

Affordances for 1- to 3-year-olds' risky play in Early Childhood Education and Care

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Abstract

This article focuses on how Early Childhood Education and Care institutions provide for 1- to 3-year-olds' risky play—a previously little researched topic—utilizing data from an exploratory, small-scale study investigating aspects of risky play in the age-group. The main findings describe how three essentially different Early Childhood Education and Care centers provide different opportunities for risky play. These environments are assessed with the theoretical concept of affordance and suggest that versatile, flexible, and complex environments and equipment—with little objective risk—are optimal for children's risky play in this age-group. Being a new topic, the affordance assessment is discussed in relation to a standardized measurement, the Infant-Toddler Environment Rating Scale—Revised edition. Findings indicate that the two approaches partly coincide but also that there are discrepancies. Interpretations and implications are discussed.

Introduction

Internationally, there are indications that the range of play experiences in childhood is narrowing (Ball, 2004; Hendricks, 2011; Rivkin, 2006; UN Committee on the Rights of the Child, 2013; Waters and Begley, 2007). Presumably, this trend affects play that involves risk of physical injury in Early Childhood Education and Care (ECEC) settings, where such play is dissuaded because of injury concerns and, in some cases, fear of legal consequences (Bundy et al., 2009; Copeland et al., 2012; Staempfli, 2009; Wyver et al., 2010). Even in Norway, there are indications of similar developments (Sandseter and Sando, 2016), despite Norwegian culture previously being known for a relatively high tolerance toward children's outdoor play and risk-taking (Borge et al., 2003; Brewer, 2012; Little et al., 2012).

While there are good reasons to keep children safe from harm and avoid physical injury, there are also indications that children's ability to assess risks is developed by approaching and handling, gradually, more realistic risks (Aldis, 1975; Boyer, 2006; Byrnes, 2011; Miller and Byrnes, 1997). It is also found that children, albeit subject to individual differences, have a propensity to take risks (Apter, 2007; Lyng, 1990; Zuckerman, 1994). This propensity is investigated from different perspectives, either describing how it puts children at risk of injury (Christensen and Morrongiello, 1997; Morrongiello et al., 2009) or how it might be beneficial in various aspects. First, the exhilaration and the pleasurable arousal related to risk is found to be conducive to vigorous physical activity (Apter, 2007; Ball et al., 2012; Sandseter, 2010a), and hence is a good way to keep children healthy (Brussoni et al., 2015). Second, by imitating real-life risks in playful contexts, children obtain knowledge about their own abilities and limitations, thus strengthening their ability to avoid excessive risks (Aldis, 1975; Byrnes et al., 1999; Sandseter, 2010b). This is congruent with the view that a certain degree of risk-taking has been beneficial in evolution, increasing the probability of survival and reproduction (Pellegrini et al., 2007; Sandseter and Kennair, 2011).

One way to allow children to learn about risk is through play, hence the concept of risky play. Children's risky play is previously defined as play that "*involves thrilling and exciting forms of physical play that involve uncertainty and a risk of physical injury*" (Sandseter, 2010b: 22). Six categories of risky play are also identified: (1) Play with great heights (danger of injury from falling), (2) play with high-speed (uncontrolled speed that can lead to collision), (3) play with dangerous tools (that can lead to injuries), (4) play near dangerous elements (such as fire, water, or heights), (5) rough-and-tumble play (where children can harm each other), and (6) play where the children can get lost.

Linking risk to play means that common characteristics of play apply: generally that play is a volunteer and purposeless activity, driven by intrinsic motivation (Johnson et al., 2012; Lillemyr, 2009). Seen this way, children engage in risky play with only the immediate reward of playing—or the activity itself—as motivation. The immediate experience of risk-taking in play would typically entail opportunities for experiencing emotions ranging from excitement and joy to hesitation and fear (Sandseter, 2009c).

Given these potentially positive aspects of children's risk-taking, and since approximately 90 percent of Norwegian children between 1 and 6 years now attend ECEC (The Norwegian Directorate for Education and Training, 2016), this article aims to (1) examine provision for 1- to 3-year-olds' risky play in ECEC, that is, physical space and equipment and (2) discuss how provision for risky play relates to a general understanding of quality in ECEC.

Notably, most previous research on children's risk-taking focus on children 3 years and older, so established conceptions must be cautiously considered whether they are relevant to children under 3 years or if adaptations are needed.

The concept of affordance

Considering the potential positive aspects of children's risky play, one might argue that appropriate facilitation in ECEC is crucial. To assess the appropriateness of allowing children to gradually approach risks, this article applies the concept of affordance. In general, this concept addresses how features of the environment invite us to interact with it in certain ways (Gibson, 1986) and has been applied for various research purposes. Smith et al. (2016) maintain that "*The concept provides a powerful tool for environment-behavior analysis and has been embraced by a group of environmental design researchers and environmental psychologists, several of them researching children's environments [...]*" (p. 553). Heft (1988) used Gibson's concept of affordance to develop his *functional approach* to understand how children interact with their environments, and the concept has

later been utilized to investigate the relationships between environments and a wide variety of aspects of children's life and development, including brain development (Agyei et al., 2016), sociability (Kyttä, 2002), play activities (Fjørtoft, 2001), physical activity (Azlina and Zulkiflee, 2012; Smith et al., 2016; Storli and Hagen, 2010), or, as in this study, risky play (Little and Sweller, 2014; Sandseter, 2009a).

Research suggests that improving or adding equipment usually means more activity, for example, more appropriate, or simply *more* equipment, normally leads to more physical activity (Bundy et al., 2009; Nielsen et al., 2010). Similarly, there are indications that *adjacency*—that is, how various equipments relate to each other—is vital to understand appropriate affordance (Smith et al., 2016). Finally, children's opportunities to interact with the environment also depend on what children are allowed to do, that is, the freedom they are given by adults to act based on their own judgments and desires. This is assessed as *actualized affordances* (Kyttä, 2004; Sandseter, 2009a).

Affordance for risky play

Risky play is a relatively novel concept in ECEC research. There are generally few studies and none focusing 1- to 3-year-olds. When investigating affordance for older children's risky play, Little and Sweller (2014) maintain that "*Affordances encompass characteristics of both the environment and the person, and consequently are unique for each individual and correspond with the individual's body size, strength, skills, and motivation [...]*" (p. 338). Thus, considering children's diverse interests and developmental trajectories, both of physical capabilities (Pellegrini et al., 2007; Pellegrini and Smith, 1998) and of risk tolerance (Morrongiello et al., 2010; Sandseter, 2010a), the versatility, complexity, and flexibility of materials, equipment, and environments are central for allowing individual children to test, regulate, and find their optimal level. This will also include to what extent children can shape and manipulate environments and move equipment (Engelen et al., 2013; Heft, 1988; Sandseter, 2009a). To assess how the environment affords such diverse opportunities and meet individual needs, the Zone of Proximal Development (ZPD; Vygotsky, 1978: 84) is applied as an additional lens. The ZPD refers to what a learner can achieve with some guidance or help from an adult or more experienced peer. Therefore, the features of the environment enabling children's learning must afford a variety of levels challenging individual children.

In playful situations, risk can be identified either by objective measurements (e.g. the height of a potential fall) or the child's subjective experience of danger, observed as hesitant, fearful, or exhilarated body language, facial expressions, or vocal expressions (Sandseter, 2010a). The activity can be interpreted as *play* based on general characteristics such as intrinsic value, volunteerism, and inner motivation (Johnson et al., 2012; Sutton-Smith, 1997). Following Heft's (1988) functional approach, Sandseter (2007) uses her six categories of risky play to identify and link specific features of the environment (e.g. climbable features) to specific risk categories (e.g. great heights) (Table 1). These categories have been used in several later studies to investigate affordances for risky play (see Brussoni et al., 2015; Little and Sweller, 2014).

Since previous research has focused on children from 3 years and older, it is presumed that this model needs adaptation for younger children. Suggestively, 1- to 3-year-olds play—to a large extent—with equipment and environments that have very little objective risk but may still entail a subjective experience of risk (Kleppe et al., 2017). It is necessary to consider, for example, what is climbable for a 1-year-old or what is graspable for a 2-year-old. The balance between subjective and objective risk should also be considered. First, appropriate opportunities for climbing for 1- to 3-year-olds might not necessarily entail the objective risk of great heights. Similarly, slides might sometimes be too slow to entail the objective risk of high-speed. Children in this age-group might

Table 1. Risk categories (Brussoni et al., 2015: 6429).

<i>Risky play environment</i>		
Environment that affords or accommodates risky play behaviors		
<i>Affordances</i>		
Features of the environment can enable and invite children to engage in certain types of play behaviors. Affordances are unique for each individual and can be influenced by personal characteristics (e.g. strength, fear) and other features that may inspire or constrain actions (e.g. trees with low branches afford climbing).		
<i>Risky play environments</i>	<i>Affordances for risky play</i>	<i>Risky play category</i>
Climbable features	Affords climbing	Great heights
Jump-down-off-able features	Affords jumping down	Great heights
Balance-on-able features	Affords balancing	Great heights
Flat, relatively smooth surfaces	Affords running, rough-and-tumble play (RTP)	High-speed, RTP
Slopes and slides	Affords sliding, running	High-speed
Swing-on-able features	Affords swinging	High-speed, great heights
Graspable/detached objects	Affords throwing, striking, and fencing	RTP
Dangerous tools	Affords whittling, sawing, axing, and tying	Dangerous tools
Dangerous elements close to where the children play (e.g. lake/pond/sea, cliffs, and fire pits)	Affords falling into or from something	Dangerous elements
Enclosure/restrictions (e.g. differently sized sub-spaces or private spaces where children can explore on their own or hide away from larger groups, mobility license)	Affords getting lost, disappearing	Disappear/get lost

also play with dangerous tools, but “dangerous” only in the sense they might cause pain (or fear), and not physical injury, for example, sticks, rubber hammers, or plastic shovels. Second, 1- to 3-year-olds sometimes play rough-and-tumble, for example, chasing each other; pushing each other over; sometimes adding “tools” such as pillows, soft toys, or sticks. A similar game is “playing with impact,” where children throw themselves onto a mattress or crash their bicycles into walls and so on. Both play categories have low probability of physical injury but relative high levels of exhilaration. Appropriate affordance for such play includes sufficient space—for example, not interfering with other children’s activities—and soft surfaces (grass, mats etc.), mattresses, and/or pillows/soft toys. Third, one might consider 1- to 3-year-olds’ opportunities to watch older children engage in risky play. This experience could have value for children, either from a learning perspective or as so-called vicarious risk, as observing others taking risks might give approximately the same thrilling experience as taking the risk oneself (Apter, 1992). Fourth, previous conceptions of children’s risk-taking have largely focused on outdoor play (Brussoni et al., 2015; Sandseter, 2010b), but recent investigations indicate that younger children spend a substantial portion of their awake time in Norwegian ECEC indoors (Kaarby et al., 2017). It is therefore important to also consider affordance for risky play indoors.

Two general points should be made about appropriate affordance for this age-group. First, the potential for increased exhilaration is seen as a main motivational factor in risky play (Apter, 1992, 2007; Lyng, 1990; Sandseter, 2010a). This conceptualization suggests that while the child progressively masters an objective risk, the subjective risk experience, including the experience of

thrill and excitement, decreases. As a result, the child increases the objective risk to optimize exhilaration (Apter, 1992; Sandseter, 2009c). It is therefore necessary to assess how equipment and environments afford the potential for increasing the risk experience from diverse starting points, in various and safe ways.

Second, research indicates that fear of novel situations is a negative factor for learning and functioning in adolescence and adulthood, and that play experiences in childhood might dampen such fear (Pellegrini et al., 2007; Pellis and Pellis, 2007). Although considering parental behavior (and not environmental features) several studies show that a certain parenting style of allowing and appropriately supporting autonomous exploration—that is, allowing a certain level of uncertainty—is conducive to increased self-reliance in children from infancy into adolescence (NICHD ECCRN, 2008; Riksen-Walraven and Van Aken, 1997). Of relevance here is that these studies argue that play has an essential function in “training for the unexpected,” a potential way of countering anxiety in adolescence and adulthood (Spinka et al., 2001).

Although unexpected events do not necessarily involve risks, the notion of “unexpectedness” captures an essential point: Life is unpredictable and risk is sometimes inevitable. ECEC is potentially a safe place to explore and master such aspects.

Method

Participants

Three ECEC centers were selected from the large scale longitudinal project Better Provision for Norwegian Children in ECEC (BePro, 2013),¹ including 39 children (between 1 and 3 years of age). The centers were selected on the basis of scores on global quality (Harms et al., 2006) and thereby potential for contrasting effects (Seawright and Gerring, 2008). Two centers were selected based on a high and low Infant-Toddler Environment Rating Scale—Revised (ITERS-R) edition scores (Center 1 > 5.50, Center 2 < 2.5). In addition, one nature ECEC center was selected to explore the potential qualitative aspect of affordances in a natural environment, based on previous literature documenting a higher probability of both vigorous physical play (Aarts et al., 2010; Storli and Hagen, 2010) and risky play (Sandseter, 2009a) occurring outdoors. While referring to the ECEC centers in this article, the ordinary centers are referred to as Center 1 and 2, while the nature center is referred to as the Nature center. This is done mainly as a reminder of the different reasons for why the centers were included in the study, and as a reminder of their fundamental different environments that might have implications for the findings of the study. The Norwegian Data Protection Authority approved the study; participants’ integrity and confidentiality are considered in all situations and anonymity is ensured.

Relation to the ITERS-R

Since 1- to 3-year-olds’ risky play is a new concept, this study uses several approaches to strengthen the validity of the assessment, as elaborated in the next sections. In addition, as the participating centers are selected partly based on their scores on the ITERS-R (Harms et al., 2006), the qualitative findings are discussed in relation to respective ITERS-R results.

The ITERS-R is built on the theoretical concept that infants and toddlers have certain physical, mental, and emotional needs, and that these needs must be provided for in ECEC. Generally, basic needs that are evaluated in the ITERS-R are need for “protection of [...] health and safety, appropriate stimulation through language and activities and warm supportive interaction” (Harms et al.,

2006, p. 1) and as maintained by Clifford et al. (2010), “All three components must exist to create a high quality environment” (p. 5). The instrument consists of 39 items organized under seven distinct categories. A center with a high score provides for all these aspects and assumes high *global quality* (Hestenes et al., 2007). A center with a general low score provides minimally or inadequately for all or most aspects and is therefore essentially different from a high scoring center. The instrument has previously been tested in Norway and was considered relevant to the Norwegian Framework Plan for ECEC (Baustad, 2012).

As suggested in the introduction, risky play might relate to children’s needs in several aspects but is not addressed per se in the ITERS-R. Comparing the respective ITERS-R scores to the qualitative findings provide an outside approach, potentially contradicting or confirming the latter (Breitmayer et al., 1993), thus providing an opportunity to discuss general conceptions of appropriate provision for 1- to 3-year-olds in ECEC.

Observations

Observations were made for three full days in each of the three centers, in total 9 days. As the aims of the study are related to risk, observing and describing everything throughout a day was deemed redundant. Instead, certain criteria for making observations were decided beforehand; that is, observations were required only when there was any risk involved (whether the activity could be determined to be *play* was assessed in the analysis). The criteria were whether either subjective and/or objective risk was observed. Following Sandseter (2009a, 2009b), the objective risk was identified as *environmental characteristics* of the situation, for example, height, speed, and unstable surfaces. The assessment of the objective risk followed the logic of risk assessments in relation to accident prevention (Rausand, 2011), including both the probability of and severity of a negative consequence. For example, the higher the child would climb, the more severe the consequence if the child would fall: the more unstable a surface, the higher probability of a fall and so on. In addition, children themselves sometimes alter the objective risk factors by, for example, changing the environment (e.g. by moving objects further apart when jumping between them) or changing their own ability to handle a challenge (e.g. by sliding backwards or blindfolded). The subjective risk was identified as *individual characteristics*, that is, how children express their experience through nonverbal communication, outward appearances, sounds, or words (Sandseter, 2009a, 2009b). Previous research on children’s risky play indicate that this type of play is easy to recognize by its “loud” appearance, including overt sounds, for example, excited screaming and laughing (Mårtensson, 2004; Readdick and Park, 1998; Stephenson, 2003) and apparent body language of hesitation and fear (Sandseter, 2009b, 2009c). These expressions are interpreted as indications of subjective experiences of risk, regardless of the objective risk. However, recent research on children under 3 years indicates that these expressions are less apparent in this age-group (Kleppe et al., 2017). Therefore, in this study, observations and interpretations of subjective experience of risk have included the possibility that such emotions may be expressed in more subtle ways.

Summarized, detailed descriptions were made every time these criteria were met, building a dataset of units of behavior. According to Lincoln and Guba (1985: 345), this way of delineating information to such units of information is feasible, as long as the information is relatable (comparable) and meaningful. In this article, this unit is called “instance of risky play” and constitutes this article’s analytic sample (n = 178).

For each unit of risky play, contextual information were collected, that is, time, place, age, and gender composition of the children involved and the gender of staff involved. In addition, descriptions were made of social interaction and the instance was given a tentative risk category (height,

speed, rough and tumble, etc.). Consequently, the dataset provides qualitative descriptions comprising information that can be quantified and used for descriptive statistics.

Risky play environments for 1- to 3-year-olds in ECEC centers

The following list of risky play environments is based on the studies of Sandseter (2009a) and Brussoni et al. (2015) and adapted to 1- to 3-year-olds based on Kleppe et al. (2017). All additions to the original list are in *italic*.

In general, all information from the original list is kept, but in categories where only subjective risk applies, “playing with risky elements” is added as a risk category. For example, if a climbable feature has the objective property of height to cause physical injury, it is attributed to the risk category “great heights,” but if the climbable feature is too low to cause physical injury—but still evokes subjective risk—it is attributed to the risk category of “playing with risky elements.” Similarly, if a slope or slide is too short (and therefore too slow) to be attributed to the risk category of “playing with speed,” it is attributed to the risk category of “playing with risky elements.” The same applies to balance-features and swing-features. To address the application of affordances and 1- to 3-year-olds’ risky play, the example of “risky elements” is addressed further in the discussion.

- Climbable features—affords climbing (great heights) or (risky elements),
- Jump-down-off-able features—affords jumping down (great heights) or (risky elements),
- Balance-on-able features—affords balancing (great heights) or (risky elements),
- Flat, relatively smooth and/or soft surfaces—affords cycling, running, skating, skiing, chasing, and play fighting (high-speed and rough and tumble-play),
- Slopes and slides—affords sliding, sledging, and running/cycling/skiing (high-speed) or (risky elements),
- Swing-on-able features—affords swinging (high-speed and great heights) or (risky elements),
- Graspable/detached objects (including sticks, soft hammers, plastic shovels)—affords throwing, striking, and fencing (rough-and-tumble),
- Dangerous tools—affords whittling, sawing, axing, and tying (dangerous tools),
- Mattresses, sofas, pillows, soft grounds, and soft walls—affords falling onto, crashing into (playing with impact and rough-and-tumble),
- Windows facing the outdoor area or sharing time and space with older children—affords watching/interacting with older children (vicarious risk).

Analysis

First, affordances were examined using mapping data and qualitative descriptions from the in-depth study. The focus was to assess environments and equipment for appropriateness, complexity, flexibility, and actualized affordances. Second, the ITERS-R were examined, in general, for comparisons of the two approaches. ITERS-R data for each center were examined in relation to the qualitative findings.

Results

In the following table, each center’s affordances are presented by risk-affordance category, indoor/outdoor is specified.

Table 2. Center 1 affordances.

	Outdoors	Indoors
Climbable features	Climbing frame (1.5–2 m high), play hut, 1 climbable tree (1 m high).	Two climbing frames (1.5 m high and 2 m high), wooden shelves (50 cm high), children’s chairs (30 cm high), and tables (50 cm high).
Jump-down-off-able features	Play hut (from the steps), 1 tree (jumping down from branches), large wooden storage box (50 cm high).	Climbing frame with steps (jumping down onto a mattress). Wooden pallets (10 cm high).
Balance-on-able features	Branches in the climbing tree, exposed roots, rims around sandpits.	Rim around corner mattress.
Flat, relatively smooth and/or soft surfaces	Asphalted path around the center, two flat surfaces with grass, and four sandpits.	Separate room with mattresses, corner mattress in the main room where balancing, crashing, and RTP are allowed.
Slopes and slides	A large grassy hill, with trees and bushes on one side, snow-covered in winter. One built in slide in the hill and one slide in the climbing frame.	One (part of the climbing frame).
Swing-on-able features	Four playground swings, accommodating one or two on each.	None
Graspable/detached objects (including sticks, soft hammers, and pillows)	Many plastic buckets and spades	Pillows and soft animals
Dangerous tools	None	None
Mattresses, sofas, pillows, and soft grounds.	Grass patch approx. 50 m ² , including grass in slope.	One large mattress 2 × 2 m in corner, large mattress 3 × 4 m, mattress on the wall (to crash into).
Other dangerous elements	None	None
Opportunities to watch other children take risks/playing risky (vicarious risk)	Partly sharing time and space with older peers	Large windows facing the slope outside

RTP: Rough-and-tumble play.

As shown in Tables 2 to 4, there are differences in affordances for risky play among the three centers. Center 1 (Table 2) has a wide variety of environments and equipment including all risk categories except “dangerous tools.” Environments and equipment also afford diverse levels of objective risk. Notably, Center 1 also affords many opportunities for risky play indoors. In contrast, Center 2 (Table 3) has less equipment and environments and what they afford generally has low objective risk, that is, less variety in risk-levels. The Nature center (Table 4) does not afford any indoor opportunities, apart from the fire place where children regularly helped maintain the fire, and children would sometimes play with the fire by, for example, throwing wooden chips into it, thus affording an experience that the ordinary centers did not. The Nature center affords experiences in each category. On the other hand, the variety in equipment is somewhat limited compared to Center 1. For example, during winter, children in the Nature center have abundant opportunities

Table 3. Center 2 affordances.

	Outdoors	Indoors
Climbable features	Climbing frame (1 m high), play hut.	Slide (50 cm high)
Jump-down-off-able features	Rim around sandpit	Large mattress (40 cm high)
Balance-on-able features	Rim around sandpit	None
Flat, relatively smooth and/or soft surfaces	Asphalted ground outside the center	
Slopes and slides	A small grassy slope, one slide in the climbing frame.	Slide (50 cm high)
Swing-on-able features	One playground swing, accommodating four or five children.	None
Graspable/detached objects (including sticks, soft hammers, and pillows)	Many plastic buckets and spades	None
Dangerous tools	None	None
Mattresses, sofas, pillows, and soft grounds.	Sandpit	One large mattress 2 × 3 m in corner
Other dangerous elements	None	None
Opportunities to watch other children take risks/playing risky (vicarious risk)	None	None

to play with speed because they slide in the snow, but during summer, they have limited access to experiences with speed because there are no bicycles or large toy rides, and no swings accessible for the youngest children (they have a rope-pendulum, but it is too large). Briefly summarized, these results indicate that when considering appropriate affordance, both variety in experiences and a variety in risk-levels should be taken into account.

Actualized affordances by center and risk category

In the following, instances of risky play are presented by risk category per center, that is, how many instances of play were observed in each category in each center, indicating actualized affordances.

The total number of instances of risky play in each center is roughly equivalent (Center 1=30.9%, Center 2=33.7%, Center 3=35.4%; Table 5). However, there are some differences: Center 1 has instances in each category, compared to Center 2 that has no instances in two categories, namely playing with height and playing with tools. The Nature center has instances in all categories.

One example from the qualitative data is presented in the following to elaborate on the complexity of natural environments. The prerequisite here is also that children are allowed to use such natural environments.

Example 1:

200 m north of the center there is a large rock formation with both smooth and edgy surfaces, steep and gradual drops and small steps and levels. The top point is around 1.5 m and the whole formation covers about 50 m². It is surrounded by thick undergrowth and soft moss. Staff follow the children there and supervise their playing. Today Olav (3) goes directly to the top and jumps off from the highest point. Five

Table 4. Nature center affordances.

	Outdoors	Indoors
Climbable features	Some climbable trees (from small trees to trees up to 7–8 m high), many small rocky walls (15–40 cm), cliffs, and climbable big rocks, some with smooth surfaces, some wooden structures with steps. In winter, staffs build large snow boulders (from 50 cm–1 m) which are climbed extensively.	NA (Not applicable since the center only uses indoors for limited activities such as some fine motor activities, eating, and diaper change.)
Jump-down-off-able features	Many cliffs and rocks (10–40 cm), several exposed roots, logs and wooden stumps, several wooden structures with steps, and large snow boulders.	NA
Balance-on-able features	Many cliffs and rocks (10–40 cm), several exposed roots, logs and wooden stumps, several wooden structures with steps, and large snow boulders.	NA
Flat, relatively smooth and/or soft surfaces	Area around the center is relatively smooth with a gravel path toward the exit. Some flat areas in the natural forest surrounding the house with grass, moss and bushes etc.	NA
Slopes and slides	Long snow-covered slope outside the house in winter. Some cliffs and rocks with smooth surfaces.	NA
Swing-on-able features	One giant's-stride made of a rope tied to a tree branch (3–4 m pendulum).	NA
Graspable/detached objects (including sticks, soft hammers, and pillows)	Wooden sticks	NA
Dangerous tools	Children's hammers and saws. Children's axes and knives used under staff supervision.	Children's knives used under adult supervision.
Mattresses, sofas, pillows, and soft grounds	Grass and moss in some areas	NA
Dangerous elements	Fire pit burning regularly and open stream visited regularly.	Fire pit burning everyday in winter
Opportunities to watch other children take risks/playing risky (vicarious risk)	Most of the time and space shared with older peers	

other children follow (boys and girls, 1–3 years). They climb up; some only half way, some slide down, some balance on top, some jump down from various levels. The sliding is slow, still they seem very excited about it. (Nature center; Day 2)

Typically, environments like this provided both in the Nature center and in Center 1 were used by children in very different developmental stages. It was used by all children from 1–3 years, and typically one could observe how children could climb as high as they seemed comfortable with or able to, and then slide down from that point. In addition, it was used for a variety of activities including climbing, balancing, jumping off, sliding, and varieties of rough-and-tumble: that is,

Table 5. Category of play versus ECEC center crosstabulation.

Category of play		ECEC center			Total
		Center 1	Center 2	Nature center	
Heights	Count	11	0	4	15
	% within Category_of_play	73.3%	0.0%	26.7%	100.0%
Speed	Count	17	13	15	45
	% within Category_of_play	37.8%	28.9%	33.3%	100.0%
Impact	Count	6	7	1	14
	% within Category_of_play	42.9%	50.0%	7.1%	100.0%
Rough 'n'	Count	8	5	9	22
	% within Category_of_play	36.4%	22.7%	40.9%	100.0%
Tumble	Count	1	0	5	6
	% within Category_of_play	16.7%	0.0%	83.3%	100.0%
Tools	Count	10	33	24	67
	% within Category_of_play	14.9%	49.3%	35.8%	100.0%
Elements	Count	2	2	5	9
	% within Category_of_play	22.2%	22.2%	55.6%	100.0%
Other*	Count	55	60	63	178
	% within Category_of_play	30.9%	33.7%	35.4%	100.0%

ECEC: Early Childhood Education and Care.

*Run away, vicarious risk, and not categorized instances.

chasing each other around the formation. Such environments were also used over a length of time (up to 20 minutes). For comparison, no commercial climbing frame was observed with similar actualized affordance.

Notably, 1-year-olds were engaged more in risky play indoors (64.1%; Table 6). Overall, 2- to 3-year-olds engage more in risky play outdoors as expected from previous research.

Relation between the affordance-concept and the ITERS-R

When relating qualitative findings to the ITERS-R scores, appropriate and abundant affordance is found in the center with the high ITERS-R score (Center 1), and poor affordance is found in the center with the low score (Center 2), indicating similarities in the theoretical foundation for assessing quality in ECEC. Even if some items are more relevant to the concept of risky play (e.g. Item 16 physical activity), single item-scores are not presented and analyzed in this article. Rather, some potential general similarities and discrepancies in the theoretical foundations are discussed.

Discussion

In this study, appropriate affordance for 1- to 3-year-olds' risky play consists of versatile, flexible, and complex environments. Versatility means that a wide range of experiences are accessible for children, including playing with heights, speed, impact, rough and tumble, elements, tools, and vicarious risk. Flexibility refers mostly to how equipment and environments can be manipulated and/or transformed by the children themselves. Complexity means that the variety of risk-levels offered by environments and equipment is sufficiently fine to accommodate diverse individual developmental and risk tolerance levels.

Table 6. Age versus location crosstabulation.

Age		Location		Total
		Outdoors	Indoors	
1 year	Count	14	25	39
	% within age	35.9%	64.1%	100.0%
2–3 years	Count	88	36	124
	% within age	71.0%	29.0%	100.0%
Mixed group	Count	10	5	15
	% within age	66.7%	33.3%	100.0%
Total	Count	112	66	178
	% within age	62.9%	37.1%	100.0%

Brussoni et al. (2015).

Although 1- to 3-year-olds engage in play in all risk categories, the largest category was playing with risky elements. Previously this category (playing *near* dangerous elements) included playing near fire or water, or near steep edges or similar (Sandseter, 2009b). In this study, the category was renamed “playing *with* risky elements,” and extended to include a wider range of objects and environments that was observed and assessed to *appear* risky for the children (i.e. a subjective experience of risk). For example, a group of 1-year-olds played with a low, curved structure (5 cm high) that posed little-to-none objective risk, that is, low probability of physical injury and low severity of any negative consequence, for example, falling off. Yet, children appeared to find the play risky, based on their body language. Typically, they first showed keen interest, then hesitation, and then withdrawal. Apparently, there was a “risky element” perceived by the children, probably of losing their balance on top and falling off, but from an objective assessment it did not fit in the category of “playing with great height” (Sandseter, 2007), thus rather categorized as playing with risky elements.

With the perspective of affordance, this indicates that, even if the objective risk is low and children’s display of excitement is subtle, a low and curved structure affords (sufficient) challenge and exhilaration. Similar subtle examples were observed several times, even in unexpectedly low-risk objects or environments. The potential for sufficient excitement in this age-group is therefore not necessarily found in high-risk environments (such as high climbing walls or high-speed slides), but in versatile, flexible structures with fine variations. Even though it was sometimes difficult to assess what was exhilarating for a 1-year-old, sometimes also 2-year-olds, the “-able”-concept (i.e. climbable, balanceable) proved useful to assess whether equipment and environments were appropriate. Considering the children’s play with the low curved structure, it fits in the category of playing with elements, including loose parts and/or parts that can be moved and manipulated by children, identified by Sandseter as “graspable, detached object.” Such interaction with objects and environments was observed both indoors and outdoors and seemed to add to the ownership and control the children felt in the situation. Potentially, the flexibility and transformability of objects and environments increase children’s opportunities to manipulate, control, and learn about a risk (Bundy et al., 2011). This way, a child can basically construct his or hers own proximal risk zone, in line with recent applications of the concept of Zone of Proximal Development (Johnson et al., 2012). The flexibility provided by moveable, transformable equipment and environment would be essential, especially considering that there are big individual differences in general development, but also in risk tolerance among children (Morrongiello and Rennie, 1998; Pellegrini and Smith, 1998; Sandseter, 2010a).

Another example of versatility and complexity in environments is the rock formation (Example 1): a gradual incline/decline without articulated steps where children can climb as high as they like and also slide back down from any height. In a learning perspective, this means that the moment children master a challenge within their Zone of Proximal Development, there is a new one ready at hand. Such complexity and fine variation was previously reported to be a prominent feature of natural environments (Hagen, 2015; Mårtensson, 2004). Even if commercial fixed installations attempt to simulate this, similar examples of long and elaborate play—including many children in diverse play—was not observed on fixed installations in this study. The versatility, complexity, and flexibility of natural environments are seemingly difficult to recreate. Commercial fixed installations might therefore lack the property of *surprise* or “the unexpected” (Spinka et al., 2001). Saliently, natural environments might change throughout the day (e.g. from cold to warm) or throughout seasons (e.g. from a dry and firm surface to a wet and slippery surface). According to the mapping assessment (Table 2 to 5), the Nature center is generally similar to Center 1. Still, the Nature center provides opportunities for playing with fire, sometimes with open water (small streams), and sometimes with dangerous tools that is not afforded by Center 1. In this respect, nature has a stronger element of “the unexpected,” for example, the stream might one day be dried out, another day flooded, and another day frozen solid, and therefore of added value for children’s experience and learning. These experiences are valuable by themselves, but as *play experiences*, they might also carry potential for longtime learning and to strengthen children’s ability to handle changing conditions and novel situation (Pellegrini et al., 2007).

In this study, the Nature center provides slightly less variation in typical everyday experiences compared to the ordinary centers. Particularly, the children had fewer opportunities to play with speed during summertime because of lack of swings, bicycles, or large toy rides. On the other hand, the Nature center provides opportunities to play near—or even with—fire and running water. Such regular contact with nature, or natural forces, is seen as valuable in general (Gill, 2014; Ulset et al., 2017) and here, also for the possibility of encountering realistic risks. However, if only offering natural materials and environments means limited opportunities—especially with common experiences such as cycling and swinging—awareness is required in nature centers for providing the necessary variety. Likewise, ordinary centers should be aware of to what extent they afford experiences with real-life risks such as fire and water. In line with a recent study on playground design (Luchs and Fikus, 2018), a mix of natural environments and contemporary equipment appears to be a good way to provide sufficient variation and diversity.

When examining actualized affordance, the assumption that appropriate and abundant affordance leads to more risky play (Bundy et al., 2009), similar to effects on physical activity (Nielsen et al., 2010) is not apparent in this study (Table 5). This might be due to too few observations and should be investigated in future studies. Nevertheless, there are differences in the variation of play: children in the centers with environments affording more risk categories show more varied play (Table 5). This indicates that children in these centers provide a bigger variety in potential risk experiences and therefore also a bigger chance of finding a challenge within their ZPD (Vygotsky, 1978). This is probably an essential feature considering the big variations in development and risk tolerance in a group of infants and toddlers. The possibility to choose different risk experiences might be more important than simply affording a high frequency of limited experiences. More varied play might also be an effect of adjacency (Aarts et al., 2010; Smith et al., 2016). For example, the rock formation offers a variety of experiences in close proximity, and therefore leads to continuous play over time. Similarly, adjacency might be contributing to the high number of instances in Center 1, where both outdoor and indoor areas afforded a variety of experiences in close proximity.

In addition, the higher occurrence of risky play *indoors* for 1-year-olds (Table 6) might relate to how the existing prefabricated fixed installations outdoors are not appropriate for this age-group,

that is, the affordances cannot be actualized by this age-group (e.g. they are simply not climbable). As mentioned, the qualitative analysis reveals differences in use of fixed installations and natural environments. Previous studies have shown that fixed installations are in little use throughout the day, despite dominating the outdoor environment (Hagen, 2015). In this study, inappropriate affordance might be reflected in low frequencies of risky play among the youngest children outdoors. It might substantiate the point, albeit paradoxically, that the Nature center in this study fails to provide for the youngest children because although there is some manufactured outdoor equipment, it is not appropriate for them.

Considering similarities between the affordance assessment and the ITERS-R scores, the ITERS-R emphasizes facilitation for play and activity both outdoor *and* indoor throughout. The higher frequency of 1-year-olds' risky play indoors in this study might suggest improvements of affordances for this age-group outdoors, but it might also be a reminder of the need for appropriate affordance indoors. In addition, the ITERS-R emphasizes *access* to equipment and environments. This is congruent with the idea of actualized affordances; equipment and environments must be appropriate and available to children—certainly important in an age-group with limited possibilities to communicate their wishes and needs verbally.

Despite the congruence, there are also discrepancies. One appears in Item 16 *Active physical play*, indicator 5.1, where centers have to have an “Easily accessible outdoor area where infants/toddlers are separated from older children.” (Note that the indicator assesses two different aspects, namely access and separation from older children.) In the clarification notes, it is stated that “Two-year-olds do not need to be separated from preschoolers to give credit, unless safety or access to appropriate active physical experiences, due to the presence of older children, is an issue.” (Harms et al. 2006, p. 36–37) Seemingly, the assumption is that preschoolers are dangerous to 1-year-olds and/or will hinder 1-year-olds' access to active physical experiences. However, in this study, the youngest children were fascinated to watch the older children engage in risky play and this might confirm the assumption that watching others might be an approximation of experiencing the risk themselves (Apter, 1992, 2007; Kleppe et al., 2017). It might also entail a learning aspect; children observe and learn from more experienced peers. Therefore, opportunities to watch (and/or interact with) older children might be seen as a good quality.

In addition, in the affordance assessment, nature—exemplified earlier by the “rock slide” (Example 1)—is considered optimal because of its complexity. A typical feature of this environment is exposed roots, which might provide a range of potential motoric experience and has the feature of unexpectedness. In this study, observations indicated that children seemed to enjoy climbing, balancing, and jumping between exposed roots. Long-term, negotiating exposed roots might be strengthening physical development and might be a concrete example of why playing in natural environments are documented to enhance motor development (Fjørtoft, 2001, 2004). In contrast, in the ITERS-R, exposed roots are considered a minor hazard, which, if observed more than six times, will contribute to a minimal score (Cryer et al., 2004: 142–145).

Finally, the learning perspective in the ITERS-R sometimes appears narrowly academic or cognitive oriented. For example, learning about risk is addressed specifically in Item 11 *Safety practices*, indicator 7.1—*Staff help children to follow safety rules (e.g. staff prevent crowding on slides [...])*—and 7.2—*Staff explain reasons for safety rules to children*. Language stimulation for 1-year-olds is essential but explaining reasons for safety-measures to infants and toddlers verbally might be futile. In contrast, some bodily aspects of children's learning of risk seem apparent. The bodily reward of increasing the subjective risk experience is a strong motivational factor for engaging in risky play altogether (Apter, 1992; Lyng, 1990; Sandseter, 2010a), and without the rewarding thrill, it is difficult to imagine any risk-taking at all. Children's eventual choice of either increasing or decreasing the risk is, to a large extent, an internal process, both triggered by bodily experience and executed as a bodily function.

Conclusion

Appropriate affordance for 1- to 3-year-olds' risky play is characterized by equipment and environments with diverse objective risk, emphasizing low-risk affordance and flexibility in environments and equipment. Environments should be developed with the purpose of accommodating a wide range of individual developmental levels, interests, and risk tolerance. Accordingly, this study indicates that centers with more appropriate affordance have more *varied* risky play (not more risky play). In addition, the assessment of affordance for risky play coincides substantially with the ITERS-R scores, that is, appropriate affordance in a center coincides with the general assessment of global quality. Discrepancies suggest that a holistic assessment of ECEC quality could beneficially include provision for exploration, risky play, and bodily learning.

Although the findings in this article are based on well-established theories and the observations are executed and interpreted with different approaches to strengthen the reliability, the findings are based on a small-scale, exploratory study and are therefore limited in terms of generalization. The findings should therefore be tested on a larger scale. For example, the suggested criteria for appropriate affordances could be used to examine how environments and equipment affect physical activity, that is, to what extent arousal from experience with risk is conducive to vigorous physical activity. Another hypothesis in the field is that risky play affects children's well-being. Creating an environment based on the characteristics suggested in this article could be used as comparable measurements relating environments to both physical activity and well-being.

Note

1. The Infant-Toddler Environment Rating Scale—Revised (ITERS-R) data used in this article is acquired through two projects funded by the Research Council of Norway, “Better Provision for Norway’s Children in ECEC” and “Searching for Qualities.”

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