical since children need a diverse environment including various affordances or a holistic development. These are especially present in natural environments (Louv, 2011) since natural environments enable continuity and change at the same time. Continuity and change arouse by seasons and weather, meeting the need of children for reliability, safety, orientation, and at the same time curiosity, imagination, and adventure (Gebhard, 2014). Simultaneously, limitations and resistance in natural environments support the development of one's personality and help to become aware of one's own strengths and weaknesses (Renz-Polster & Hüther, 2013). Facing these tendencies of a modern childhood, we should take a closer look at the effects of natural environments on childhood development.

Significance of Natural Environments for Child Development

Numerous studies are stressing the importance of gaining experiences in natural environments – in contrast to built environments – during childhood. Especially in a time with increasing diagnoses such as attention deficit disorders, attention deficit hyperactive disorder, obesity, and cognitive problems, natural environments play an assuasive role (Mustapa, Maliki, & Hamzah, 2015). The exposure to natural environments has a restorative effect (Hartig, Mitchell, de Vries, & Frumkin, 2014), e.g., children with attention deficits are able to concentrate significantly better after being exposed to natural environments than after being exposed to urban environments (Taylor & Kuo, 2009). However, the effect of natural environments is much more general. Restorative effects of natural environments have been shown on different levels (Hartig et al., 2014). Children who are highly exposed to natural environments show significant differences on a physical, mental, and social health level compared to children with less exposure to natural environments (see ▶ Chap. 50, "Everyday, Local, Nearby, Healthy Childhoodnature Settings as Sites for Promoting Children's Health and Well-Being" by Green, Dyment, and Dooris).

Physical Effects of Natural Environments

Children get less sick and develop better motor skills in a forest kindergarten compared to a conventional kindergarten (Grahn, Mårtensson, Lindblad, Nilsson, & Ekman, 1997). Additionally, children are more resistant to illness. They develop better motor skills and present a healthy body weight (Jung, Molitor, & Schilling, 2012), and children's motion intensity is higher in natural environments than in built environments (Wheeler, Cooper, Page, & Jago, 2010). Also, children develop more diverse motion patterns (Fjørtoft, Kristoffersen, & Sageie, 2009).

Mental Effects of Natural Environments

Executive functioning skills, which are obtained by measuring the attention span, are more developed in 7- to 8-year-old children who are exposed to the natural environment (Schutte, Torquati, & Beattie, 2017). Research reveals that children who spend time in natural environments show lower levels of psychological distress (Wells & Evans, 2003). Additionally, children living in a more natural environment show a higher level of self-discipline, measured by power of concentration, impulse control, and delayed gratification (Taylor & Kuo, 2009). They also show higher levels of self-competence, measured by creativity, motivation, self-dependence, power of concentration, and fluency (O'Brien & Murray, 2005).

Social Effects of Natural Environments

Children who spend time in natural environments have been shown to develop better social competencies such as team work, communication, and social behavior (Dyment, 2005).

Considering the effects and thus the importance of contact to natural environments for children, the tendencies of a modern childhood described above are rather alarming. Children who are not able to play freely in natural environments may suffer serious limitations in physical, social, and cognitive development, and deprivation of natural environments may lead to children developing into adults who lack essential social and personal skills (Blinkert & Weaver, 2015).

Significance of Autonomy for Child Development

Another important factor in healthy child development is autonomy. Due to societal changes, action spaces for children – spaces in which children can move freely and without supervision – have begun to disappear. Blinkert distinguishes between autonomous and heteronomous forms of childhood (Blinkert, 2016). An *autonomous childhood* is defined by indicators of independency, namely, when children play outside for long periods of time without supervision and little time in institutions in the afternoon. A *heteronomous childhood* is defined by indicators of little independency, namely, when children play outside rarely without supervision. They are often accompanied by parents and take part in afternoon child care, providing few affordances to experience the natural environment.

The most important condition for a positive autonomous childhood is the quality of the action space of a child (Blinkert, 2016): the time spent outside correlates with quality of children's residential environments. Children living in a high-quality residential environment have a higher potential to access action space autonomously (Blinkert, 2016). Interestingly, when children had the possibility to choose their spare time environment, they preferred a large number of various locations where they were not being controlled or supervised, while they avoided playgrounds which were especially designed for them (Beach, 2003). However, we have to be aware that natural environments are not always positively associated by children, and it might arouse negative effects as well (Malone, 2016). Children name natural environments often as locations where they feel insecure, e.g., because of darkness, loneliness, and fear of crime or threatening interactions with adults (Hallmann, Klöckner, Beisenkamp, & Kuhlmann, 2005).

Thus, natural high-quality action spaces for children have to meet specific requirements in order to increase the willingness of parents to allow their children to play outside. The action space should be characterized by:

1. Safety – while yet accepting that danger can be perceived and handled by children. There is no complete safety.
2. Accessibility of appropriate play locations in the neighborhood without insuperable barriers
3. Possibilities for creation, which describes the practical value of a location
4. Possibilities to interact with each other (Blinkert, 2016).

Especially in large cities, it is often difficult to provide open spaces for children for unsupervised play. The barriers include dense traffic as well as fewer play locations in the neighborhood and parental fear that their children might hurt themselves (see ▶ Chap. 47, ""She's Only Two": Parents and Educators as Gatekeepers of Children's Opportunities for Nature-Based Risky Play" by Laird and McFarland). Still, children need a daily contact with natural environments to encounter other species, risk, and free play (Richard-Elsner, 2016).

Learning Environments and Nature Experience

Most urban centers tend to be denaturalized and dehumanized. For children it is difficult to engage with natural environments in daily life, especially if they are not allowed to move independently. Thus, children's opportunities to develop literacy, risk assessment skills, and resilience are limited (Malone, 2016). There are research approaches which explicitly or implicitly have identified this problem and are addressing the interaction between child and non-human nature, trying to design environments which are supporting imaginative and creative play. These approaches include the development of schoolyards (Raith, 2015; Tsevreni), preschools (see ▶ Chap. 23, "Child-Nature Interaction in a Forest Preschool" by Kahn), and child-friendly urban structures in general (Broberg, Kytta, & Fagerholm, 2013). In Scandinavia, there is a long history of outdoor education. "Utescole" in Denmark is the concept of school taking place outside, growing stronger since 2000. This "outdoor school" is defined by context-based learning, working outside the classroom and a multi-sensual approach to practical and guided activities, including group work (Jordet, 2010). This meets the call for a place-responsive outdoor education (Mannion & Lynch, 2016). Outdoor learning and education opens up space for physical activity such as play and games, communication, teamwork, experiences, curiosity, and imagination. These aspects are the basis for nonformal learning processes. Outdoor learning and education aims to integrate advantages of school inside and outside and merges the need of a holistic development using the affordances of natural environments. As a result, children are enabled to achieve an interaction with natural environments on a daily basis to reduce nature deficit disorders (Louv, 2011; see ▶ Chap.80, "Childhoodnature in Motion: The Ground for Learning" by Eddy and Moradian).

The self-organized autonomous contact of a child with natural elements such as soil, water, and plants has a high importance for healthy physical and psychological development (Gebhard, 2014; Schemel, 2002, 2008). Thus, nature experience areas could substantially contribute toward learning by immediate, multisensory, affective prescientific learning experiences. Some examples for meaningful activities in the natural environments are given in Table 1 (Reidl, Schemel, & Blinkert, 2005).

Nature experiences include a direct, multisensory, affective, and prescientific learning opportunity a child receives through her or his contact to nature (Bögeholz, 1999).

Table 1 Activities and examples for nature experiences

Activity	Natural element: nature experience
Soil activities Walking in mud puddles	Feel soft, wet soil, interaction of soil and water (see, hear, smell, touch)
Water activities Impound water	Experience water on own body Perceive running water
Activities with plants Harvest and eat fruits Cut and carve parts of plants	Perceive with all senses: see, taste, smell, touch, hear Creatively modify plants
Activities with animals Follow and catch animals	Experience the behavior of animals
Overall activities Run, walk	Experience the variety of the terrain

It includes opportunities for the child to have an embodied experience in a living environment (Meske, 2011), which are made by actively perceiving the environment through observation, smelling, tasting, touching, enjoying, researching, grasping, and recognizing (Renz-Polster & Hüther, 2013).

Playing as a Learning Process

As we can see, one important factor of learning is exploration and play. Play enables development and education. It is an innate behavior in humans enabling a variety of different experiences which are valuable throughout life. Playing offers the opportunity to develop competencies such as creativity, social competence, and executive control (Renz-Polster & Hüther, 2013). According to the definition of nature experiences and play, we consider play behavior as a learning resource for children. In order to contribute to this, some countries adopted the children's right to play in their laws according to the UN Convention on the Rights of the Child (e.g., Bundesministerium für Familie, Senioren, & Frauen und Jugend, 2014).

In contrast to purposeful, planned work, play is the purposeless, spontaneous, voluntary action, which is intrinsically motivated, pleasure-oriented, led by imagination and follows specific rules. Depending on the developmental stage a child is in, play behavior shows a different complexity (Hegemann-Fonger, 1994; Oerter & Montada, 1998). The research is based on the following classification of play behavior.

Play behavior	Description	Authors
Psycho-motor play or exercising play	First occurrence in nursing age Surroundings get integrated, e.g., being outside and playing with sand, moving objects and playing in puddles	Hegemann-Fonger (1994)
Exploration	This looks much alike psycho-motor play in nursing age. However, it is a *conscious* exploration of objects. Again, the surrounding environment plays a major role	Bögeholz (1999)

(*continued*)

Play behavior	Description	Authors
Imagination and role-play	It develops from the age of about one and a half years. Familiar situations as fictional scenes get reenacted. Children pretend to do something, e.g., sociodramatic play adopting roles from family life	Hegemann-Fonger (1994)
Construction play	A specific purpose is apparent, thus overlapping with work: there is an aim to build something. Construction play includes handicraft, painting, and reparation Construction and role-play often depend on each other, e.g., the construction is used to illustrate a role scene	Hegemann-Fonger (1994)
Games	Games integrate various play activities, e.g., "pretending," motor skills or competition Games provide specific rules and often have a name	Hegemann-Fonger (1994)
Movement play	Movement play does not follow specific rules. Children have a strong need for movement, which provides the motivation for their own experiences and physical strength development. The movement as such is the aim, e.g., running, jumping, or swinging. Often, it is repetitive. Movement play does not necessarily involve strong active movement of children, e.g., swinging can be played with little physical activity	Hegemann-Fonger (1994)
Communication play	With increasing age of children, communication play becomes more important. It is rather quiet and with limited movement, e.g., watching, listening, talking, and making music	Bauer (2001)

All play activities can provide parts of others, e.g., games often include communication and movement play, and construction play often includes movement and role-play. The classification serves to differentiate the complexity of play by the main aspect addressed in the apparent play behavior. All these play activities need a location where they can take place and affordances to be activated. Besides structured programs such as outdoor school or the design of playgrounds, nature experience areas could serve to activate children to broaden their play behavior.

Nature Experience Areas: A New Concept to Enable Children's Interactions with Natural Environments

While the concepts mentioned above address institutionalized play areas, free accessible areas for children are still rare. Natural experience areas close this gap and focus on free play for children in their neighborhood and can be reached by children aged 6–12 years without supervision of adults. Natural experience areas, which are located close to the living environment, are unstructured and design-free natural open spaces for children to play and

experience natural environments in an autonomous, spontaneous, and unsupervised manner (Schemel, 1998). Thus, natural experience areas might provide a naturally managed area addressing the loss of non-human nature contact of children. They provide hardly any artificial play elements such as slides or swings. Still, their main purpose is recovery for children. Table 2 summarizes the concept of nature experience areas for large cities.

Empirical research on nature experience areas has been conducted in the German-speaking area in particular. Using observations and interviews, previous empirical studies show that children play in larger groups and the age group of children playing together showed a greater variety in a rural natural experience area (Reidl et al., 2005). Also, children's play is more complex and continues for a longer time in the nature experience area compared to a playground and parental supervision was lower (Berglez, 2005). The play behavior included the creative production of things and play elements such as huts or earth dams. Thus, the play behavior included more planning and setting goals (Blinkert, 2005; Reidl et al., 2005). Additionally, children showed an interest for their physical surroundings and animals (Lude, 2001; Meske, 2011). These reported studies took place in small cities, and a generalization to children living in large cities needs to be questioned. We will now introduce an interdisciplinary project, supported by the Federal Agency for Nature Conservation in Germany. In this context, three nature experience areas in Berlin are supervised by ecological, planning, and social research. Here, we question the effects of nature experience areas on children growing up in an urban context. Results are shown from the initial phase of one of these recently initiated urban nature experience areas in 2016, connecting play activities and nature experiences for children who have fewer

Table 2 Characteristics of urban natural experience areas (Stopka & Rank, 2013, adapted to Schemel, 1998)

Use	Primarily recovery
Character	Min. 50% natural, untreated areas, other areas extensively cultivated Natural development of plants (natural succession) Natural attraction (e.g., mound, puddle), no play tools or other infrastructure
Size	0.5 ha with minimal width of 20 m
Maintenance	Extensive care in order to preserve open views in some parts Development of care plan with organizers and users Control of areas in order to avoid hidden safety risks
Location	Integrated into the living environment in the range of 500 m
Target group	Children in the age of 6–12 years
Assistance	Play actions to get to know location and lose a fear of "wild" nature Extracurricular offers, offers for child care institutions Work in public relations Enable unobserved, free play on a daily base
Regulation	Considering safety issues (according to insurance) All activities allowed except for motor sports
Protection by planning	Initiation in given space category without additional protection Initiation of separate greenspace category possible

opportunities to be in natural environments than children in small cities. We are focusing on the following research questions: **How do children growing up in an urban context experience nature experience areas? What kind of play behavior do nature experience areas arouse in children growing up in an urban context?**

Structure of the Reported Methods

In order to address this research question, we decided to opt for a two-stage empirical approach, including a quantitative and a qualitative part (see Fig. 1). In study 1 we conducted observations in order to see how many children were present, analyzing play behaviors in the natural experience area. A conventional playground served as the control area (see section "Study 1: Observational Study on Utilization and Play Behavior in a Metropolitan Nature Experience Area"). Subsequently, in study 2 we carried out media-supported interviews with children, a hands-on research method in order to analyze in detail what kind of activities children are involved in the nature experience areas (see section "Study 2: Media Supported Interviews with Children: A Photo Ramble"). Figure 1 gives an overview about the mixed-method approach.

Study 1: Observational Study on Utilization and Play Behavior in a Metropolitan Nature Experience Area

In Berlin, Germany, a city with roughly 3.5 million inhabitants, a new nature experience area was initiated in June 2016, located in the periphery of the city with a mixed sociodemographic infrastructure. Results from an analysis of data on the experience of the use of this nature experience area will be presented. In order to compare the play behavior of children, we chose a conventional playground in the direct neighborhood as a comparison site. Thus, there were two different research areas – the nature experience area and the conventional playground – where behavior observations took place.

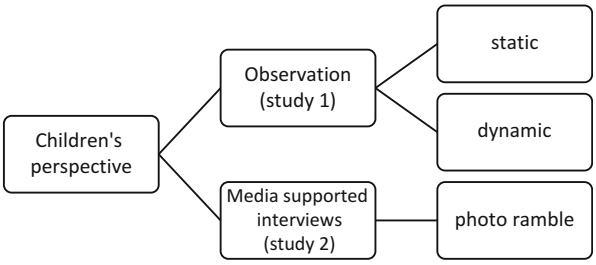

Fig. 1 Structure of the reported methods

Nature Experience Area

The nature experience area is a public space, thus accessible 24 h a day without restrictions. It consists of 0.64 ha of natural vegetation with a high variation between open, partly covered, and covered spaces. The design of the area took place in participation with children from schools and child care institutions in the surrounding neighborhood, starting in December 2015. After visiting and playing in the area, planners asked the children about their ideas and requests concerning the design of the area. Children built models and discussed their implementation. The planners integrated the children's considerations into the design of the area, including work on the space with children. The area was opened for play on June 6, 2016, in an official ceremony. Figures 2, 3, 4, and 5 gives an overview of the nature experience area.

In order to inform neighbors and decrease a possible fear about accidents, a trained child care worker was employed. This employee is in charge of perceiving and removing possible sources of dangers for children and to talk to neighbors, parents, and teachers in order to introduce the concept of a nature experience area.

Playground

As a comparison site apart from the nature experience area, a playground in the direct vicinity was observed. This site was chosen as a comparator since it had the same size and accessibility as the nature experience area. It was located about 100 m away from the nature experience area but served the same neighborhood. The playground has been designed in 2002 and provides play elements in play sand which has a natural appearance due to sandstone elements (see Fig. 6).

Fig. 2 Impression of the nature experience area with entrance area

Fig. 3 Impression of the nature experience area with headge structure

Fig. 4 Impression of the nature experience area with constructed hut

Procedure

Four weeks after the opening, the observation of usage started. A randomized time scheme for the observations was put up to avoid bias due to time, observer, weather, season, and school or holiday season. Fridays were excluded due to special activities conducted on these days before the weekend, thus not being representative for daily

Fig. 5 Impression of the nature experience area with trees

routines (Bauer, 2001). The observations were alternated from 10 a.m. to 4 p.m. and from 2 p.m. to 6 p.m. alternatively in order to include morning activities as well as evening activities in the areas.

The observations were divided into two different procedures: a static and a dynamic observation (see Fig. 1).

- In the static observation, children were counted on various days, differentiated by age and gender. This served the purpose of usage of nature experience areas and playground as a control in general.
- In the dynamic observation, consisting of 1093 time slots, one randomized chosen child was observed in detail for 4 min, including the play behavior according to Hegemann-Fonger (1994).

Observers were trained for 1 day in the given areas, which included obtaining examples for children's play behavior and conducting observation in teams. Results have shown a high consistency between different observers. Two persons were present each day of observation: one person observing the nature experience area, the other person observing the playground. The distribution toward the starting observation area was randomized in order to avoid observers' preference or time effects. After 2 h, they changed locations in order to avoid observation biases due to fatigue. The frequencies of visits in different defined parts of the nature experience area were counted every 15 min. All children were counted, grouped by age and gender, both on the playground and the nature experience area. Additionally, adults were taken into account and served as an indicator for autonomous or heteronomous childhood of the present children.

Fig. 6 Impression of the playground with slide and climbing elements

A pretest of 2 weeks from July 5 to 17 served to evaluate the given sketches of the areas, the measurements, and the research procedure. After analyzing the data and experiences with the procedure, small changes were adopted. The pretest was excluded from subsequent analysis.

The main study took place from August 22 to September 25 on a daily basis which included 2 weeks during school season and 2 weeks during holiday season. Due to low case numbers in the nature experience area, an additional week in September was added.

Sample

The sample of the static observation consisted of all children who were present in the areas when observers were present, either on the playground or the nature experience area. Since the children were not randomly distributed to one of these areas, we worked in a quasi-experimental design, leading to $n = 439$ children in the natural experience area and $n = 2866$ children on the conventional playground for static observations (see Table 3).

Additionally, we had a total of 1093 time slots observing detailed play behavior of children for 4 min in the dynamic observation. Including the additional week of observation in the nature experience area, we had observation data for 380 children in total, consisting of 58 cases in the nature experience area and 322 cases on the playground (see Table 4).

Table 3 Frequencies of children present and no children present in the natural experience area and the conventional playground

Area		Frequency	Percent
Nature experience area	No children present	397	47.5
	Children present	439	52.5
	Total	836	100.0
Playground	No children present	101	3.4
	Children present	2866	96.6
	Total	2967	100.0

Table 4 Gender distribution in the play areas

Area		Frequency	Percent
Nature experience area	Female	25	43.1
	Male	33	56.9
	Total	58	100.0
Playground	Female	167	51.9
	Male	148	46.0
	Missing	7	2.1
	Total	322	100.0

Measures

The observers had a structured protocol to follow and marked how many children were present and what they played, separated by age and gender. Additionally, the observational protocol included weather and temperature in a three-part scale (sunny, cloudy, rain) and the temperature, as well as time, date, school or holiday season, the name of the observer, and the number of children and adults.

Results and Discussion of the Observational Study (Study 1)

In the next sections, results of both parts of the observation study, the static and the dynamic observation, will be provided and discussed.

Static Observation: Number of Children in the Play Areas and their Age

Static observation data show that far more children were visiting the conventional playground than the newly opened nature experience area. In the time span of observations, 78% of the observed children were present on the conventional

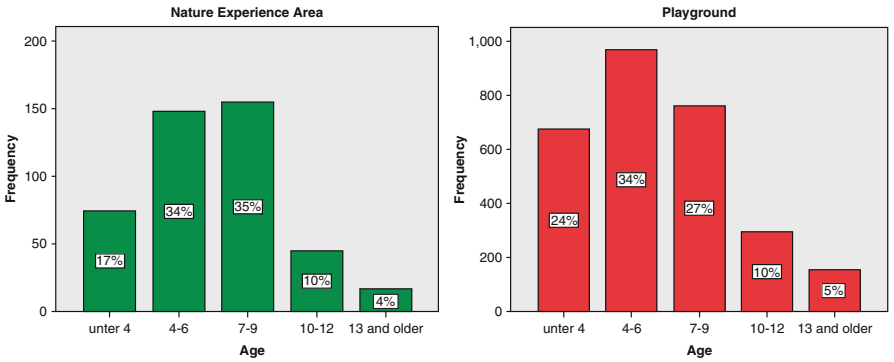

Fig. 7 Frequencies of children present on nature experience area (left, green columns; $N = 439$) and playground (right, red columns; $N = 2865$)

playground. Consistent with this, the times of children present varied between both areas (see Table 3). The nature experience area had more time slots with no children at all (47.5%) than the playground (3.4%).

The age distribution of children in the nature experience area and the playground differs as well. The majority of children (69%) in the natural experience area ranged within an age group of 4–6 and 7–9 years. On the playground, almost one quarter of the children was under 4 years old; most children were between 4 and 6 years old (34%). With 27%, the age group of 7–9 year olds was less represented on the playground than in the nature experience area. Children over 10 years and over 13 years used both areas the least amount of times (see Fig. 7).

A slightly lower percentage of girls (43%) were observed in the nature experience area compared to the playground with 51%. The number of adults supervising children was higher on the playground. The peak of present adults was 26 persons on the playground, while in the nature experience area, in most cases three adults were present, with a peak of 12 persons at the same time.

Discussion of the Utilization of the Play Areas

Results show clearly that a higher number of children were present at the conventional playground than in the nature experience area. This might be due to familiarity since the playground existed for some years already, providing the opportunity to get established for parents to go there with their children or send their children off to play. The nature experience area opened up 6 weeks before the main observation was taken; thus, it is possible that the majority of people from the neighborhood did not know about it yet and therefore have not visited it yet. Furthermore, the nature experience area with dense vegetation might not be inviting for some people due to esthetical considerations (Martens, Gutscher, & Bauer, 2011). Parents might fear their children would hurt themselves in such an area. Watching their children at all times is

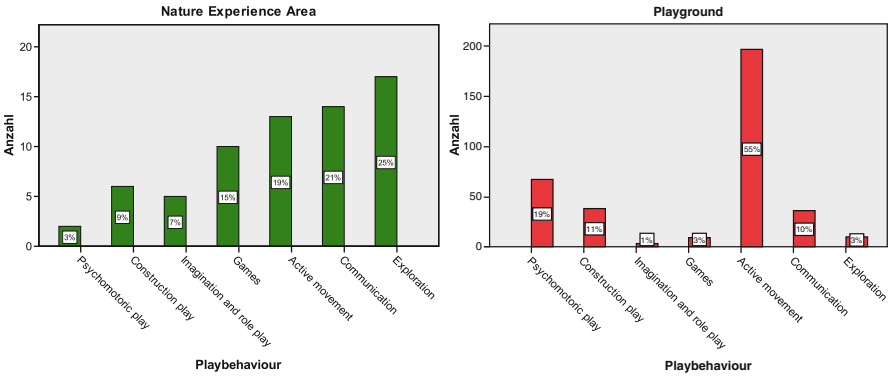

Fig. 8 Play behavior in the nature experience area (left, green columns, $n = 58$) and on the playground (right, red columns, $n = 322$)

not possible in the nature experience area due to the dense vegetation unless parents moved with their children all the time. However, the dense vegetation might be one of the driving factors of children playing freely and learning in the nature experience area. The person employed in order to take care of the area and inform parents and neighbors about the usage of the area could lower this obstacle in the long term. Mostly, children were accompanied by their institutions such as school or preschool on the nature experience area.

The observation data shows that the natural experience area meets the target group of children aged 6–12 years. However, the nature experience area seems to be quite relevant for younger children as well, considering that 17% of the observed children were younger than 4 years old. These children possibly came with an institution, and child care educators have been chosen the area for their play. These groups should be focused in further research, questioning the effects of nature experience areas in early childhood development.

Dynamic Observation: Play Behavior in the Play Areas

Our data show a different pattern of play behavior in the nature experience area and the playground, respectively (Fig. 8).

The comparison between the nature experience and the playground shows some interesting differences: While movement play provides the main play behavior on the playground with 55% of the observations, followed by psycho-motor play with 19%, the play behavior in the nature experience area is more diverse, representing all groups of play behavior to a relevant extent.

The dominant behavior in the nature experience area was exploration (25%), followed by communication (21%), active movement (19%), and games (15%). Activities like construction play (9%), imagination and role-play (7%), and psycho-motor play (3%) are represented less often.

The dominant behavior in the control group on the conventional playground was movement play with 55%. Psycho-motor play was observed in 19% of the cases, while other play behaviors appear in less than 12% of the observed cases (see Fig. 8).

Discussion of Play Behavior in Play Areas

Not taking into account the different group sizes between nature experience area and playground, we analyzed the percentages of play behavior in each area in order to show the relative distribution. Overall, the play behavior in the nature experience area shows a much broader variety, ranging from simple and repetitive movement play to complex imagination and role-play. The dominance of movement play on the playground does not necessarily indicate more physical activity, because more complex play behaviors include movement as well, e.g., creating a hut, which is considered to be construction play, includes running around looking for movable material, carrying it, and moving back to the initial construction site. This can be physically just as challenging as swinging for a longer time. The play classification we used does not aim to make any suggestions to the amount of movement in play but to differentiate the complexity (Hegemann-Fonger, 1994).

The apparent play behavior is more complex in natural areas, consistent with earlier studies carried out in a more rural context (Reidl et al., 2005). We assume that the natural environment stimulates the children with the variety of bushes, trees, and shrubs and thus provides affordances to play (Jansson & Mårtensson, 2012). The playground provides affordances to play as well, but often it is a single function arousing specific play behavior, e.g., the slide to slide, the sandbox to play with sand, and the swing to swing. The natural environment offers opportunities without a given obvious function, e.g., the tree can be used to climb on, to hide behind or as a part of a hut. It challenges the children to develop their own ideas and functions of the elements and thus could stimulate a broader variety of play behavior. Another aspect present in the natural experience area is movable material, such as sticks. Movable material can be put into different locations and be used in a multifunctional way, again supporting a more complex play behavior (Maxwell, Mitchell, & Evans, 2008). Our analysis suggests that the variety of play behavior is an effect of the given environment: a natural environment provides continuity on the one hand, e.g., by a slow growing and changing process, and change on the other hand, e.g., by the different appearance due to season or weather, at the same time. These antipodal trends apparent in the natural environment meet the need of children for routine and excitement at the same time, thus supporting their cognitive development (Gebhard, 2014).

Since children's play in the nature experience area is more complex, they are likely to have diverse experiences, such as social interaction, psycho-motor perceptions, and the exploration of natural elements; it provides a basis for more complex learning processes (Edelmann, 1996). Exploration was the dominant play behavior in the nature experience area, shown in 25% of the observed cases. This is especially interesting in comparison with the conventional playground: exploration

does not play a significant role on the playground representing 3% of the play behavior only. On the playground, movement play such as sliding, swinging, and running is the dominant play behavior which is often repetitive. The cognitive stimulation is higher in more complex play behaviors such as exploration. Exploration of the surrounding environment includes a prescientific experience and understanding (Bögeholz, 1999). Opportunities for various play behaviors enable complex learning in children (Lau, Nerger, & Schreiber, 1997) which could be increased by the implementation of nature experience areas.

One aspect that needs to be further analyzed is the age distribution. Younger children tend to play in less complex ways. Psycho-motor play appears at the age of 4–6 years especially, which was the second most frequent age group on the playground.

Our results suggest that natural experience areas have a stronger affordance character to show different and complex play behavior, while the playground has a strong affordance to show the predetermined play behavior such as sliding or swinging. Thus, it seems nature experience areas stimulate a greater variety of different play behaviors. This may be due to the possibilities of active involvement by modifying the environment themselves, e.g., by creating huts, breaking sticks, or designing pathways. This result is consistent with research on the positive effect of movable objects in outdoor play areas (Maxwell et al., 2008; Moore, 2014) and the importance of space for learning is apparent in general (see ► Chap.7, "Outlining an Education Without Nature and Object-Oriented Learning" by Bengtsson). Results of study 2 will pick up these considerations in detail.

Study 2: Media-Supported Interviews with Children: A Photo Ramble

In order to give a deeper insight into the play behavior in the nature experience area, an explorative procedure questioned the children's view of the area and play opportunities. This served to explore the specific behavior in nature experience areas, which had not yet been analyzed in detail. Due to this focus and the explorative aim, no control group was implemented (Kuckartz, 2012). We were interested in what places children preferred, which ones were avoided, and what kind of activities children were involved in the natural experience area, thus using a playful method (see ► Chaps.17, "Unplanning Research with a Curious Practice Methodology: Emergence of Childrenforest in the Context of Finland" by Vladimirova & Rautio and ► 39, "Embodied Childhoodnature Experiences Through Sensory Tours" by Green). Media-supported interviews serve to address children in a playful, understandable way and place-responsive way (Bauer, 2001; Lynch & Mannion, 2016). The natural experience area was the same as described above (Figs. 2, 3, 4, and 5); the conventional playground was excluded for this study. The interviews took place during early autumn; thus, there were ripe blackberries next to the stinging-nettles and trees full of ripe large and small plums.

During summer break 2016, we contacted organizers of school holiday activities in the neighborhood, supported by the pedagogical staff of the nature experience area. The elementary school holiday institutions were located in the radius of at most 3 km from the nature experience area. From August 15 to August 22, 2016, we conducted 20 media-supported interviews with elementary school children, aged 6–12 years.

Children were informed and offered to take part in the media-supported interview called "photo ramble." Children carried an informed consent letter to be read and signed by their parents. When the children arrived at the area with their holiday institution, they handed in the informed consent sheet. Children took part voluntarily. Some children decided not to take part in order to just play in the area. Children who took part were given an easy to use camera. The researcher explained how to use the camera. The child took a picture of the feet from child and researcher as a first picture to indicate the beginning and to test the usage of the camera. Then, the child was instructed to take five photographs in total, with the following aims:

1. A favorite place
2. A place to be avoided
3. A place to be alone
4. A place to be with others
5. An object that is particularly fascinating to the child

The child received a little flag to put up at each photo to indicate the location in question. As a reminder, the five different photo aims were written on the backside of the flag. Then one child at a time strolled through the nature experience area and took five pictures. No time limit was given.

After taking the pictures, the child came back to the indicated location where a researcher waited. The pictures were put onto an 11-inches-screen in order to present the photos to child and researcher. The interview took the photos one-by-one as prompts (see photo-elicitation, e.g., Briggs, Stedman, & Krasny, 2014). The interview consisted out of five blocks of open questions according to the selected and photographed locations. The first question was "Why did you pick this location as your favourite place?" (place to be with other children, to be alone, respectively), followed by "What do you do there?". Further questions were developed in case an answer was not detailed enough for research reasons. Additionally, we asked for age, gender, and independent activities in a daily context of the children, e.g., the way they get to school (accompanied or by themselves), spare time activities, and distance to the nature experience area. After the interview, we thanked each child for their expertise and handed out a certificate of participation.

The interviews were recorded, and a transcript was written. The interview text was analyzed by content analysis (Mayring, 2003). The first step, the coding, was done very close to the interview material. In the second step of analysis, the codes got reduced, reaching ten categories. These categories were then, in the third step, generalized into four head categories, which aimed to analyze the research question how children perceive nature experience areas.

Results and Discussion of the Interviews (Study 2)

Twelve girls and eight boys at the age of 7–12 years took part. More than half of them (11 children) were accompanied by one of their parents to school, while 9 children went by themselves or were accompanied by siblings. The walking distance to the nature experience area was estimated by most children to more than 20 min from home. Only six children reported a walkable distance of 10 min.

The coding system (see Table 5) derived into a categorization of the whole interview material on the perception of urban children perceiving the nature experience areas. The four head categories adventure and creativity, retreat, instrumental use, and threat, which are shown to be meaningful to the children, will now be reported and illustrated by anchor examples (Mayring, 2003). The anchor examples were translated by the authors from German into English. Results are discussed directly after each head category.

Natural Environment as Location for Adventure and Creativity

The nature experience area was described as a location for playing, climbing, and creating in particular. Adventure was a major aspect children mentioned. Children enjoyed free play and role-play: "In this area, I play with my female friends and pretend to be pirates – or police women" (D1, girl, 10 years old).

Physical activity is an important factor mentioned by the children: "We can run and create uproar. I have to find (my friend) all the time since he is hiding from me. And then I run after him and run through the whole area" (D10, boy 10 years old).

Places to be alone stimulated needs and different play behavior, including role-play: "Here, I can play nicely alone. I'm a dancer and dance... and nobody can disturb me" (D1, girl, 10 years old). Favorite places often had a variety of climbing opportunities: "I like to climb. And this was the location, where you can climb trees" (D7, girl, 9 years old).

Table 5 Categories and head categories of nature experiences

Category	Head category
Possibility to climb	Nature as location for adventure and creativity
Possibility to create	
Possibility to observe	
Possibility to hide/shelter	Nature as retreat location
Esthetics	
Quietness	
Possibility for nutrition	Instrumental use of nature
Darkness	Nature as threatening location
Derangement	
Painful experiences	

Another important activity reported is creating. Building something played an important role for fascination and identification: "This is my favourite place, because I have built it with my friends (. . .) We found a tree. We put sticks onto it, and a hole appeared. And then we could sit in there. (. . .) I built it together with my friends and we had a lot of fun looking for the sticks" (M7, boy, 9 years old).

An important aspect which was reported by several quotes is the explorative character of the area. Children reported observing and thus discovering things as a fun activity, either observing natural phenomena such as animals or other children in play: "(We) look if somebody attacks us in our play, or we look for animals or something else" (M1, boy, 9 years old).

Possibilities to climb and adapt the area were mentioned to be very important. Children enjoyed climbing trees, including the perception of dangerous action as well as the appreciation of a challenging task. These results confirm earlier studies (Reidl et al., 2005) and open up a more detailed picture. The adventure and creativity aspect reflects the explorative nature experience dimension facing the examination of animals and plants (Bögeholz, 1999). Consistent with previous results on the design of play areas, it needs to be considered that children enjoy natural elements, which they are able to utilize in new ways (Maxwell et al., 2008). This is possible to a stronger degree in the natural experience area and might be an explanation for the higher variety of play behavior that we reported in study 1. The learning aspect is assumed to be stronger due to this category, because the possibility to hide plays an important role for children and their learning processes (Renz-Polster & Hüther, 2013). The creative leeway was wider in the nature experience area as results show here, indicating that we need to move away from telling children how things should be to enabling their climbing and creating needs instead. Hiding places, hand-made or given by designed structure, enhance the adventure-orientated dimension of natural environments and need to be considered in terms of design. Creative play and design of the area have to be enabled deliberately in order to support childhood development. This is a main difference to conventional playgrounds, which often provide given elements only and few possibilities for children to change the area.

Natural Environments as Retreat Location

Children reported finding quiet places for retreat or creating places like that, such as huts or walls with little possibilities to be observed. They purposefully sought out such places, e.g., when they are angry or had an argument: "There, I'm always alone, for example when someone beat me or I'm not doing well or so on. Then I sit down there. (. . .) I can calm down, (. . .) because usually there is nobody. Because, when I was there, nobody disturbed me" (M9, boy, 12 years old). They purposefully sought out areas with high vegetation in order to find quietness for themselves: "I went into the shrubs very, very deep. And thus, you do not hear any voices" (M7, boy, 9 years old).

They also looked for quiet areas in order to plan and talk to others: "We are there to make plans what to build" (D3, girl, 8 years old). Imagination and role-play were

part of exclusive locations as well: "I have a secret path to this location (...) and nobody can reach it except for me" (D8, boy, 8 years old). Quietness and esthetic pleasure are enjoyed: "Because it's pretty there (...) and sometimes so quiet, too" (D6, girl, 7 years old).

In a very instrumental way, children expect specific characteristics of the natural area, which they use, e.g., recovery. This is consistent with the recovery-oriented dimension of nature experience including the restorative effects arousing by a stay in a natural environment (Lude, 2001). The data show that dense vegetation structures meet the need for quiet time well. The mention of recovery was probably primed by the research design since the media supported interviews included one question on the location where children liked to be alone. Thus, our results give important additional information about the need of children for quiet areas. Children seeking quietness often perceive the beauty in the natural environment, which is a strong pattern in the esthetical nature experience dimension (Bögeholz, 1999). Planning should include spaces for recovery such as hiding places or areas which are not accessible for adults.

Instrumental Use of Natural Environments

The instrumental dimension of natural environments was apparent especially as it was early autumn and there was an abundance of ripe fruit, which were present during the interview period. Locations with fruit were photographed as favorite places as well as places to be alone: "Because there are so many fruits and you can eat them. (...) small plums and plums. I like to play there or eat (...) the plums I picked" (M1: boy, 9 years old). Collecting fruit was a favorite activity for some children: "There are small plums which I collect and eat. And blackberries" (D9, girl, 9 years old).

A third aspect apparent in our interview data was the instrumental dimension of nature experience, shown by the use of ripe fruit. Our data show the instrumental dimension consistent with earlier research of Bögeholz (1999), including the cultivation of plants and the care for animals. In our case, this dimension was apparent due to the collection and consumption of fruit; children show a fascination to pick and eat fruit. A very intense and positive contact to natural environments was apparent through the consumption of fruit.

Natural Environments as Threatening Location

As we did not limit our perspective on positive effects of natural environments, the interviews asked for avoided locations, too. Children took pictures of negative aspects of the nature experience area. Especially esthetical assessment, such as an untidy appearance, darkness and the lack of climbing opportunities were mentioned. One boy disapproved the change of things he had created earlier, again a sign for identification with the location. "Earlier I liked this (location), there was a

hut, and now it is destroyed, everything, and I dislike it strongly. (. . .) When I came back, everything was broken" (D10, boy 10 years old). "I dislike that it is so narrow and dark" (M2, boy, 7 years old).

Additionally, the children reported threatening and painful experiences. They report a strong sensory-physical perception. "There are thorns and they sting" (M4, girl, 9 years old).

Some children were additionally afraid of getting dirty. "When I run (through the fruits on the ground), my shoes get messed up. And sometimes I fall down, when I run there" (M8, boy, 9 years old).

The threatening dimension of nature experience found in our data is a new aspect, which has not yet been focused in research on nature experience of children (Bögeholz, 1999; Lude, 2001; Reidl et al., 2005). We took it into consideration due to the fact that it was represented in the photo ramble. The threatening nature experience dimension addresses the inconveniences in natural environments, which are perceived by children. These consist of the risk to be hurt as well as esthetical assessment of the area. The threatening dimension addresses an esthetic nature experience dimension (Bögeholz, 1999) but in a negative way. Children cope with it in different ways, such as avoidance or practice. It could provide an important challenge for the children to learn how to deal with new or complicated situations and control them. Thus, it provides an important additional aspect, which could be a key factor for the positive influence of natural environments on children's development.

Limitations of the Research

The studies presented show some potential for the planning and design of children's play areas in an urban context. Nature experience areas were researched regarding their affordances for children and their play and learning behavior.

Study 1 focused on the usage of a nature experience area and a conventional playground as well as a comparison of play behavior. As we used a quasi-experimental design, not randomizing the children to either area, we could not exclude systematic effects here: it might be that a different selection of children visits each area, e.g., very fearful parents prefer the playground, while nature-oriented parents are more open for the nature experience area. These aspects – fearfulness, nature orientation, and environmental literacy, just to name some – might influence the effects of play behavior, too. This could be addressed in further research.

Study 2 with an explorative approach gives a deeper insight into the perspective of the children, showing the importance of complex and creative play in the nature experience area. However, generalizing from these results was not an aim of the research and is not possible. Further research could address the findings and test them for generalization.

The main weak point of this research is the cross-sectional design, allowing innovative results in one point of time only. If we want to make suggestions for planning processes, the studies need to be repeated in a longitudinal design in order to gain results about the development of the site and the development of children's

use of the site. Further work addresses this lack in the context of an interdisciplinary research project.

Conclusion

With an increasing consumption of media and decreasing contact with natural environments for children living in urban areas, the meaning of free play (Skår & Krogh, 2009) and the contact to natural environments (Bögeholz, 1999) are the focus of the two studies about nature experience areas, which were conducted in the metropolis Berlin, Germany. In order to analyze the specific effects of an extensively designed "wild" nature experience area for children, the main research questions addressed the experience of children and their play behavior in nature experience areas. Two studies, using quantitative and qualitative methods, show that playing in natural environments provides important opportunities for children to both play freely and experience natural environments. The results show important nature experience dimensions, which serve the cognitive development of children and influence their attitude toward nature (Bögeholz, 1999).

Nature experience areas in an urban context provide possibilities for contact with natural environments. Thus, they could counteract the recent trends of childhood such as institutionalization and media consumption (Blinkert & Weaver, 2015; see ▶ Chap. 25, "Children in the Anthropocene: How Are They Implicated?" by Malone). However, in order to reach this effect, children need to visit nature experience areas. We compared the usage of a newly initiated nature experience area and a conventional playground and showed that the natural experience area was much less frequently visited. It may be that the new installation needs some support in usage in order to promote the positive effect on children. The improvement of familiarity could well support the visits of children to the natural experience area. Other strategies could be initiated to meet the parents' needs for comfort and child safety. One possibility for this is a design solution: the appearance of a well-tended play area in the front can be inviting also for fearful parents since they can see the purpose and care of the area. Another possibility is a human resource solution: an employed mentor or supervisor of nature experience areas could take care of the area and inform about the potential. This has been the case at the research site and needs to be analyzed in future research over a longer time span. This can reveal whether the usage of nature experience area increases over time due to increasing familiarity or decreasing parental fears. A third solution, again by design, is to create opportunities for parents to sit and socialize. There were not many obvious places to sit down and meet other adults in the nature experience area. More comfortable seating could motivate parents to accompany their children, especially younger ones, into the nature experience areas. Parents' acceptance and willingness to let their children play in nature experience areas is strongly needed and could be supported by opportunities for parents to have a say in further planning of nature experience areas. Still, these need to be designed in a way that the children have the opportunity to play freely and without supervision.

Nature experience areas help to promote a more complex play behavior compared to a conventional playground. This is consistent with earlier studies showing that children develop diverse motion patterns in the natural environments (Fjørtoft et al., 2009). Children show various different play behaviors and thus enable the development of different competencies (Meske, 2011). The nature experience area enables a contact to natural environments for children and complex play behavior, which is very meaningful in their development and learning process (Louv, 2011; Renz-Polster & Hüther, 2013), a nonformal learning process in particular. Both studies show that children find continuity and change at the same time in the nature experience area, a basic need for their cognitive development (Gebhard, 2014). As our data show a broader variety of play behavior in the natural experience area compared to the conventional playground, we show that the learning process is strongly influenced by space itself (Mannion & Lynch, 2016): we assume that children will develop higher creativity and motivation as well as a stronger variety of motion patterns in the long run, thus initiating a more intense learning process (Reidl et al., 2005). Our analysis of interviews on the perspectives of children support these findings, showing creative and complex play behavior in the nature experience area. Also the importance of physical activity for the children becomes apparent in the interviews. Natural environments allow children to engage in independent mobility and thus develop environmental literacy and risk assessment skills (Malone, 2016), and nature experience areas could provide the independent engagement with natural environments (Blinkert, 2016). Our photo-elicitation interviews show that adventure and creativity are important dimensions for the children: they actively adapt and design the areas visited, e.g., by building huts. Such behavior is important for a healthy cognitive development (Oerter & Montada, 1998). Thus, possibilities to climb and to create and design the area should be taken into consideration in the planning process of not only nature experience areas but play areas in general. The interest for physical surroundings was quite apparent in the nature experience area. Affordances in the environment, shown in the reported study by a diverse vegetation and movable material for multifunctional use, can support independent mobility (Broberg et al., 2013). In this context, nature experience areas can play a key role in incidental learning processes in an urban context. The utilization of such areas needs to be carefully looked at as mentioned above over a longer time span in order to promote more regular and established use.

Learning by playing is possible in both of the research areas: a variety of play behaviour was observed in the nature experience area and the playground. However, since the variety of play behavior is much broader in the nature experience area (showing less repetitive movement play and a more diverse and complex play behavior including exploration), the learning effect promoted is stronger. Children engage in a variety of play from simple psycho-motor, construction, imagination, movement and communication play, and exploration behavior. This variety does not appear on the built playground. This result supports earlier studies on nature experience areas in smaller cities (Reidl et al., 2005). Variations of play in the nature experience area arouse more diverse experiences across many levels such as

movement, social interaction, and cognitive challenges, thus supporting the development of different competencies and learning processes. The stronger learning process involved in nature experience areas could be due to the affordance character for children to play and experience their environment (Jansson & Mårtensson, 2012). Qualitative data support the learning process by showing the importance of creative, free, and complex play children reported. Additionally, daily experiences in natural experience areas can contribute toward a better understanding of natural interrelations and to an enhanced environmental awareness (Bögeholz, 1999) and a better subjective importance of nature conservation (Hallmann et al., 2005) (see ▶ Chap. 24, "Childhoodnature and the Anthropocene: An Epoch of "Cenes"". by Cutter-Mackenzie, Krasny, Malony, and Whitehouse).

Our results suggest that nature experience areas should be included into urban planning processes on a regular basis in order to create affordances to enable complex play behavior of children, which are the basis for various learning possibilities. More generally, further design of play areas, traditional playgrounds, as well as nature experience areas needs to consider the positive effect of movable play elements and of play elements which are not predetermined in their function.

Considering the *characteristics of nature experience areas*, our observational and interview data show some interesting results. There is some divergence to the basic concept of the nature experience area according to Schemel (1998). So far, there is no area that remains undeveloped. This was due to the initial design phase, which has been realized with the participation of children in 2016. The derelict brownfield site chosen before the project started is most likely not to be favored by people in an esthetical way (Tenngart Ivarsson & Hagerhall, 2008). Since this subjectively rather unattractive area has been turned into a play area for children, it may take some time for visitors to become familiar with the setting. Signs of setting care effect people positively (Martens et al., 2011) and could lead to an acceptance of the rather wild natural concept for parents and neighbors over a longer time span. For example, could a tended entrance area provide a needed perceived sense that the area is being taken care of, providing a greater acceptance for the more valuable "wilderness" behind?

The size of the nature experience area has been rather small with 0.64 ha. With the use of playing children, the ecological development needs to be focused in longitudinal research: is the area dedicated to play for children sufficient for ecological development in the long run? This should be focused in further research and is part of our interdisciplinary research including ecological development of nature experience areas. Also, safety issues need to be addressed in the maintenance of natural experience areas, especially when trying to promote positive learning effects and autonomous activities in these complex environments. The advantages of nature experience areas in child development shown in the reported studies need to be harnessed into planning processes of an urban child-friendly environment and place-conscious education. Such places need to be created and used for outdoor education in order to enact place-responsive education (Mannion & Lynch, 2016). The value of implementing nature experience areas could possibly simultaneously increase the

opportunities for children to learn in the urban environment while also addressing the need for nature conservation.

Cross-References

- ▶ Childhoodnature and the Anthropocene: An Epoch of "Cenes"
- ▶ Child-Nature Interaction in a Forest Preschool
- ▶ Children in the Anthropocene: How Are They Implicated?
- ▶ Embodied Childhoodnature Experiences Through Sensory Tours
- ▶ Outlining an Education Without Nature and Object-Oriented Learning
- ▶ Remembering and Representing the Wonder: Using Arts-Based Reflection to Connect Pre-service Early Childhood Teachers to Significant Childhoodnature Encounters and Their Professional Role
- ▶ Significant Life Experiences That Connect Children with Nature: A Research Review and Applications to a Family Nature Club
- ▶ The Child-Nature Relationship in Television for Children
- ▶ The Influence of Nature on a Child's Development: Connecting the Outcomes of Human Attachment and Place Attachment
- ▶ Unplanning Research with a Curious Practice Methodology: Emergence of Childrenforest in the Context of Finland

References

Bamler, V., Werner, J., & Wustmann, C. (2010). *Lehrbuch Kindheitsforschung: Grundlagen, Zugänge und Methoden. Studium Elementarpädagogik*. Weinheim, Germany: Juventa-Verl. Retrieved from http://www.socialnet.de/rezensionen/isbn.php?isbn=978-3-7799-2326-8

Bauer, N. (2001). *Das Aussenraumverhalten und die Mediennutzung 8- bis 12-jähriger Kinder und die Konsequenzen für die Wohnungsumfeldgestaltung*. Berlin, Germany: dissertation.de.

Beach, B. A. (2003). Rural children's play in the natural environment. In D. E. Lytle (Ed.), *Play and educational theory and practice* (pp. 183–194). London, England: Praeger.

Berglez, R. (2005). Beobachtungen und qualitative Befragungen in Naturerfahrungsräumen und konventionellen Spielplätzen. In K. Reidl, H. J. Schemel, & B. Blinkert (Eds.), *Nürtinger Hochschulschriften: Vol. 24. Naturerfahrungsräume im besiedelten Bereich. Ergebnisse eines interdisziplinären Forschungsprojekts* (pp. 50–89). Nürtingen, Germany: Hochschulbund Nürtingen/Geislingen.

Blinkert, B. (2005). Bedeutung von Naturerfahrungsräumen für die Situation von Kindern. In K. Reidl, H. J. Schemel, & B. Blinkert (Eds.), *Nürtinger Hochschulschriften: Vol. 24. Naturerfahrungsräume im besiedelten Bereich. Ergebnisse eines interdisziplinären Forschungsprojekts* (pp. 15–16). Nürtingen, Germany: Hochschulbund Nürtingen/Geislingen.

Blinkert, B. (2016). Urbane Kindheit und Räume. In R. Braches-Chyrek & C. Röhner (Eds.), *Kindheiten. Gesellschaften: Vol. 2. Kindheit und Raum* (1st ed., pp. 65–84). Opladen, Germany: Verlag Barbara Budrich.

Blinkert, B., & Weaver, E. (2015). Residential environment and types of childhood. *Humanities and Social Sciences, 3*(5), 259–268. https://doi.org/10.11648/j.hss.20150305.11.

Bögeholz, S. (1999). *Qualitäten primärer Naturerfahrung und ihr Zusammenhang mit Umweltwissen und Umwelthandeln*. University, Dissertation – Kiel. *Schriftenreihe "Ökologie*

und Erziehungswissenschaft" der Arbeitsgruppe "Umweltbildung" der Deutschen Gesellschaft für Erziehungswissenschaft: Vol. 5. Opladen, Germany: Leske und Budrich.

Briggs, L. P., Stedman, R. C., & Krasny, M. E. (2014). Photo-elicitation methods in studies of children's sense of place. *Children, Youth and Environments, 24*(3), 153–172.

Broberg, A., Kytta, M., & Fagerholm, N. (2013). Child-friendly urban structures: Bullerby revisited. *Journal of Environmental Psychology, 35*, 110–120. https://doi.org/10.1016/j.jenvp.2013.06.001.

Bundesministerium für Familie, Senioren, & Frauen und Jugend. (2014). *Übereinkommen über die Rechte des Kindes: VN-Kinderrechtskonvention im Wortlaut mit Materialien* (5th ed.). Retrieved from https://www.bmfsfj.de/blob/93140/8c9831a3ff3ebf49a0d0fb42a8efd001/uebereinkommen-ueber-die-rechte-des-kindes-data.pdf

Dyment, J. E. (2005). *Gaining ground: The power and potential of school ground greening in the Toronto District School Board*. Evergreen Foundation: Toronto, Canada.

Edelmann, W. (1996). *Lernpsychologie* (5., vollständig überarbeitete Auflage). Weinheim, Germany: Beltz Psychologie Verlags Union.

Fjørtoft, I., Kristoffersen, B., & Sageie, J. (2009). Children in schoolyards: Tracking movement patterns and physical activity in schoolyards using global positioning system and heart rate monitoring. *Landscape and Urban Planning, 93*(3–4), 210–217.

Gebhard, U. (2014). Wie viel "Natur" braucht der Mensch? "Natur" als Erfahrungsraum und Sinninstanz. In G. Hartung & T. Kirchhoff (Eds.), *Welche Natur brauchen wir? Analyse einer anthropologischen Grundproblematik des 21. Jahrhunderts* (pp. 249–274). München, Germany: Verlag Karl Alber.

Grahn, P., Mårtensson, F., Lindblad, B., Nilsson, P., & Ekman, A. (1997). Ute på dagis. Stad och Land. Hässleholm, Sweden: Norra Skåne Offset.

Hallmann, S., Klöckner, C. A., Beisenkamp, A., & Kuhlmann, U. (2005). Freiheit, Ästhetik oder Bedrohung? Wie Kinder Natur bewerten. In S. Bamberg, R. Becker, C. Hoffmann, et al. (Eds.), *Umweltpsychologie. Naturbilder und Naturverhältnisse in Zeiten der Globalisierung* (9/2, pp. 88–108). Lengerich, Germany: Pabst Science Publishers.

Hartig, T., Mitchell, R., de Vries, S., & Frumkin, H. (2014). Nature and health. *Annual Review of Public Health, 35*, 207–228. https://doi.org/10.1146/annurev-publhealth-032013-182443.

Hegemann-Fonger, H. (1994). *Zum Wandel des Kinderspielens: Eine empirische Analyse des Freizeitverhaltens von Grundschülern. Beiträge zur Welt der Kinder*. Münster, Germany: LIT Verlag.

Jansson, M., & Mårtensson, F. (2012). Green school grounds: A collaborative development and research project in Malmö, Sweden. *Children, Youth Environments, 22*(1), 260–269. https://doi.org/10.7721/chilyoutenvi.22.1.0260.

Jordet, A. N. (2010). *Klassrommet utenfor – tilpasset oplaeringi et utvidet laeringsrom*. Oslo: Cappelen Akademisk Forlag.

Jung, N., Molitor, H., & Schilling, A. (Eds.). (2012). *Auf dem Weg zu gutem Leben: Die Bedeutung der Natur für seelische Gesundheit und Werteentwicklung*. Eberswalder Beiträge zu Bildung und Nachhaltigkeit: Vol. 2. Opladen, Germany.

Kuckartz, U. (2012). *Qualitative Inhaltsanalyse: Methoden, Praxis, Computerunterstützung*. Weinheim, Germany: Beltz-Juventa.

Lau, S., Nerger, H., & Schreiber, B. (1997). *Spielorte für Kinder: Eine Praxisanleitung zur Gestaltung öffentlicher Räume* (Beltz-Praxis). Weinheim, Germany: Beltz.

Louv, R. (2011). *Das letzte Kind im Wald: Geben wir unseren Kindern die Natur zurück!: [mit 80 Umweltaktionen für unsere Kinder]*. Weinheim, Germany: Beltz.

Lude, A. (2001). *Naturerfahrung & Naturschutzbewusstsein: [eine empirische Studie]*. University, Dissertation u.d.T.: Lude, Armin: Einfluss von Naturerfahrung auf Naturschutzbegründungen und Naturschutzbewusstsein im Jugendalter – Kiel, 2000. *Forschungen zur Fachdidaktik: Vol. 2*. Innsbruck, Austria: Studien-Verlag.

Lynch, J., & Mannion, G. (2016). Enacting a place-responsive research methodology: Walking interviews with educators. *Journal of Adventure Education and Outdoor Learning*. https://doi.org/10.1080/14729679.2016.1163271.

Malone, K. (2016). Reconsidering children's encounters with nature and place using post-humanism. *Australian Journal of Environmental Education, 32*(1), 42–56. https://doi.org/10.1017/aee.2015.48.

Mannion, G., & Lynch, J. (2016). The primacy of place in education in outdoor settings. In B. Humberstone, H. Prince, & K. A. Henderson (Eds.), *International handbook of outdoor studies* (pp. 85–94). Oxford, UK: Routledge.

Martens, D., Gutscher, H., & Bauer, N. (2011). Walking in "wild" and "tended" urban forests: The impact on psychological well-being. *Journal of Environmental Psychology, 31*, 36–44. https://doi.org/10.1016/j.jenvp.2010.11.001.

Maxwell, L. E., Mitchell, M. R., & Evans, G. W. (2008). Effects of play equipment and loose parts on preschool children's outdoor play behavior: An observational study and design intervention. *Children, Youth and Environments, 18*(2), 36–63.

Mayring, P. (2003). *Qualitative Inhaltsanalyse Grundlagen und Techniken* (8th ed.). Weinheim, Germany: Beltz.

Meske, M. (2011). *"Natur ist für mich die Welt": Lebensweltlich geprägte Naturbilder von Kindern*. Wiesbaden, Germany: VS Verlag für Sozialwissenschaften/Springer Fachmedien Wiesbaden GmbH. https://doi.org/10.1007/978-3-531-92760-2.

Moore, R. (2014). *Nature play & learning places. Creating and managing places where children engage with nature*. Raleigh, NC/Reston, VA: Natural Learning Initiative/National Wildlife Federation.

Mustapa, N. D., Maliki, N. Z., & Hamzah, A. (2015). Repositioning children's developmental needs in space planning: A review of connection to nature. *Procedia – Social and Behavioral Sciences, 170*, 330–339.

O'Brien, L., & Murray, R. (2005). *'Such enthusiasm – A joy to see': An evaluation of Forest School in England*. Retrieved from Social Research Group, Forest Research website: http://www.forestresearch.gov.uk/website/forestresearch.nsf/ByUnique/INFD-6HKEMH

Oerter, R., & Montada, L. (Eds.). (1998). *Entwicklungspsychologie: Ein Lehrbuch* (4., korrigierte Aufl.). Weinheim, Germany: Beltz Psychologie-Verl.-Union.

Raith, A. (2015). Informal nature experience on the school playground. *International Journal for Transformative Research, 2*, 18–24.

Reidl, K., Schemel, H. J., & Blinkert, B. (Eds.). (2005). *Naturerfahrungsräume im besiedelten Bereich: Ergebnisse eines interdisziplinären Forschungsprojekts. Nürtinger Hochschulschriften: Vol. 24*. Nürtingen, Germany: Hochschulbund Nürtingen/Geislingen.

Renz-Polster, H., & Hüther, G. (2013). *Wie Kinder heute wachsen: Natur als Entwicklungsraum; ein neuer Blick auf das kindliche Lernen, Denken und Fühlen*. Weinheim, Germany: Beltz.

Richard-Elsner, C. (2016). Freies Kinderspiel in der Stadt: Ein blinder Fleck in Forschung, Politik und Stadtentwicklung. *Frühe Kindheit,* 3, 46–53.

Schemel, H. J. (1998). Zur kommunalen Haftung auf naturnahen Spielräumen. In Bundesamt für Naturschutz (Ed.), *Naturerfahrungsräume* (Angewandte Landschaftsökologie No. 19, pp. 328–330). Bonn, Germany.

Schemel, H.-J. (2002). Naturerfahrungsräume auf kommunaler und regionaler Ebene als Beitrag zur Wohnqualität und zur touristischen Wertschöpfung: Mehr Chancen oder Risiken für die Stadtentwicklung? *Raumforschung und Raumordnung, 60*(2), 136–145. https://doi.org/10.1007/BF03183869.

Schemel, H. J. (2008). Das Konzept der städtischen Naturerfahrungsräume und Thesen zu seiner Umsetzung. In Bundesamt für Naturschutz (BfN) (Ed.), *BfN-Skripten: Vol. 230. Kinder und Natur in der Stadt. Spielraum Natur; ein Handbuch für Kommunalpolitiker, Planer sowie Eltern und Agenda-21-Initativen; Dokumentation der wichtigsten Beiträge zum Kongress "Kinder und Natur in der Stadt" vom 24. und 25. November 2005 in München* (pp. 79–93). Bonn, Germany: Bundesamt für Naturschutz.

Schutte, A. R., Torquati, J. C., & Beattie, H. L. (2017). Impact of urban nature on executive functioning in early and middle childhood. *Environment and Behavior, 49*, 3–30.

Skår, M., & Krogh, E. (2009). Changes in children's nature-based experiences near home: From spontaneous play to adult-controlled, planned and organised activities. *Children's Geographies, 7*(3), 339–354. https://doi.org/10.1080/14733280903024506.

Stopka, I., & Rank, S. (2013). *Naturerfahrungsräume in Großstädten: Wege zur Etablierung im öffentlichen Freiraum; Abschlussbericht zur Voruntersuchung für das Erprobungs- und Entwicklungsvorhaben "Naturerfahrungsräume in Großstädten am Beispiel Berlin". BfN-Skripten: Vol. 345*. Bonn, Germany: BfN Bundesamt für Naturschutz.

Taylor, A. F., & Kuo, F. E. (2009). Children with attention deficits concentrate better after walk in the park. *Journal of Attention Disorders, 12*(5), 402–409. https://doi.org/10.1177/1087054708323000.

Tenngart Ivarsson, C., & Hagerhall, C. M. (2008). The perceived restorativeness of gardens – Assessing the restorativeness of a mixed built and natural scene type. *Urban Forestry & Urban Greening, 7*, 1017–1118.

Wells, N. M., & Evans, G. W. (2003). Nearby nature. A buffer of life stress among rural children. *Environment and Behavior, 35*(3), 311–330.

Wheeler, B. W., Cooper, A. R., Page, A. S., & Jago, R. (2010). Greenspace and children's physical activity: A GPS/GIS analysis of the Peach project. *Preventive Medicine, 51*, 148–152.