


## Article

# A GoPro Look on How Children Aged 17–25 Months Assess and Manage Risk during Free Exploration in a Varied Natural Environment

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**Abstract:** Research indicates that risky play has positive effects on children’s development, learning and health, and ability to assess and manage risk, but there is a lack of knowledge on how toddlers engage in risky play. This study aims to investigate how toddlers assess and manage risk in free exploration in a varied natural environment and was conducted within an explorative qualitative approach. Observations were collected through head-mounted GoPro cameras while seven toddlers freely explored a natural environment. The results show that toddlers are able to assess and manage risks in challenging natural environments. They develop their own risk management skills and assess risks directly and indirectly. The results also show that practitioners sometimes perform risk assessment/management on behalf of the child and thus override the child’s own actions. The findings suggest implications for an early childhood education and care (ECEC) practice where children even as young as 17–25 months should be allowed to explore challenging environments and learn how to assess and manage risks.



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## 1. Introduction

Injuries are the leading cause of death for children, and the literature suggests that traffic and transport, e.g., being a passenger in a car, is the most common cause of death and serious injury among children together with accidents in which children fall from heights [1]. Not much is known about how children learn to handle risk and avoid injuries, but there are indications that children’s own ability to assess risk can be improved through risky play where the child can test out risky behavior, situations, or actions without the severe real-life consequences [2,3]. Risky play has thus emerged as a topic of interest for researchers, parents, early childhood education and care (ECEC) practitioners, and policy makers and authorities over the last twenty years.

Nevertheless, research also shows that outdoor risky play has decreased over the last 60 years [4–8]. There are cultural differences in how politicians, practitioners, and parents restrict or value risk-taking among children [7], which results in differences between countries’ regulations for how to handle risk in institutions such as ECEC. In Norway, where the present study is conducted, the National Framework Plan for Kindergartens [9] states that it is important to ensure that all children have the opportunity to sense, experience, play, learn, and create using their bodies as a starting point. It also states that children shall experience opportunities to assess and master risky play through physical challenges [9]. Norway’s long tradition for outdoor play and learning, including its risks, also provides children with ample opportunities for risky play. However, there are also increased safety regulations in Norwegian ECEC [10], and many parents and preschool owners in Norway are concerned about the possibility of injury.

With the backdrop that risky play could serve as a way for children to improve risk assessment and risk management skills, the present study focuses on how toddlers, who are the youngest children in ECEC, explore risk in a varied natural environment.

### *1.1. Risk Taking in Children's Play*

During recent decades, there has been a growing interest in research on children's risk-taking in play. This includes issues such as understanding what risky play is [11,12], whether it has positive or negative effects on children's development, learning, or health [2,13,14], and whether it has an impact on children's ability to assess and handle risk [3,15]. The reason for interest in this emerging field of research is ever-increasing standards and regulations having a detrimental effect on children's play environments [16,17], as well as an overall growing focus on safety in children's lives and activities [7,18–20].

When children play, their main aim is to have fun and to create their own activities without adults deciding what to do or not to do [21,22]. Ambiguity and uncertainty are important characteristics of play [23,24], and attempting something they have never achieved before, feeling on the borderline of being out of control (often because of height or speed), and overcoming fear are elements that children seem to seek during their play [8]. This kind of risk and thrill seeking in play has lately been called risky play, which is commonly defined as "thrilling and exciting forms of physical play that involve uncertainty and a risk of physical injury" [25]. Eight categories of risky play have been identified through observations and interviews with children and ECECs [11,12,26]: (1) play at great heights, (2) play at high speeds, (3) play with dangerous tools, (4) play near dangerous elements, (5) rough-and-tumble play, (6) play where children go exploring alone, (7) play with impact, and (8) vicarious risk (observing others taking risks). The former six were developed in research with 4–6-year-olds [11], while the latter two were added through research on 1–3-year-olds' engagement in risky play [12]. Studies thus far indicate that risky play and risk-taking activities occur across a wide span of ages, including 1- to 3-year-olds [12], 4- to 6-year-olds [11] and 4- to 13-year-olds [27], as well as among both girls and boys [28].

Characteristics of children's risky play have been described both on the basis of individual characteristics such as how the play is carried out by the children (e.g., how high they choose to climb) and environmental characteristics such as how much risk the play environment would afford (e.g., the steepness of a cliff) [26]. How children express the exciting feeling of taking risks is further described by exhilaration (e.g., joyful yelling, smiling, shrieking and being enthusiastic), fear (e.g., scared and worried facial expressions, whining, withdrawing), and a mix of both emotions [29]. While the former study was based on observations of 4- to 5-year-olds, in his study on 1- to 3-year-olds, Kleppe found that they individually sought out risk at an age and competence appropriate level and that versatile and flexible environments, often without much objective risk, are what creates risky play among toddlers [30]. In addition, toddlers have more focused and repetitive subtle expressions while engaging in risky play and are typically less sociable and extroverted than older children [12,30].

The play environment available for children is essential for their opportunity to engage in risky play. A few studies have investigated the relationship between risky play and the features of the play environment. Functional playground equipment and moveable/loose toys and materials seem to afford risky play [31–34]. Other findings show that natural environments provide opportunities for more diverse risk-taking suited for a variety of children according to their age, competence, interest, and courage as well as higher levels of challenges and risks [31,34]. Nature, therefore, seems to be an ideal environment where all children, regardless of different developmental levels, can engage in risky play. Children also prefer to play in natural environments and with natural materials [35–37].

### *1.2. Children's Risk Assessment*

Observations of how children engage in risky play indicate that they are aware of the risk they are taking and that they have measures to mitigate or increase the risk according

to how they experience the situation. An ethnographic study of 10–12-year-olds showed that they actively engaged in and quite skillfully managed the everyday risks that they encounter during their activities [38]. Additionally, children aged 7–11 have been found to have knowledge about how to reduce risk to avoid mishaps or injuries, and they primarily base their risk reduction practice on their own experience rather than prevention advice [39]. Similarly, Sandseter [40] observed among children as young as 4–5 years that their risk-taking decisions are balanced between their evaluation of positive and negative outcomes of the play situation. Interviews with children in the same age group show that children can even articulate their strategies for increasing or reducing risk in their play. They often heighten the risk by increasing speed or height and choosing more scary strategies for action or mitigating the risk by actively avoiding too much speed or height, being more cautious, and choosing less risky strategies [26].

More targeted research assessing how children interpret and assess risk has found that children aged 6–10 years [41] and 4–5 years [42], when presented with a pictorial task to rate the risk in different play activities, are capable of assessing risks. Furthermore, interviews with children in Little and Wyver's [42] study revealed that they are applying this competence to make risk decisions during their play activities. Similarly, a study by Nikoifidou [43] found that 5–6-year-old children could successfully assess and discuss the level of risk between pairs of pictures showing the same play activity but with different inherent risks.

Other studies have explored the relationship between physical activity and risky play among children and their risk assessment competencies and proneness to injury. Lavrysen et al. [15] conducted an intervention study (with a control group) with risk assessment tasks before and after an intensive period of scheduled risky play with 4- and 5-year-olds. The intervention group showed a significant improvement in risk perception compared to the control group. Looking at the risk of injuries among children, Bloemers et al. [44] found that, physically inactive children aged 9–12 were more prone to injuries than their physically active peers, even though those who were physically active were more exposed to potential injury because they engaged in more vigorous behaviors. Being physically active thus seems to have injury preventive means. Moreover, Myhre et al. [45] found that children aged 1.5–3 years with high motor skills experience fewer injuries than children at the same age with impaired motor skills. Based on this, one can assume that being physically active, which implies encountering challenges and risk, enhances both motor skills and risk assessment competence, which would most likely contribute to preventing injuries in children.

### *1.3. Risky Play among Toddlers*

Mangione et al. [46] pointed out a general lack of research on children under three years of age in ECEC. Studies investigating risky play among children under the age of three years are almost nonexistent [47]. Even though there are a few studies exploring risky play among toddlers, there is still a lack of knowledge on how the youngest children engage in risk in their play, how they experience risky play, what benefits that risky play could have for this age group, and how toddlers assess and manage risks.

To the best of our knowledge, Kleppe et al. [12] were the first researchers to observe risky play and identify the categories and characteristics of risky play in this young age group. Kleppe [30] further investigated how these children used affordances in their ECEC environment to take risks in play and found that even for such young children, ECEC should be designed with possibilities for different levels of risk-taking to accommodate for various developmental levels, interests, and risk tolerance. Kleppe [48] also investigated the characteristics of staff–child interactions during toddlers' risky play and found that sometimes staff would stop the children from trying to handle the risks themselves by intervening, stopping the activity, or actively removing the child from the risk.

Recently, Little and Stapleton [49] observed 18- to 26-month-old children in ECEC to see how the environment promotes risky play and belonging. They found that engaging in

risky play supported the children's sense of belonging. Apart from these two studies, we have found no publications reporting research on 1–3-year-olds' risky play from the child's perspective, either through observations or interviews/conversations with children. An obvious methodological challenge for conducting interviews in such a young age group would be the linguistic skills required. Nevertheless, more innovative methods for video observations have been developed, and some seem more suitable to capture children's perspectives. A study by Hov and Neegaard [50] used chest-mounted GoPro cameras on children exploring nature. The method was proven to provide unique and valuable insights into children's behavior and exploration, including close-up footage, self-talk about their actions, and discussions with peers about their experiences.

#### *1.4. Aim and Research Question*

This study aims to generate more knowledge about how the youngest children assess and manage risk in their play and how they deal with obstacles and uncertainties in a natural environment. The research question in the present study is as follows: how do seven children aged 17–25 months assess and manage risk during free exploration in a varied natural environment?

## **2. Materials and Methods**

This study has a qualitative approach where we, through children's perspective, seek increased knowledge on how toddlers assess and manage risk while playing and exploring freely in a natural environment.

### *2.1. Participants*

In this study, we investigated seven children (two girls, five boys) aged 17–25 months in two different centers of ECEC in Norway, exercise free outdoor exploration, and risk assessment in varied natural environments. All the children had learned to walk and had mastered a normal variety of movement skills according to their age. The research was conducted in connection with the Regional Kindergarten Development Project (REKOMP) through which the Østfold University College cooperates with regional kindergartens in different development areas. The data sample was selected with a focus on the areas relevant to our study from ECEC centers included in the REKOMP project. This study was designed using a qualitative approach and conducted with a few participants, as recommended when exploring a new phenomenon [51]. Four staff members known to the children participated in the exploration.

### *2.2. The Use of GoPro Cameras*

In this study, video observation with GoPro cameras was chosen as the method for data collection. Children's exploration of a varied natural environment without intervention from adults was captured on the recordings from the children's own perspective. Thus, instead of filming from a distance, the children themselves acted as the data collectors using head- or chest-mounted GoPro cameras. This allows us to share the perspective of the wearer [52]. Hov and Neegaard [50] also suggested that the use of chest mounted GoPro cameras could give unique and valuable insights into children's behavior.

During the trial of cameras with children, both head- and chest-mounted cameras were tested. After observing the children and reviewing the recordings, we concluded that head-mounted GoPro cameras better reflected the children's perspective and that the increased weight on the head did not seem to affect the balance of the children, as was hypothesized by Hov and Neegaard [50]. Consequently, the children in our study wore head-mounted cameras, except one child who preferred to wear the camera on his chest.

An important basis of investigation in this study was to let the children lead the way, as opposed to following instructions from ECEC staff, in an area considered to be as safe as necessary but not as safe as possible [4,8]. This meant a low risk of severe injury



but nonetheless challenging and varied affordances [53] for the children to explore. The pictures in Figure 1 show some potential affordances in the nature areas explored.



**Figure 1.** Examples from the varied natural environments that toddlers explored in the present study. The blue figure represents approximately toddler's height.

The data material from the GoPro cameras gave unique insight into how children approached, explored, assessed, and handled risk in these environments, as well as how adults/staff reacted to children's risk-taking when they found it necessary to intervene.

### 2.3. Procedure of Data Collection

The data collection in each of the participating institutions was conducted between 9 a.m. and 11 a.m., when all the participating children had arrived at the ECEC and before lunch and nap time. All observations were conducted by the same two researchers between September and October. There was a total of three days of data collection, whereas the same group of children from the first ECEC center participated in two days. At each data collection, 3–4 children wore cameras at the same time. The cameras were activated when the children entered the natural environment and then deactivated when the children exited the natural environment. Each video lasts between one to one and a half hours, resulting in a total collection of approximately 14 h of video recordings.

An important element of the procedure was that the children were the main characters and that they decided how the area was used and explored. The researchers and the ECEC staff were conscious of restricting themselves from intervening in children's exploration so that children were provided opportunities to follow their own initiative [54,55].

The natural environments for the data collection were selected in cooperation with the ECEC staff. They were all close to the ECEC centers, and consisted of a combination of forests, rocky crests, and open areas. Having spent time there before, the children were familiar with the environments, but this was the first time they were allowed to explore freely on their own terms without adult interference.

### 2.4. Analysis

The videos were transcribed and coded by two researchers independently using NVivo 12 software. Both researchers individually transcribed the videos and then coded

the transcriptions. Our basis of analysis is inductive thematic analysis, as described by Braun and Clarke [56]. When the initial coding process of each video was completed, the researchers collected all the codes from the videos in one document and met to discuss the themes that appeared in the material.

At this stage in the analysis, we had more than a hundred codes, which we sorted into themes step by step within the scope of this article and its research question. To narrow the focus to how children explored and handled risk in the natural environment, data material pertaining to the themes of risk assessment and risk management were further explored. The video recordings were then reinvestigated to identify nuances and conflicting evidence in the material [57]. A third researcher contributed to the final stage of the analysis and developing a conceptual map of the main themes.

### *2.5. Methodical Weaknesses and Strengths*

We acknowledge that our presence may affect the children's behavior regardless of observation method and intentions [51]. In the present study, the researchers and ECEC staff tried to avoid influencing children's exploration by spreading out in the environment rather than standing together as a large group of adults. The researchers and staff would also crouch down to the children's level and answer their various invitations for exploration or questions they may have while at the same time letting them lead the way and explore freely on their own terms. The aim was for the children to be comfortable with the adults' presence and feel an increased sense of trust and safety. The researchers and the ECEC staff discussed the data collection procedure prior to each data collection to clarify questions and to strengthen the study's reliability.

A strength of this study is how the data material captures naturalistic, real situations, where children are allowed to explore and experience nature freely. Such free exploration gives valuable insights into young children's competence in assessing and managing risk and movement challenges. In this study, three researchers contributed to the analysis process, which further strengthens the study's credibility [58].

### *2.6. Ethics*

Hov and Neegaard [50] discussed the possible benefits and challenges of using chest-mounted GoPro cameras on children as a method for data collection. GoPro cameras placed within the children's private sphere seem to capture valuable situations from the children's perspective but can also lead to possible ethical issues. One factor that could be ethically challenging is that the children seem to forget that they are wearing a camera, thereby not being aware that what they do and say is captured [50]. On the positive side, this could reduce biases in the data material often observed in conventional camera observation with an external person filming. However, this could also lead to recordings of conversations between children concerning sensitive themes or secrets they intentionally would want to keep between themselves. Primarily because of the children's verbal communication level in our study, we did not capture any sensitive conversations between the children. Nevertheless, it is important to be aware of this possibility and be prepared on how to handle such incidents.

Research with young children in situations that involve risk calls for special attentiveness to avoid situations that could lead to serious harm or injury [11]. If the researchers or the staff in the present study observed children at high risk of being physically injured, then they would intervene. No such situations occurred during the observations.

Furthermore, since we are researching children, we must take special considerations into account to ensure the rights and integrity of the participants. Therefore, before starting the data collection, the staff informed the children that two researchers were going to join them and that they could wear cameras if they wanted to. Introducing each data collection, the children were allowed to explore and become familiar with the GoPro cameras before they were asked if they wanted to wear it. One child did not want to wear a camera and was, therefore, excluded from data analysis.

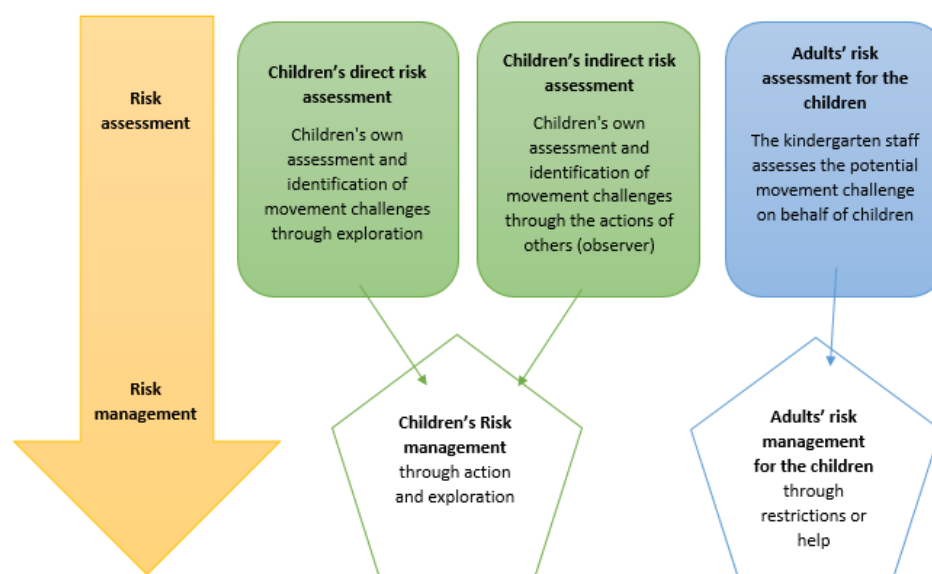
The researchers and staff were attentive to the children's expressions, and if the staff observed that the children did not want to wear the camera, then they could remove it.

On behalf of the Østfold University College, the Norwegian Social Science Data Service and Norwegian Data Protection Authority (NSD) have deemed that the processing of personal data in this project is in accordance with privacy regulations. This approval presupposes informed consent from ECEC staff and parents of children. Written information explaining the study and its aims was delivered to the parents and the ECEC staff members, and written informed consent was gathered from all participants involved.

### 3. Results and Discussion

In general, the videos provide rich descriptions of how challenging it is for children aged 17–25 months to move and explore in rugged natural terrain and what courage it requires of them to persist in dealing with it. It is impressive to observe the children's effort and competence during their exploration. There are signs of constant risk assessment and management; they fall all the time, get up, find solutions, and "fight" with surfaces, bushes, and other obstacles. Just moving in the terrain is a challenge and a risk in itself because of the natural design of the environment. The observations show awareness of risk in the children's behavior. One example is that Girl 2 talks for a long period about how the ground is "slippery" and that she "fell". She also talks to herself about this while she keeps on moving on the slippery terrain to remind her of the risk of falling. Another example is Boy 3, who tests the height of a slope he approached by throwing sticks down the slope repeatedly. The sound in the video recordings also provides insight into how much energy they use and the joy they express when they conquer varied challenges in the area. As such, the videos show how moving in such environments challenges children both physically and mentally. They experience both failing and overcoming challenges. In the recorded observations, the children seem drawn to water, slopes, and natural materials.

More specifically, the results focus on how children perform risk assessment and risk management and constitute three broad themes: (1) children's direct risk assessment, (2) children's indirect risk assessment, and (3) adults' risk management for the children. The two former themes, in which children are responsible for their own risk assessment, relate to children deciding for themselves on how to manage risks. The latter theme, in which adults perform the risk assessment on behalf of the children, leads to situations where the staff decide how to handle the risk. The main findings are summarized in Figure 2 as a conceptual map [59].



**Figure 2.** Conceptual map showing the main themes of children's risk assessment and risk management in a varied natural environment within an ECEC context.

The findings within the three main themes will be presented and discussed in the following section. Boys 1, 2, and 3 account for one ECEC, while Boys 4 and 5 and Girls 1 and 2 represent the other.

### 3.1. Children's Direct Risk Assessment and Risk Management

The results show several situations where children stop and apparently make assessments before continuing their movement or exploration. In some cases, the children change their pattern of action, while in other cases, the children continue on the same path. Furthermore, we also observed instances where the children choose not to face the obstacle and find other features to engage. These two transcriptions are examples of children who first assessed the situation and then adapted their movement to master the challenge.

*Boy 4 walks away from the other children. On his path there is a cliff where some tree branches are sticking out, forcing whoever passes to the very edge of the cliff. When boy 4 approaches the obstacle, he slows his pace and goes from long to very short steps as he carefully sneaks around the edge and over to the other side.*

*Boy 2 picks up mud and pine needles in his hand and then throws them over the rocky surface. He repeats the procedure, looks around a bit and walks on to an edge (about 40 cm high). He then stops and sits on his butt before sliding down with his feet first on the rock. When at the bottom, he walks to another edge (about 2 m high), throws what he has in his hand, turns and walks up again. He chooses another way up, a little to the side of where he slid down, which is not as steep and consists of some soil and pine needles on top of the rock. He repeats this procedure many times. We can hear him make strenuous noises both when he slides down and when he gets up.*

Other instances of risk assessment and risk management occur continuously throughout the session. The children are in almost constant movement when not exploring the nature materials in their surroundings, and the environment offers a great diversion of movement challenges the children must adjust accordingly by either mitigating or heightening the risk. For example, the children often run when it is flat and open, even though it is wet and slippery on the rocky surface, while on the other hand slowing down when approaching other challenges such as heights. Without intervention from adults, the children mostly find their own paths, and they regularly choose challenging environments to conquer. This transcription is an example of how the child tries different approaches to overcome an obstacle and eventually succeeds.

*Girl 1 stands and observes the other children trying to climb up a cliff, then turns and looks at an adult who points at the right side of the cliff where the slope is gentle and indicates that she should choose that way up. Girl 1 seemingly ignores the adult's advice and tries to climb straight up the cliff, where it is steep. She tries to get up, but it is too difficult. She then walks sideways along the edge of the cliff until she finds an easier way up. It is slippery, and she falls multiple times on the way. When reaching the top, she stands up straight and smiles at the adult, who returns the smile.*

In some situations, the children seem to assess the endeavor ahead through nonverbal communication, such as pointing, looking from side to side or up and down, and verbal communication in the form of different exclamations, and then choose not to challenge the obstacle.

*Girl 1 walks briskly on the slippery rocks when she arrives at a high cliff (about 1 m), she slows her pace and walks slowly out to the edge and points down. She stands and observes for a couple of seconds before she turns and finds another way down.*

The results show that the children continuously assess and manage risk while managing their movement in response to the different challenges in the environment. This indicates that children as young as 17–25 months are able to navigate risk and continuously make risk decisions on either heightening or mitigating risk. Although previous studies have shown that older children above four years of age, are capable of assessing risks and



applying this in their risk decisions [31,40–43], the present study gives valuable insight into how and if younger children have similar capabilities. As the quotes above show, the children assessed the risk and mitigated the chance of failing, as shown in the situation where Boy 4 slows his pace and moves more carefully as he sneaks around the edge of a cliff. By moving more slowly and taking very short and careful steps around the edge, he mitigates the risk at the most difficult part of the obstacle and manages the challenge of passing the branches. Alternatively, children could choose not to take the risk at all, such as Girl 1 who approached the edge of a high cliff. Similar to Boy 4, she slows down her pace to be more careful; she takes some time to assess the height of the cliff and chooses not to try the risky way down but rather finds another less risky option. Since the cliff was approximately one meter, the height was objectively very high relative to the girl's own height, and as such, this seems to be a sensible and realistic risk decision. As such, the results in the present study support earlier findings of even very young children being capable of assessing risks and making sensible risk decisions [42,43]. The suggestion that young children also learn to assess and manage risk by engaging in risky play [15] can be seen in the present study's observations where children reach their limit of competence and learn through the failure and persistence by trying it out themselves. The above situation where Girl 1 attempts several different ways of getting up the cliff until she finally succeeds is one example. Her failures force her to make new risk assessments and find other ways to manage the obstacle. Managing risk in this way, even though it takes courage and hard effort, produces smiles and joy among the children, and gives them positive experiences of managing their own body and the environment [29]. These expressions of exhilaration are subtler among toddler-aged children than among older children [12,30]. The results from the present study support this, as most observations show nonverbal expressions such as careful smiles and gestures. While assessing and managing risks, the children in the present study also show a deep concentration on the challenge they face, similar to what is found among older (3–6 years old) children [29].

### 3.2. Children's Indirect Risk Assessment and Risk Management

The videos show situations in which children seem to experience excitement and risk through others. When one child starts playing in a water pond by running and jumping while screaming with joy, the other children nearby also engage in the excitement, and they imitate each other. The results show that children sometimes change their behavior after observing others' handling of movement challenges. Two transcriptions from the same situation show this:

*Boy 2 walks up the path and meets an uphill slope that also slopes sideways, with slippery rock beneath his feet. He sees the two other boys further ahead slipping on the rock and falling several times. Boy 2 quickly looks to the side. He sees an area at the bottom of the sideways slope, where the surface consists of soil and grass, where he chooses to walk. When he passes his friends who have fallen, he stops. His friends come down to him, and they walk together next to the slippery rock.*

*Boy 1 and Boy 3 climb the slippery rock with both uphill and sideways slopes while expressing sounds of exertion. The boys fall several times. At the same time, they see another friend walking on the ground at the bottom of the sideways slope. Both boys on the rocky surface then sit down and start sliding forward on their butts until they also come to the place with soil and grass, where they get up and continue their walk/run while humming and speaking.*

These two transcriptions show how children take into consideration other children's failure or successes in handling risks when making their own risk decisions. In the first example, Boy 2 watches his two friends slip and fall on the rocks where they have decided to walk and then looks for another option of where to walk himself. The second example is the same situation seen from the perspective of Boy 1 and Boy 3's GoPro camera, where they, after failing to get up the rocky slope, watch their friend and see how he succeeds

with choosing another way up. To our knowledge, there is no earlier research exploring how children may learn to assess and manage risks by observing how peers make risk decisions and manage risks. Nevertheless, one cannot disregard the possibility that children in Lavrysen et al.'s study [15] also learned from each other when engaging in risky play together. Watching peers' risky play, which is called vicarious risk [48], is one of the categories of risky play particularly identified among toddlers. One may assume that this could be both a way to be introduced to risky play and its joys for the youngest children but also a way to learn from others' risk taking. The finding that when one child started to play and explore, other children often joined is also a sign of the social nature of risky play found in Little and Stapleton's [49] study. They are aware of and attentive to each other's presence in the area; they inspire each other and develop social and emotional belonging.

### 3.3. Adults' Risk Assessment and Risk Management for Children

When exploring the area, the children are usually independent and seldom ask for help. Nevertheless, on some occasions, children began whining, cried out for help from the staff, or asked for their mother. As previously mentioned, the staff was instructed not to intervene with children's exploration unless the children were at high risk of being physically injured. In some situations, during the data collection, staff members expressed that they would have restricted the children's activity if it had not been for the procedure of the study. The results did not show many situations in which the adults intervened in children's risk assessments or management, either to help or to restrict their actions, but some incidents occurred. The transcription below shows one example in which adults intervened during a child's exploration.

*Boy 4 walks on a path and stops when he sees some broken branches and sticks that are lying on the ground and blocking the way. He points to the obstacle and says "no, come" to a staff member. He gets closer and begins to feel and explore the branches a couple of seconds, while the adult stands close behind and urges him forward. Boy 4 is looking back at the adult for a couple of times while expressing himself verbally, before the adult lifts the boy over the obstacle.*

In situations where adults intervened in children's exploration and assessed the level of challenge and risk on behalf of them, the results show both verbal and nonverbal signs that the child's own assessment is interrupted. In the above transcription, when Boy 4 meets the broken branches across the path, a couple of interesting elements occur. First, the adult is gradually moving closer to the child when the child explores the twigs, and the adult's body language seems to stress the boy, sensing an urge to move forward. The child is not given the opportunity to explore the branches for more than a couple of seconds, and finally, the adult intervenes and lifts the child over the obstacle. In this situation, the staff member both assessed and handled the risk on behalf of the child, similar to what Kleppe found in his research [48]. The boy's verbal expressions in the observation can be interpreted as dissatisfaction. It is easy to understand the adult's action, but the boy may have managed to cross the branches on his own or found a different path, given more time and space. The adult's decision to intervene could possibly deprive the child of increasing his skills of risk assessment and risk management [3,15] in a situation that did not involve a high risk for injury. On the other hand, it is possible that the child needed comfort from an adult when he met this challenge and that it would have been unwise to leave the boy alone. Nevertheless, a more positive way of dealing with this might be that the staff member had stayed in the situation and rather supported the child to manage the risk himself [48]. A supportive relationship between the child and the staff is essential for the child to develop confidence in their ability to take risks and to dare engage in new experiences and explore in new environments [49]. This is also seen in the present study's results in situations where children expressed frustration and despair when the risk has become too great or that they faced a challenge that they are unable to overcome. When a staff member verbally supported and encouraged the toddlers, it was interesting to observe how fast these emotions improved. These situations show how

important adult support is by giving the children time and opportunity to assess different situations without acting on behalf of the children.

#### 4. Conclusions

The children participating in the study are seemingly constantly assessing and managing risk and challenges while exploring. The areas explored in our study had a variety of affordance, consisting of cliffs, slopes, and woodland, and were considered as safe as necessary by the staff members and researchers. The children demonstrated understanding and respect for the challenges of the terrain and do not throw themselves recklessly into situations that could lead to injuries. In contrast, the results also showed that the children handle the risks sensibly based on regular assessments. Similar to what is found in other studies [8,11,12,29], children in the present study sought challenges and risky situations, even when easier paths were available and introduced, which indicates that children find risk in play and exploration intriguing. The results also illustrate that the children used the affordances that the varied and natural environments offered to explore and seek out risks [30,31,33,49]. They climb, jump, slide, balance, explore, and watch other children's risk taking, all of which are play types that constitute risky play [11,48].

When moving around in the challenging natural environments in this study, children employed various strategies of assessing and managing risks. The most common strategy was children's own direct risk assessment, where they typically slow down their pace and look carefully at the surroundings and the obstacle before making a risk decision. In these situations, they manage the risk themselves through their own actions and exploration. The other strategy for risk assessment found in the present study's results was children's indirect risk assessment, in which they observe peers' risk taking and learn how to assess and handle risks through this. In both of these strategies, it is imperative that the staff take a withdrawn role and trust the children to explore and handle risks on their own. The method of the present study was based on a prerequisite that the children should be allowed to decide for themselves how the areas were used and explored, and this enabled the data material to capture children's own risk assessment and risk management. Nevertheless, the results showed a third, though less commonly used, strategy of assessing and managing risks. This strategy is not within children's own agency but is rather an example of how staff members sometimes intervene and make risk decisions and risk management on behalf of the children, such as lifting them over obstacles, removing them from the risk, or telling them that they should not proceed with their exploration.

The present study contributes to the knowledge of how children young as 17–25 months (toddlers) explore risks and use strategies to assess and manage risks. Earlier literature suggests that children will become more skilled in assessing and managing risks through risky play [2,3,15], and the present study supports this. These findings indicate that ECEC staff and parents should give children, even as young as 17–25 months, the opportunity to explore challenges and risks in varied natural environments. This includes bringing the children to diverse play environments, preferably to nature areas, where they can explore affordances freely. This also means that ECEC staff and parents should support children's independent exploration, rather than directing or restricting children's play. Adults should try not to do the risk assessment and risk management for the children, but let the children learn to assess and manage risk through own exploration and experiences.

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