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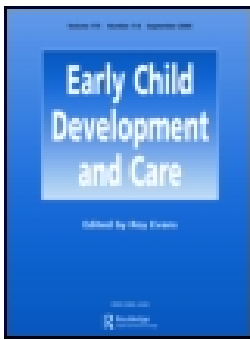
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Children's use of environmental features affording risky play in early childhood education and care

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ABSTRACT

Risky play is defined as thrilling and challenging forms of play that have the potential for physical injury and has been linked to development and health benefits for children in the early years. These benefits include risk-assessment skills, increased physical activity and well-being, and promoting social competencies and resilience. Currently, in a Western context, children's opportunities for risky play are decreasing and at the same time, childhood inactivity and coinciding health concerns are on the rise [WHO. (2016). *Childhood overweight and obesity*. Retrieved from <https://www.who.int/dietphysicalactivity/childhood/en/>]. Risky play may help ameliorate some current health problems for children. This research aimed to increase understanding of how children use affordances (environmental factors that intersect with and influence human behaviours) for risky play. Physical environmental factors have been found to influence children's affordances for all play, including risky play. The study employed a deductive analysis of participant-observer field notes and focused-video observations in order to identify how children utilize indoor and outdoor environmental features for risky play. Data was interpreted through Gibson's [(1979). *The ecological approach to visual perception*. Boston: Houghton-Mifflin.] theory of affordances and was then fit to established taxonomies of environments for children's risky play. Research was conducted with children, ages 3–4 years, at a kindergarten in Norway. Findings identified environmental affordances for risky play that were actualized by children in this study. We propose that findings from this study may be useful in considering the physical design of early childhood education and play spaces.

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Introduction

Across Western contexts in the mid-twentieth century, there was a shift from risks and injuries being considered a natural part of life, to the notion that injuries are preventable and that all hazards should be eliminated or significantly reduced if possible (Sandseter, Little, Ball, Eager, & Brussoni, 2017). Safety concerns and a predominantly negative perception of risk are prevailing in modern Western societies (Beck, 1992; Harper, 2017; Sandseter & Sando, 2016). Hazard-based approaches and risk-mitigation processes are being implemented across all sectors, including Early Childhood Education and Care (ECEC) settings (Sandseter et al., 2017). Fear-based policies and practices may have developmental and health consequences for children growing up in the current risk-adverse context. Children's independent mobility and opportunities to explore risk are often restricted due to perceived safety concerns (Brussoni, Olsen, Pike, & Sleet, 2012; Jelleman, McPhee, Brussoni,

Bundy, & Duncan, 2019). Paradoxically, constraining children's risk-taking in play may contribute to considerable negative health outcomes, such as decreased physical activity, childhood obesity, and non-communicable diseases (Brussoni et al., 2015). Additionally, children encountering risk through their play has been linked to the promotion of children's development of self-esteem and pro-social behaviour, risk-assessment skills, and self-regulation (Brussoni et al., 2015; Sandseter, 2010; Sandseter & Kennair, 2011). While we recognize the efforts of child injury prevention fields in reducing the occurrence of unnecessary childhood accidents (Towner, Dowswell, & Jarvis, 2001a, 2001b), we also advocate for risky play as a developmental need (Tremblay et al., 2015).

Risky play

Risky play can be defined as a thrilling play that provides challenge and opportunity for children to test their capabilities, where there is a risk of physical injury (Little & Wyver, 2008; Sandseter, 2007). In 2007, Sandseter developed six distinct categories of risky play: (a) play with great heights (danger of injury from falling); (b) play with high speed (uncontrolled speed and pace, potential for collision); (c) play with dangerous tools (with potential for causing injuries); (d) play near dangerous elements (where one can fall into or from something resulting in injury); (e) rough-and-tumble play (where children are able to harm each other); (f) play where children can 'disappear/get lost' (Sandseter, 2007).

In recent years, ample research on the benefits of risky play for children in the early years has emerged (Jelleyman et al., 2019; Sandseter et al., 2017). The most extensively cited benefits of risky play include increased physical activity, improved mental health and well-being, and the development of risk-assessment (Brussoni et al., 2015; Sandseter & Kennair, 2011; Tremblay et al., 2015; Wyver, Tranter, Naughton, Sandseter, & Bundy, 2010). Other benefits of risky play frequently noted in literature include increased self-esteem, development of resilience, self-regulation, emotional expression, improved motor skills, and decrease in conflict sensitivity (Brussoni et al., 2015; Harper, 2017; Harper, Rose, & Segal, 2019; Little & Sweller, 2015; Sandseter, 2010).

Environments for risky play

The environments in ECEC institutions provide an important setting for children's engagement in all forms of play, including risky play. Research suggests that physical environments impact children's play in terms of type, diversity, physical levels, creativity, and social interactions (Hart & Sheehan, 1986; Herrington & Lesmeister, 2006). Given the relationship between physical environments and children's play, numerous studies have implemented environmental interventions to children's play spaces and seen shifts in children's activities (Brussoni, Ishikawa, Brunelle, & Herrington, 2017; Engelen et al., 2013; Ridgers, Fairclough, & Stratton, 2010).

There has been some research specifically on physical environments in relation to children's risky play. Sandseter (2009a) conducted research comparing outdoor play spaces and their affordances for risky play in an ordinary pre-school with a nature pre-school in Norway. The study concluded that environmental affordances in risky play were abundant in both preschools; however, the degree of riskiness was greater in the nature pre-school (Sandseter, 2009a). Another study by Herrington and Brussoni (2015) employed environmental interventions to outdoor play spaces in two ECE settings, with the intent of increasing both risky play and nature play. Interventions included the addition of shrubbery, boulders, sand, and more vegetation to existing play spaces. Behavioural maps of children's movement patterns pre- and post-intervention suggested that the environmental interventions influenced children's activity to be more complex and intense, suggesting increased engagement (Herrington & Brussoni, 2015).

Little and Sweller (2015) used an online survey to investigate the intersection of resources and spaces with affordances for risky play and physical activity in 242 ECEC centres in Australia. Little and Sweller concluded that 'outdoor play areas that do not adequately provide challenging risky play opportunities are likely to be less inviting for children and consequently reduce children's

engagement in physically active play' (Little & Sweller, 2015, p. 339). Similarly, Fjørtoft and Sageie (2000) looked at the influence of natural environments on children's play and concluded that there is a 'strong relation between landscape and play functions' (p. 83). These findings support the importance of the relationship between physical environments and children's play.

Aim of study

The overall purpose of this research was to identify how children use indoor and outdoor physical environmental features for risky play. This research draws on Gibson's theory of affordances (1979), and related taxonomies (Heft, 1988; Kytta, 2002; Sandseter, 2009a) to analyse and present findings on actualized affordances for risky play.

Theoretical framework

The theory of affordances, as defined by Gibson, states that physical environments invite or *afford* particular actions and behaviours. Affordances are not only considered in terms of physical environments but through individual characteristics such as body size, strength, skill, and disposition (Chemero, 2003). Heft (1988) and Kytta (2002, 2004) built on Gibson's theory (1979) by defining taxonomies of physical structures in children's play spaces by the affordances they offer. Heft argued that a functional taxonomy 'may be more psychologically meaningful than the standard form-based classification of environmental features' (Heft, 1988, p. 29). The terminology associated with affordances describes places in terms of function rather than form. For example, a tree in an outdoor play space would be described as a *climb-able structure* and a shelter in a playground is considered a *place for hiding and being in peace and quiet* (Kytta, 2002, 2004). When describing children's play spaces in terms of function, the environment becomes an avenue to promote desired outcomes such as increased physical activity, development, and well-being. This view of children's physical environments can prove useful in designing and adapting ECEC institutions.

Sandseter (2009a) proposed a functional taxonomy for environmental features for risky play using the most relevant affordance categories developed by Heft (1988) and Kytta (2002). These categories included the following environmental features; climbable (affords climbing); jump-down-off-able (affords jumping off of); balance-on-able (affords balancing); flat and relatively smooth surfaces (affords cycling, running, skating, skiing, and rough-and-tumble play); slopes and slides (affords sliding, sledding, running, cycling, skiing); swing-on-able; graspable/detached objects (affords throwing, striking, fencing); dangerous tools (Sandseter, 2009a, p. 441). This study used Sandseter's (2009a) taxonomy to conceptualize how children utilize physical environmental features for risky play.

Methods

Two separate sources of data, participant observation field notes and focused-video observations, were analysed in order to identify how environmental features were utilized by children for risky play. Data were analysed using deductive thematic analysis (Braun & Clarke, 2006) by coding for environmental features and categories of risky play (Sandseter, 2007). The primary author collected field notes, coded the focused-video observations in consultation with the second author, and conducted analysis on both sources of data.

Data collection

Participant observation field notes (Patton, 2002) were used in order to collect data describing the environments that risky play was occurring in. Field notes were collected from an ECEC institution in Norway over a two-month period, consisting of 100 h of observations over 33 days. Field notes were made via pen and paper and were recorded during or soon after documented occurrences.

Additionally, photographs were taken to aid in recollection of observations and provide a visual representation of findings.

The criteria for an occurrence of risky play was derived from previous research defining risky play, categorizing risky play, and investigating children's expressions during risky play (Little & Wyver, 2008; Sandseter, 2007; Sandseter, 2009b). In order for play to be considered risky, it needed to pose a risk of physical injury to the child (e.g. a child was climbing on something high enough that a fall would hurt). Additionally, the child's facial, bodily, and verbal expression were observed considering Sandseter's (2009b) research investigating children's expressions during risky play. Sandseter (2009b) found that children engaged in risky play expressed exhilaration, fear, and often both emotions at the same time. In situations where it was unclear whether the play posed a real risk of physical injury, expressions of exhilaration and fear were consulted. Children expressing exhilaration would often be hesitant at first before 'going for it' and would be smiling, laughing, and shouting excitedly (Sandseter, 2009b, p. 98). Facial expressions of worry or being scared, asking staff questions, and taking breaks from the risk-taking play were considered expressions of fear (p. 99). Children expressing both exhilaration and fear often had serious facial expressions, moved calmly and cautiously, and seemed deeply focused on the task (p. 99). Occurrences of risky play were further categorized using Sandseter's (2007) descriptions: (a) play with great heights (danger of injury from falling); (b) play with high speed (uncontrolled speed and pace that can lead to collision with something or someone); (c) play with dangerous tools (that can lead to injuries); (d) play near dangerous elements (where you can fall into or from something); (e) rough-and-tumble play (where the children can harm each other); (f) play where the children can 'disappear/get lost'.

The secondary data source includes focused-video observations that were collected as part of a research project the second author is leading. The participating ECEC setting in this study was one of the settings in this larger research project inquiring into ECEC physical environments. Focused-video observations (Patton, 2002) were also collected from the same ECEC institution as participant observations were. Videos were collected over two one-week periods in October 2017 and October 2018 and included 223, 2-min focused-video observations. All observations were video-recorded and performed in accordance with a strict protocol that ensured a random sampling of observational sequences and identical methods of data collection at each institution in the larger study. Two children were selected to be observed on each data collection day and were each observed for six 2-min sequences during free play indoors and outdoors. The protocol instructed the data collector to perform each observation by recording Child 1 for 2 min, followed by a 6-min break to locate the next child in the play area. Next, Child 2 was recorded for 2 min as well, followed by another 6-min break to find Child 1 for his or her second round of observation, and so forth. If the data collector encountered a child in a situation that could not be filmed (e.g. using the toilet or changing clothes), then the observation was postponed until filming was permitted. If the child was in such a situation for more than 10 min, then the data collector proceeded to continue observing the other child and performed the missing observations at the end of the observation period.

Research site and participants

The ECEC setting was chosen by convenience sampling on the criteria that the setting had a large outdoor environment with a multitude of different sub-environments that had the potential of affording risky play. Then one department/group of children in the ECEC setting was chosen to be the focus group of the study. The criteria for choosing the department were that the children in the group were from 3 to 5 years old and that the pedagogical manager of the group agreed to participate in the project. Informed consent from the parents of the children was sought to get permission for observing them. Additionally, children were informed about the project and their right to withdraw at any moment by their educator in an understandable way according to their age.

During field observations, all children at the selected department were observed ($N = 28$), while the strategy for sampling children to participate in video observations was to randomly draw 10 children – five boys and five girls – from the same department. The first data collection thus included 10 children. Because of the attrition of two children during the time before the second observation day, the second data collection included eight of the same children as in the first collection and one new child who was added to the group. Ultimately, the focused-video sample consisted of 11 children (5 girls, 6 boys): 8 were observed at both data collections and three were observed at only one of the data collections.

Contextual information on Norway may be an important consideration for this study on risky play. Norway is considered to take a more liberal approach to children's risk-taking than many other western countries (Sandseter et al., 2019; Wyver et al., 2010). One component of the more liberal outlook to safety in Norway can be attributed to the Kindergarten Act and the Norwegian Framework Plan for Content and Task of Kindergartens (NFK), where a pedagogical focus of development and learning through providing adequate challenges, including risky play, is emphasized nation-wide. Another factor contributing to Norwegians relaxed attitude towards risky play may be the cultural phenomenon *friluftsliv*, meaning open-air-life, which promotes outdoor activities that inherently present some degree of risk (Beery, 2013). Borge, Nordhagen, and Lie (2003) note that kindergartens in Norway, and especially outdoor kindergartens

Table 1. Environmental features used for risky play.

Type of risky play	Heights	Speed	Rough and tumble	Dangerous tools	Disappear/get lost/explore	Elements
Stable features	-Climbing wall	-Hill/steep cliff	-Flat surface (concrete, grass, dirt)		-Forest	-Fire pit/fire
	-Wood rounds	-Trail (dirt, gravel)	-Hill			-Forest
	-Forest	-Swing (regular, circle, tire)	-Tumble-room (matted floor)			-Deep water or moving
	-Tree	-Flat surface (concrete, grass, dirt)				-Steep cliff
	-Climbable structure					
	-Ledge					
Moveable features	-Swing (regular, circle, tire)					
	-Ropes					
	-Soft-moveable object	-Wheels (toy truck, bike, toy stroller, toy wheel barrel)	-Loose materials (tires, wood planks, crates)	-Kitchen knives	-Loose materials (tires, wood planks, crates)	-Loose materials (tires, wood planks, crates)
	-Loose materials (tires, wood planks, crates)	-Sled	-Rocks (small)	-Rocks	-Mats	
		-Skis	-Sticks	-Hammer and nails	-Blankets	
		-Mats	-Chains	-Saw		
Weather features			-Ropes	-Loose materials (wood planks)		
			-Blankets			
			-Soft-moveable objects			
			-Mats			
			-Snow		-Snow	-Ice
		-Frost				
		-Ice				
		-Snow				

(friluftslivsbarnehage), have been influenced by the Norwegian tradition of connecting with nature and being active outdoors. In the NFK, it is stated that 'outdoor play and activities are important parts of child culture and that must be retained regardless of geography and climatic conditions' (NMER, 2017, p. 16). Norwegian's common affinity with nature and the coinciding emphasis on outdoor play in kindergartens likely leads to increased opportunities for children to engage in risky play.

Analysis

The first phase of analysis included the use Observer XT (Grieco, Loijens, Zimmermann, & Spink, 2007; Zimmerman, Bolhuis, Willemsen, Meyer, & Noldus, 2009) to code focused-video observations for occurrences of risky play and category of risky play (e.g. heights, speed, etc.). The primary author then took descriptive notes on the physical environments that risky play was occurring. These observational descriptive notes from focused-video observations (secondary data source) were then combined with the participant observer field notes (primary data source) from the ECEC centre and further analysis was conducted on both data sources identifying how environmental features had been used for risky play.

Initially, deductive thematic analysis (Braun & Clarke, 2006) was performed on both sources of data. Environmental features were coded based on previously developed taxonomies for children's play and children's risky play (Heft, 1988; Kyttä, 2002; Sandseter, 2009b). Coded environmental



Figure 1. Play at great height; picture shows two girls on a *climbing wall*.

features were then grouped by the type of risky play that they had been observed to afford using Sandseter's (2007) categories. Examples from field notes are used to illustrate and support findings and will be identified as follows: FN, date (e.g. field note from December 12, 2018 → FN12.12.2018). An example of the analytical process included the coding of the following field note for environmental features, such as *hill*, *snow* and *sled*, and risky play category *speed*.

It snowed today at the ECEC institutions. The children did some sledding down two big hills. The sleds would get going quite fast and 1–4 children were on each sled. Often one of the children would fall off mid-way down the hill. (FN.12.05.18)

We further categorized environmental features into *stable*, *moveable*, and *weather* features. In this example, hills would be stable features, snow is a weather feature, and a sled would be a moveable feature. Table 1, Environmental Features Used for Risky Play, presents findings on how children used environmental features for specific categories of risky play.

Findings and discussion

As seen in Table 1, identified environmental features were divided into three categories; stable features, moveable features, and weather features. Stable features are environmental structures or objects that children cannot manipulate themselves, compared with moveable features where children have the ability to change their environment. In the risky play category for height, the rope is considered a stable structure, because in this instance rope is used as a



Figure 2. Play at heights; picture depicts a boy jumping from a *climbable structure* (fort) about half a meter off the ground.



Figure 3. Play at heights; picture of child sitting in a tree she had climbed up.



Figure 4. Play near dangerous elements; the picture shows children sitting around a fire.

slack-line balancing at heights. In the risky play category for rough-and-tumble play, the rope is considered a moveable feature, because this refers to the rope that can be used for tug-a-war. Weather features refer to environmental elements created through weather patterns, such as frost, snow, and ice.

Stable features

Stable features were foundational and afforded risky play across most categories with the exception of dangerous tools. These features included flat or hilly surfaces for play with speed play, as well as rough-and-tumble play. Stable features also included structures that children could climb up or jump off of, as well as hide-in or behind. One of the stable features that afforded a significant amount of risky play was the wood rounds. These wood rounds were often used in conjunction with moveable features and will be discussed in more depth in the following section on moveable features. Figures 1–6 illustrate how children used stable features to engage in risky play.

Moveable features

Loose materials as seen in this research (tires, wood planks, plastic crates) appeared as an environmental feature affording varied, creative, and expansive risky play, as well as allowing children to adapt levels of risk to meet their current capabilities. The ability for children to adapt the environment



Figure 5. Play near dangerous elements; the picture depicts children climbing up a *steep hill/cliff* in the forest.

to their desired degree of risk may promote the development of risk-assessment skills, which is a well-referenced benefit of risky play (Brussoni et al., 2012; Eager & Little, 2011; Lavrysen et al., 2017; Little, Sandseter, & Wyver, 2012). The diversity and potential for adaptable risky play provided by loose materials are exemplified below in Figures 7–9.

Additionally, loose materials, as seen at the site of research, can be more cost-effective than traditional stable play structures (Ball, 2002, 2003). The loose materials observed in this study were acquired for free from the surrounding community by the practitioners at the Kindergarten (FN11.03.18). Cost is referenced as a barrier in increasing play spaces affordances for risky play (Bundy et al., 2009), therefore loose materials may provide a cost-effective avenue for children's risky play. Loose materials could be particularly beneficial to playgrounds in urban settings, where natural areas that are compatible with risky play affordances are not easily accessible (Fjørtoft & Sageie, 2000; Sandseter, 2009a). Furthermore, loose materials, although not a new concept, have gained popularity in contemporary research on children's play spaces. Loose materials have been associated with increased dramatic and constructive play (Gibson, Cornell, & Gill, 2017; Maxwell, Mitchell, & Evans, 2008; Olsen & Smith, 2017), creative play (Fjørtoft, 2001), opportunities for cooperative play, and extended duration of play due to greater affordances offered (Barbour, 1999).

Figure 7 and 8 exemplify the diversity of risky play afforded by loose materials. In the following images, planks and plastic crates are being used for play at heights, as well as creating a space to disappear or 'get lost' in. Documented in field notes, the heights structure in Figure 8 was also used for rough-and-tumble play, as children were pushing each other off of the plank (FN12.04.18).



Figure 6. Play where children disappear/'Get lost'; two children playing in nearby brush (forest) that allows them out of sight from other children and practitioners.



Figure 7. Loose materials being used for risky play type disappear/'get lost'.

Loose materials also appeared to allow children to adapt the environment to their desired degree of risk. This is exemplified in the following field note:

During play on the structure with three wood circles and planks, two girls asked to hold the teacher's hands while walking on the planks. A boy removed a plank so that he could jump from circle to circle, adjusting the level of risk and challenge of the play structure. (FN11.09.18)

In the field note above, one structure composed of loose materials (wood rounds and planks), is utilized in a multiplicity of ways by three different children simultaneously. [Figure 9](#) illustrates a separate occasion on the same structure, where one child is scooting her way along a wood plank, and the other children are either standing on their own or holding a teacher's hand.

Other ways that children utilized moveable features for risky play are illustrated in the following [Figures 10–12](#).

Another example of how moveable features (soft-moveable object) were utilized by children for rough-and-tumble play is documented in the following field note:

In tumble-room, 3 children were engaging in a place sequence that involved chasing and hitting each other with foam circles. The children were oscillating between screaming and laughing during this play sequence. (FN11.12.18)

Weather features

Weather was an important feature in four of the six categories for risky play: elements, speed, rough-and-tumble, and disappear/get lost. Yet, the weather is often viewed as a barrier to outdoor play (Brockman, Jago, & Fox, 2011; Goodman, Paskins, & Mackett, 2012), including forms of risky play. For example, it may be deemed too cold outside for children to play in the snow, preventing children from experiencing risky play activities such as sledding or skiing. A recent study investigating parent



Figure 8. The same *loose materials* being used for play at heights.

and practitioner's perceptions of barriers to children outdoor play across five European countries concluded that weather conditions, alongside risk-aversion, were important reasons for a decline in outdoor play (Sandseter, Cordovil, Hagen, & Lopes, 2019). Weather afforded sledding, cross-country skiing (speed), snow-ball fights (rough-and-tumble), and slippery surfaces (dangerous elements). Figures 12 and 13 illustrate children's use of weather features for risky play.

Why create environments for risky play?

Creating ECEC and other play arenas focusing on increasing risk-taking in children's play may combat some of the unsettling trends we are seeing in children's physical and mental health and development. Global trends suggest that physical activity is decreasing worldwide and sedentary lifestyles, childhood obesity rates, and related health issues are of significant concern. There is an evident 'progressive trend towards lifestyles that are conducive to the promotion of non-communicable diseases' (Brussoni et al., 2015, p. 6477). Increasing physical activity and reducing childhood obesity continues to be a challenge worldwide (Herrington & Brussoni, 2015; Temple, Naylor, Rhodes, & Higgins, 2009; Timmons, Naylor, & Pfeiffer, 2007). Correspondingly, Tremblay et al. (2015), discussed the need to create 'accessible, acceptable, culturally adaptable, feasible, cost-effective, and scalable' (p. 6477) approaches to increasing children's physical activity. There is a substantiated and expanding body of literature indicating that risky play may increase physical activity and provide an antidote to sedentary lifestyle-related illnesses and diseases (Brussoni et al., 2015; Tremblay et al., 2015). Findings from



Figure 9. Children adapting levels of risk during play at heights with *loose materials*.

this research study, in particular the potential for free or low-cost loose materials to be used for ample risky play, can serve as one approach to increasing children physical activity.

Consistent with our findings on children's use of loose materials for risky play, several other researchers have found an increase in physical activity and risky play with the incorporation of loose materials into play spaces. Engelen and colleagues (2013) conducted a study including the incorporation of loose materials (e.g. tires, milk crates) in conjunction with a 2-h parent and practitioner 'risk reframing' seminar. Results from this study indicated a statistically significant increase in physical activity levels of children after the 13-week interventions (Engelen et al., 2013). Similarly, another study implemented loose materials and saw a significant increase in children's levels of risky play and physical activity (Bundy et al., 2009). Ridger and colleagues (2010) conducted research aiming to increase children's physical activity found that 'the overall availability of un-fixed equipment, is associated with higher levels of physical activity' (p. 326). Likewise, research comparing children's physical activity across adventure playgrounds, traditional playgrounds, and contemporary playgrounds noted that children spent significantly more time physically active on the adventure playground (75 min, compared with 21 and 32 min, respectively) (Hayward, Rothenberg, & Beasley, 1974). The adventure playground was equipped with loose materials and non-traditional play structures typically associated with affordances for risky play (Haywards et al., 1974; Sandseter, 2009a).

Another pertinent concern for children is the increasing prevalence of mental illness and in particular increases in anxiety (Bitsko et al., 2018). Risk-taking has been associated with the



Figure 10. Play with dangerous tools; picture shows a girl using a *kitchen knife* to cut up a carrot.

development of protective factors for anxiety, such as self-efficacy and resilience (Duell & Steinberg, 2019; Spokas & Heimberg, 2009; Ungar, 2009; Van Ingen et al., 2015). Without exposure to developmentally appropriate degrees of risk, children may fail to develop psychological skills to deal with the inevitable risks of life, resulting in an increased susceptibility to mental illness (Eager & Little, 2011; Sandseter & Kennair, 2011). Through risky play, children have the opportunity to experience sensations of fear, promoting the development of competencies to manage the potential risks, challenges, and stress associated with life as an adult (Eager & Little, 2011; Sandseter & Kennair, 2011). Creating environments that children will utilize for risky play can promote the development of psychological competencies and protective factors for mental illness.

Environments that afford children risk-taking will give children the opportunity to test physical limits, adjust or avoid dangerous activities, and develop risk-assessment skills (Brussoni et al., 2012; Little et al., 2012). Eager and Little (2011) emphasize that adults rely on the ability to adapt to situations and conquer challenges, and in order to acquire these skills, it is essential to engage in risk-taking behaviour during formative years. There are 'unknown factors that make success uncertain' in everyday activities that are constituted as risky (Eager & Little, 2011, p. 1). Similarly, Willoughby denotes that 'everyday life always involves a degree of risk and children need to learn how to cope with this from an early age' by being given the opportunity for challenging play (Willoughby, 2009, p. 7). We suggest that through focusing on creating environments that invite children to incorporate risk-taking in their play, children are given the opportunity to develop risk-assessment skills



Figure 11. Picture depicts a girl using a *hammer and nails* to build a birdhouse.



Figure 12. Play with speed; picture shows one girl *cross-country skiing* in the *snow*.



Figure 13. Play with speed; picture depicts four children sledding down a frosty hill.

that will keep them safe throughout their lives, while increasing physical activity and promoting mental health and well-being.

Conclusions and implications

The aim of this research was to further understand and describe how children are using indoor and outdoor physical environmental features for risky play. We built upon previous research that focused on identifying physical affordances for risky play (e.g. Sandseter, 2009a) by focusing on actualized affordances of features and providing descriptive examples of this play. This research is significant in the current context as there is a growing body of literature suggesting that societal trends towards risk-aversion may be prohibiting children's risk-taking in play and consequently impacting healthy physical and psychological development (Brussoni et al., 2015; Jolleyman et al., 2019; Tremblay et al., 2015; Ungar, 2009). Understanding how children are actualizing affordances for risk-taking in their play can be used to inform designs for playscapes that are conducive to risky play and consequently supporting healthy child development.

We intend for our research findings to be applicable to the development of ECEC environments that provide ample affordances for children to engage in risky play. The three categories for environmental features (stable, moveable, and weather), and the identified features within each of them may be a helpful guide for practitioners and ECEC designers looking to promote risky play. Additionally, findings suggest that the incorporation of loose materials such as wood planks, tires, and plastic

crates, may increase affordances for diverse and adaptable risky play, and can also be cost-effective. We recommend that ECE centres incorporate loose materials into their outdoor play spaces. Ideally, these loose materials are collected from community industries and organizations, such as construction or recycling companies and include the materials listed above and any other free and recyclable materials that ECE institutions have access to.

Further research and limitations

We recommend further research with a larger sample size investigating how children use the physical environment for risky play. In particular, we suggest further research conducted on the potentiality of loose materials to promote cost-effective and diverse risky play in ECEC institutions. Additionally, our research included one ECEC institution in a rural city in Norway, rendering it small in sample size, as well as lacking in diversity. Still, it provides valuable knowledge on how children are using the physical environment for risky play in Norwegian ECEC which can be considered for adoption in other countries.

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