



## Designing Gender-Neutral Playgrounds: The Impact of Natural Environments on Children's Behaviors

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### **ABSTRACT**

Children's engagement in free-time activities is a significant aspect of their lives. Their attitudes and play preferences are influenced by their sociocultural environment and parental background, which are often intertwined with gender stereotypes. This can have negative social effects, including social exclusion, aggression, or social withdrawal. Risk-taking patterns in play can also be affected by gender stereotypes, which may result in hostile attitudes directed against individuals. This study examined how gender-neutral and natural play environments can impact early childhood gender-related behaviors by analyzing individual and group play attitudes through behavioral mapping, observation checklists, and interviews. The study specifically focuses on the design of public playgrounds in İzmir, Turkey, aiming to eliminate negative gender-related behaviors through a collaborative design process. The findings highlight that the attitudes of both children and parents are influenced by the layout of the playground and equipment, offering valuable insights for researchers, educators, and playground designers.

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## **1.0 INTRODUCTION**

A child's overall development encompasses the acquisition of various physical, social, emotional, and cognitive skills. Children dedicate a significant amount of time to leisure activities, which play a crucial role in their learning process, influencing their preferences for play types, peers, and social environments (Maguire et al., 2015; Czalczyńska, 2014; Karsten, 2003; Shutts et al., 2017). Play environments contribute to children's social, physical, and mental development, facilitating their social growth while also enhancing self-esteem and fostering problem-solving skills (IPA, 2014; Ruth, 2008; Fjørtoft, 2001; Maguire et al., 2015; Czalczyńska, 2014; Karsten, 2003; Shutts et al., 2017; Moore, 2014; Davies, 2003). Consequently, studies focused on learning environments for children, including kindergartens and preschool playgrounds, have generally examined their impact on child development (Änggård, 2011; Fjørtoft, 2001; Barbu et al., 2011; Coe et al., 2014; Granger et al., 2016; Rönnlund, 2015; Mayeza, 2016).

Regarding gender identity development, play attitudes are influenced by peers and the play environment, which shape children's preferences for play companions (Czalczyńska, 2014; Karsten, 2003; Shutts et al.,

2017; Edwards et al., 2001; Coe et al., 2014). Interaction patterns and preferred activities during play shape children's tendencies to choose same-gender peers who engage in culturally endorsed activities for their specific gender (Granger et al., 2016; Lumen Learning, 2021). Children whose interests stray beyond these gender boundaries of their socio-cultural environment may sometimes experience less physical activity, social exclusion, and negative social behaviors due to the need for peer approval. This emphasizes the influence of playgrounds in shaping children's gendered behaviors, resulting in the emergence of negative attitudes. Playgrounds are generally sites that reinforce gender norms during the learning process, with children consistently observing and managing each other's behaviors through exclusion and bullying (Maguire et al., 2015; Mayeza, 2016; Bagner et al., 2012; Reimers et al., 2018; Buhs & Ladd 2001; Edwards et al., 2001). The primary causes of these inappropriate attitudes and children's desire for social approval are the physical and gender boundaries imposed by society. Thus, boys are generally considered able to accomplish any task through their supposed physical strength, whereas girls are perceived as vulnerable and having limited physical capabilities (Edwards et al., 2001; Thorne, 1993; Buhs & Ladd, 2001). This hegemonic perspective has negative consequences on children who break the norms, including social rejection, suicidal tendencies, and fewer relationships in later life (Buhs & Ladd, 2001).

### 1.1 Scope and Aim of the Study

While several studies have examined children's negative attitudes in outdoor playgrounds (Kung et al., 2018; Hofstede et al., 2015; Buhs & Ladd, 2001), only a few have investigated the relationship between gender and playground design to guide designers in creating more gender-neutral play settings. Previous studies have also focused on assessing children's physical activity levels in school environments supervised by adult professionals, whereas few studies have specifically analyzed unsupervised outdoor public playgrounds (Maguire et al., 2015; Mayeza, 2016; Bagner et al., 2012; Reimers et al., 2018; Buhs & Ladd 2001; Edwards et al., 2001). Yet, children routinely spend significant time in unstructured free-time activities, whereby they can explore their abilities and potential through risk-taking. Regarding risk/peril issues and social interventions, gender stereotypes are more prevalent in public spaces (Little & Eager, 2010; Boles et al., 2005; Änggård, 2011; Fjørtoft, 2001). Accordingly, the present study analyzes the effects of public outdoor play environments on children's gendered behaviors.

The present study also investigates how gender-neutral play environments may help reduce children's negative gender-related attitudes in early developmental stages, and examine how design interventions may increase girls' participation and encourage them to engage in risk-taking activities in public outdoor play environments. That is, the study aims to determine whether gender-neutral playground design can eliminate children's negative gender-based behaviors, while supporting physical activity level among girls. To achieve this objective, the study analyzes children's individual and group play attitudes, specifically negative behaviors and gender-based patterns of risk-taking. Behavioral mapping and observation checklists were used to measure children's attitudes simultaneously. Interviews were conducted with both children and parents to identify parental concerns and expectations, as well as to create playground designs that minimize parental interventions. The target playground design was developed by implementing design guidelines, focusing on risk management and creating a gender-neutral environment.

The findings and design guidelines offer valuable guidance for the design of play equipment and gender-neutral play environments to support equal play opportunities in early childhood, eliminate negative attitudes, and increase awareness of gender stereotypes.

## 1.2 Child Development, Gender, and Play

Child development includes four major dimensions: social development, emotional development, cognitive development, and physical growth. Children's gender identity knowledge is affected by these developmental sequences in an age-related manner, although children's exploration of their capabilities and limitations also depends on the interventions of their parents and the social environment (Edwards et al., 2001; Antill et al., 2003; Reimers et al., 2018; Mayeza, 2016; Buhs & Ladd, 2001; Kid Sense, n.d.).

Children start understanding others' thoughts and feelings as different from their own during their preschool years between the ages of three and five. Such children also become aware of their gender identity and their capabilities and limitations (Barbu et al., 2011; Reimers et al., 2018; Mayeza, 2016; Buhs & Ladd, 2001). For instance, infants observe gender-related messages from adult appearance and attitudes, while toddlers start to develop a sense of group belonging as they become aware of gender differences (Fagot & Leinbach, 1989; Witt, 1997; Antill et al., 2003; Zosuls et al., 2009). Research has shown that gender norms mean that girls and boys develop different risk-taking tendencies. The discourse that frequently emphasizes that men are strong and can do whatever they want encourages boys to act more impulsively when confronted with risky circumstances or challenges. These gender-based differences in risk-taking behavior established during childhood can persist into adolescence and maturity (Isci and Hasirci, 2020; Änggård, 2011; Miller et al., 2009; Mayeza, 2016; Taşçı, 2010).

Children's social, emotional, cognitive, and motor skill development, as well as their overall well-being and health, are all significantly influenced by play and physical activity. Playgrounds and play environments serve as essential learning spaces for children, where they learn and develop through interacting with their surroundings, including the obstacles and challenges (Moore, 2014; Änggård, 2001; Fjørtoft, 2001; Storli & Hagen, 2010). Therefore, children should have equal play opportunities for healthy development. However, the socio-cultural environment and gender bias may prevent this equality (Reimers et al., 2018; WHO, 2020; UNCRC, 2013; Saragih & Subroto, 2023). In patriarchal societies, for instance, gender norms lead to gender inequalities even in school activities, with girls only allowed to socialize without playing, whereas boys can engage in any activity they desire (Saragih & Subroto, 2023). In addition, children reproduce stereotypes that girls are inherently weak and vulnerable, whereas boys are stronger. Based on such stereotypes, girls and boys that behave "inappropriately" may be labeled, respectively, a "tomboy" or a "sissy," and socially rejected by peers.

### 1.2.1 Affordances and Play

The concept of affordances, introduced by Gibson (2014), is directly linked to children's motor skills and creativity. With their diverse landscape features, natural environments offer a wide range of affordances for play and physical activities (Hasirci et al., 2021; Ondul et al., 2021). Affordances also refer to an object's qualities or properties in relation to its potential uses or guide how it might be used (Merriam-Webster, n.d.). For instance, children perceive their environment as a playground: they use open areas for running around freely, shrubbery for constructing shelters, and trees for activities like hide and seek, or satisfying their adventurous spirit by climbing (Fjørtoft, 2001; Änggård, 2001; Hayball et al., 2018). Various studies have demonstrated that the natural environment supports the development of children's motor skills and creativity (Hasirci & Demirkan, 2003), while children who spend longer outdoors in natural environments can better master physical challenges (Storli & Hagen, 2010; Fjørtoft, 2001; Grahn et al., 1997).

Unstructured free-time activities also enable children to develop problem-solving abilities while their behaviors indicate their risk-taking tendencies and attitudes, which vary with factors like age and gender (Boyer, 2006; Little & Eager, 2010; Greenfield, 2004; Stine, 1997; Tovey, 2007; Heft, 1989).

### **1.2.2 Risky Play and Risk-taking**

Risk-taking behavior involves engaging in actions while being aware of potential negative outcomes, such as unintentional injuries (Boyer, 2006; Little & Eager, 2010). It is also important to recognize that risk-taking can have positive outcomes if managed with risk-minimizing strategies; such as learning the results of their decisions, preparedness for potential dangers, and acting appropriately to ensure their safety. Moreover, it enables children to explore and perceive their environment in different ways while experiencing both success and failure (Ball et al., 2008; Walmsley et al., 2010; Greenfield, 2004; Stine, 1997; Tovey, 2007).

### **1.3 Gender-based Play Attitudes**

Children show diverse play behaviors in free-time activities based on types of play (Rock, 2022; Barbu et al., 2011), and have distinct play behaviors, and variances in play behaviors related to age, gender, and type of activity (Barbu et al., 2011; Änggård, 2011; Karsten, 2003; Braun & Davidson, 2016; Edwards et al., 2001).

Various studies have shown that children's social skills and play styles vary with gender. For example, boys tend to play in larger groups while dominating their surroundings, whereas girls tend to play with other girls in smaller groups (Edwards et al., 2001; Karsten, 2003; Braun & Davidson, 2016; Harten et al., 2007; İşci and Hasirci, 2020). Girls also tend to observe and incorporate others' behaviors, which enables them to develop concerns and expectations regarding their play-peers.

Children's everyday experiences contribute to the construction of gender and affect the environments they encounter. Thus, their concerns and behaviors may be affected by both their social and parental backgrounds (Edwards et al., 2001; Karsten, 2003; Reimers et al., 2018; Isci and Hasirci, 2018). More specifically, the parents' attitudes may affect their child's inclination towards taking risks. Gender stereotypes often portray boys as more physically able than girls. Moreover, risk-taking attitudes during play have a key role in children's development because they help children recognize potentially dangerous circumstances and avoid harm while exploring their surroundings. Through engaging in risk-taking, children learn about their own physical strengths (Little & Eager, 2010; Änggård, 2011; Fjørtoft, 2001).

### **1.4 Children, Nature and Gender**

Children's experiences in natural settings help develop their motor skills and encourage them to overcome obstacles (Cengiz & Boz, 2019; Rasmussen, 2004; Coe et al., 2014; Fjørtoft, 2001; Fjørtoft & Sageie, 2004; Änggård, 2011; Karsten, 2003; Edwards et al., 2001; Barbu et al., 2011; Reimers et al., 2018; Mayeza, 2016; Little & Eager, 2010). Children evaluate their environment in terms of their capacity to interact with it. They use the affordances inherent in nature as integral parts of their play, categorizing its features in terms of their functionality (Heft, 1989; Moore 1993). That is, children's imaginations are enhanced with unstructured play environments through ecological functions and natural settings (Cengiz & Boz, 2019; Rasmussen, 2004; Laaksoharju et al., 2012). Hence, nature offers more possibilities for independent and inclusive play without parental involvement related to gender stereotypes. Parents generally believe that nature provides safer environments and helps develop children's motor abilities (Van Truong et al., 2022; Cengiz & Boz, 2019; Coe et al., 2014). Biophilic playgrounds facilitate controlled contact with nature through the natural features including topography, plants, trees, and water (Cengiz & Boz, 2019; Titman 1994; Brown, 2019).

Biophilic design conceptualizes the relationship between humans and nature through fourteen patterns (Cramer and Browning, 2008; Browning et al., 2014; Nogueira, 2017; Cengiz & Boz, 2019). Kellert & Callabrese (2015) describe these patterns as different ways of interacting with nature, categorized into three sub-groups: direct experience of nature, indirect experience of nature and experience of space and place.

The experience of space and place includes the following six elements:

- 1) Prospect and refuge areas
- 2) Organized complexity for encouraging curiosity and exploration
- 3) Integration of parts to wholes
- 4) Transitional spaces
- 5) Mobility and way finding
- 6) Cultural and ecological attachment to the space

Such natural areas provide a wide range of play activities and experiences for children, and are beneficial in terms of exploring the environment, learning to take risks, and overcoming obstacles.

#### 1.4.1 Natural Environments and Gender-Neutral Playgrounds

Nature provides opportunities for non-gendered play, allowing children to interact and help each other while sharing tasks without gender-based limitations (Davies, 2003; Änggård, 2011). Parents only consider potential injuries in natural settings, whereas in structured environments they also prioritize equipment safety, durability, appropriateness for their child's age, and preventing interference from other children and strangers (Little & Eager, 2010; Lester & Russel, 2008; Sandseter, 2007). However, design solutions for structured natural playgrounds may help reduce parental concerns and interventions with their children. Due to gender-based assumptions that girls are more fragile and require protection, girls experience a stronger parental influence than boys (Reimers et al., 2018; WHO, 2020; UNCRC, 2013; Edwards et al., 2001; Thorne, 1993; Buhs & Ladd, 2001; Perry et al., 1988).

Gender-neutral refers to something that is not associated with any particular gender (European Institute of Gender Equality, 2016). Thus, natural environments can be considered as gender-neutral spaces, whereas structured outdoor playgrounds often have fixed features and equipment that are gender typed (Thorne, 1993; Reimers et al., 2018; Mayeza, 2016; Änggård, 2011; Karsten, 2003). Designing structured playgrounds inspired by nature and that integrate nature-focused elements into a space can offer advantages in terms of risk management and promoting independent play. **Table 1** presents an analysis of playground differences in terms of children's and parents' behaviors, landscape characteristics, and play equipment design features.

## 2.0 MATERIALS AND METHODS

The study examined children's individual and group play behaviors in relation to their gender, and engagement in negative behaviors and risk-taking patterns in public outdoor playgrounds. There were two main phases: data collection and play equipment design. The research was facilitated by a collaboration protocol established as part of İzmir University of Economics' University-Industry Collaboration Project.

In line with the collaborative nature of the study and its objectives, two natural and two traditional playgrounds were chosen for the initial phase, Behavioral mapping and observation checklists were used to measure and assess children's play behaviors and interactions with the surroundings. Interviews were then conducted with the parents and their children to gain insights into parental concerns and expectations in order

to develop more suitable playground designs. Taking into consideration risk management and the incorporation of a nature-themed setting uninfluenced by gender norms, design guidelines were suggested, leading to the development of an innovative playground design concept.

**Table 1.** Playground Classification (created by authors, 2021)

		Natural Playgrounds	Traditional Playgrounds	Gender-neutral Playgrounds	Gender-typed Playgrounds
<b>Landscape Design</b>	Vegetation	X		X	
	Topography use	X		X	
	Refuges	X		X	
	Risk / Peril	X		X	
	Mystery	X		X	
<b>Play Equipment Features</b>	Safety first		X		X
	Risk management	X		X	
	Natural Materials	X		X	
	Short-lived materials		X		X
	Plastic materials		X		X
	Neutral colors	X		X	
	Vivid-bright colors		X		X
	Versatile play	X		X	
	Limited play activity		X		X
	Standard play equipment		X		X
<b>Childrens' Behaviors</b>	Same-gender group play		X		X
	Mix-gender group play	X		X	
	Negative behaviors		X		X
<b>Parents' Behaviors</b>	Minimum adult interferences	X		X	
	Adult interferences		X		X
	Safety concerns		X		X

## 2.1 Participants

The participants were children aged 3-7 years and their parents, randomly selected based on the number of individuals present during observation days. A total of 100 children were observed during the observations, and photographic data was obtained to exemplify their risk-taking and negative behaviors. Three distinct classifications were used to categorize the children according to their peer relationships: individual play, same-gender play, and mixed-gender play.

## 2.2 Settings

Previous studies have explored various types of outdoor playgrounds, including preschool and public, traditional and natural. Several studies that have investigated gender-specific distinctions indicate that natural playgrounds tend to be gender-neutral (Änggård, 2011; Fjørtoft, 2001, Ärlemalm-Hagsér, 2010). This is attributed to the shared characteristics of natural and gender-neutral playgrounds, which encourage both genders in physical activities, material use, and design features. Accordingly, this study focused on analyzing various features of natural and traditional outdoor play environments from a gender perspective.

**Table 2.** Playground classification

Playground	Bostanlı		Karşıyaka		
	Olof Palme Park	Footbridge Park	New Generation Park	Hill Park	
<b>Natural Playgrounds</b>	Vegetation	X	X	X	
	Topography use		X	X	
	Neutral colors	X	X		
	Versatile play	X		X	
	Risk management	X	X	X	
	Minimum adult interferences		X		X
<b>Biophilic Design Patterns</b>	Visual connection with nature	X	X	X	X
	Non-visual connection with nature				
	Presence of water				
	Non-rhythmic sensory stimuli	X	X	X	X
	Biomorphic forms and patterns		X		X
	Material connection with nature	X	X		
	Refuge	X		X	
	Risk/peril	X	X	X	X
	Prospect	X	X	X	X
	Mystery		X	X	
<b>Traditional Playgrounds</b>	Standard play equipment	X	X		
	Short-lived / ephemeral materials	X			
	Plastic materials	X	X	X	X
	Limited play activities	X	X		X
	Vivid-bright colors			X	X
	Safety first	X			
	Adult interferences	X		X	

The study was conducted in four playgrounds located in İzmir: Olof Palme Park, Footbridge Park, New Generation Park, and Hill Park. The specific playgrounds were selected based on several factors, including location, design aspects, quality, amount of play equipment, and site. The selected playgrounds are all located along the same Bostanlı-Karşıyaka coastline to minimize socio-cultural differences between urban districts. The assessment criteria included maintenance, play activity diversity, and playground density. The four selected playgrounds are designed playgrounds with better maintenance and design conditions than other parks in İzmir. The condition of playgrounds in İzmir vary based on the socio-economic status of each district, which determines the user profile.

Following preliminary observations regarding the playground design features (Table 2), the playgrounds were visited on six evenings between 18.30 and 20.30. One weekend day and an entire week were

selected to ensure observation of a representative number of children and gender diversity in the playgrounds. The visiting hours were chosen following an initial assessment based on the summer season when children are most actively engaged in play.

### **2.3 Research Process**

The objective was to create design guidelines for a gender-neutral prototype design incorporating significant natural elements. Empirical data was obtained from the playgrounds, while observations and interviews were conducted with both children and parents to explore gender roles in playgrounds. The study consisted of two phases: data collection and playground design. Behavioral mapping and an observation checklist were used to identify negative behaviors and risk-taking patterns in children. Interviews with parents and children were conducted in the first phase to identify essential characteristics based on their experiences. The second phase involved designing modular play equipment and establishing gender-neutral design criteria incorporating the findings in the first phase.

### **2.4 Research Instruments**

Questionnaires, observation checklists, and behavioral mapping techniques were used to analyze the children's negative attitudes and risk-taking patterns in both traditional and natural public playgrounds. Interviews were conducted with parents and children; observations were conducted of the children in each playground, and behavioral maps were created to compare and analyze the findings. The aim was to maintain high participant numbers, although the number for each data source varied due to the changing and dynamic use of each playground.

#### **2.4.1 Interviews**

Interviews (Appendices A and B) were conducted to understand parental apprehensions about playground design and equipment safety, and their attitudes regarding gender norms. The children were asked questions to understand their expectations from the playground and their perspectives about taking risks. Twelve questions were determined with sample answers in itself for both children and parents. Moreover, feedback from stakeholders such as municipalities and intermediaries, revealed by equipment manufacturers, provided insights into differences in the expectations of families.

#### **2.4.2 Observation Checklists**

The four playgrounds were observed using specific observation checklists developed for each playground's equipment (Appendix C). The observations recorded children's negative behaviors, risk-taking tendencies, parental behaviors, and environment use for individual play, same-gender group play, and mixed-gender group play. Inappropriate equipment use was documented by video recording and photography, while adhering to ethical guidelines.

#### **2.4.3 Behavioral Mapping**

Behavioral maps created (Appendix D) for each playground were analyzed in terms of classified and specified behavior in the observation checklist. The ten different behaviors identified were walking, running, crawling, climbing, hiding, transition, socialization, observation, negative behaviors, and equipment use. Each behavior was assessed individually for boys and girls using tracing and sketching applications.

### 2.4.4 Ethical Approval

All participants had the right to withdraw from participating or decline to participate and their identity was kept confidential. Participants were informed about the study procedures and gave written consent using a consent form signed by the participating child's parent(s).

## 3.0 RESULTS

The analysis was conducted at four playgrounds in Karşıyaka, Izmir: Footbridge Park, Olof Palme Park, New Generation Park, and Hill Park. **Figure 1-4** show the observed play equipment in each park.

Footbridge Park (refer **Figure 1**) had the following three sets of play equipment:

- 1) EQ1-sliding unit
- 2) EQ2-grass hill with slide and climbing unit
- 3) EQ3-climbing unit



**Figure 1.** Footbridge Park, Bostanlı, Showing Three Play Equipment Sets (Source: Authors' Archive)

Olof Palme Park (refer **Figure 2**) had the following four sets of play equipment:

- 1) EQ1-rope swing
- 2) EQ2-long swing
- 3) EQ3.1-slide
- 4) EQ3.2-climbing unit



**Figure 2.** Olof Palme Park, Bostanlı, Showing Four Play Equipment Sets (Source: Authors' Archive)

Hill Park (refer **Figure 3**) had the following three sets of play equipment:

- 1) EQ1.1-hill with slide
- 2) EQ1.2-grass hill with slide and climbing unit
- 3) EQ2-carousel



**Figure 3.** Hill Park, Karşıyaka, Showing Three Play Equipment Sets (Source: Authors' Archive)

New Generation Park (refer [Figure 4](#)) had the following three sets of play equipment:

- 1) EQ1.1-high barrel tube
- 2) EQ1.2-climbing unit
- 3) EQ1.3-ghost slide



**Figure 4.** New Generation Park, Karşıyaka, Showing Three Play Equipment Sets (Source: Authors' Archive)

### 3.1 Behavioral Mapping Findings

The behavioral mapping produced six different maps, one for each observation day in each of the four playgrounds with a total of 96 children participating. The results indicated that the children generally exhibited similar behaviors that demonstrated their willingness to climb and run in all four playgrounds. However, their specific preferences varied in terms of equipment types and available activities. They also tended to get bored more easily in small or narrow spaces and preferred areas where they could move around freely and use their creativity rather than having a large amount of play equipment. Both genders demonstrated equal interest in using each playground's topography, and exhibited nearly the same play behaviors and use of space. However, girls were affected more than boys when playing in narrow and cramped spaces in the multi-play units, and generally preferred open areas. Overall, both girls and boys were happier in playgrounds that allowed them to move between equipment, run, climb, and transition to other areas of the playground.

## 3.2 Observation Findings

The case study's observations were recorded using the checklist prepared for each playground for each observation day. Data were collected from a total of 110 children. The data were then analyzed to identify differences in attitudes, preferences, and parental interference in terms of three main relationships:

- 1) Negative behaviors and parental interferences
- 2) Negative behaviors, gender and parental interferences
- 3) Risk-taking patterns and parental interferences

Chi-square tests were used to analyze patterns in the checklist data regarding differences in children's attitudes, gender, and parental interference. The observation findings showed that children's preferences varied depending on equipment design. In the public playgrounds, they preferred engaging with their parents or friends, or played individually rather than interact with other children. On the other hand, when using the multi-user play equipment, they unintentionally socialized. For example, they waited for one another, offered assistance, and interacted to continue playing. Through these interactions, they played together and became companions as long as the other child did not display negative behavior or engage in bullying. These socializations and interactions increased parental interventions and the child's reliance on their parents during play. In short, the play equipment sets that facilitated group play helped children to engage in social interactions.

### 3.2.1 Analysis of Relationship Between Negative Behaviors and Peer Preferences

The study hypothesized that there is a correlation between gender and negative attitudes in play that is affected by gender stereotypes. The descriptive statistical analysis indicated that gender, negative attitudes, and play companion preferences varied based on the type of equipment and playground characteristics. More specifically, the two traditional playgrounds (Footbridge Park and Hill Park) increased same-gender play, which generally caused negative behaviors. However, regardless of playground type (whether traditional or natural), it was found that equipment design could encourage negative behaviors. The children's play experiences were also affected by the gender of their play companions. Regarding children's play-peer preferences, the children appeared more social in mixed-gender groups than same-gender ones.

### 3.2.2 Analysis of Relationship Between Negative Behaviors, Gender, and Peer Preferences

The study hypothesized that there is a correlation between gender, negative attitudes, and parental interventions. The analysis indicated that gender, negative behaviors, and peer preferences were interdependent. However, negative behaviors were not exclusively linked to gender and choice of play-peers. Another hypothesis of this study is that parental interference contributes to increased negative attitudes, which are affected by the children's gender. **Table 3** presents six categories of parental interventions: observing from a distance, playing together, facilitating socialization, assisting with equipment usage, providing encouragement, and giving warnings. While these interventions are not inherently negative, they may put pressure on children, potentially leading to negative behaviors.

**Table 3.** Observed parental interference for each play equipment set

			Watching from distance	Playing together	Helping them to socialize	Helping them to use the equipment	Encouraging	Warning
<b>Bostanlı</b>	Olof Palme Park	Eq.1 – Rope swing	X	X		X		X
		Eq.2 – Long swing	X	X		X		X
		Eq.3-1 - Slide	X	X		X	X	X
		Eq.3-2 – Vertical climbing	X			X	X	X
	Footbridge Park	Eq.1 – Rope swing	X	X		X	X	
		Eq.2 – Grass hill / rope climbing+ slide	X	X		X	X	
Eq.3 – Spider climbing unit		X			X	X		
<b>Karşıyaka</b>	New Generation Park	Eq.1-1 – High barrel tube slide	X			X	X	
		Eq.1-2 – Rope climbing	X			X	X	
		Eq.1-3 – Ghost slide	X	X		X	X	
	Hill Park	Eq.1-1 – Rubber hill with slide	X	X		X	X	
		Eq.1-2 – Grass seating unit	X				X	
		Eq.2 - Carousel	X	X		X		X

### 3.2.3 Analysis of Relationship Between Risk-taking Patterns and parental Interventions

**Table 4** presents five categories of risk-taking patterns among children: individual decision and risk-taking, individual decision and risk avoidance, exploratory appraisal, avoiding despite assistance, and risk-taking with help. Children risk-taking decision-making may be influenced by parental interventions, which may lead to risk avoidance. The nature of these interferences may also vary depending on the child's gender. Therefore, observations were conducted to analyze the relationship between each child's risk-taking patterns, gender, and parental interferences.

**Table 4.** Observed risk-taking patterns in each play equipment according to children’s gender

			Individual decision and taking risk	Individual decision and avoiding risk	Exploratory appraisal	Avoiding despite help	Taking risk with help
<b>Bostanlı</b>	Olof Palme Park	Eq.1 – Rope swing	G-B	G	B	G-B	G-B
		Eq.2 – Long swing	G-B	G-B	G-B	G-B	G-B
		Eq.3-1 - Slide	G-B	B		G-B	G-B
		Eq.3-2 – Vertical climbing	G-B	G-B	B	G-B	G-B
	Footbridge Park	Eq.1 – Rope swing	G-B	G		G-B	G-B
		Eq.2 – Grass hill / rope climbing+ slide	G-B	G-B	G-B	B	G-B
Eq.3 – Spider climbing unit		G-B			G-B	G-B	
<b>Karşıyaka</b>	New Generation Park	Eq.1-1 – High barrel tube slide	G-B	G-B		G-B	G
		Eq.1-2 – Rope climbing	G-B	G-B		G	G-B
		Eq.1-3 – Ghost slide	G-B	G-B	G	G	G
	Hill Park	Eq.1-1 – Rubber hill with slide	G-B	G	B		G-B
		Eq.1-2 – Grass seating unit	G-B				
		Eq.2 - Carousel	G-B	G-B			

Note: G indicates girls and B indicates boys

Moreover, the results show that boys tend to take more risks than girls, and that parental interferences can either encourage or discourage children from taking risks. The study suggests that parents should be aware of their child's risk-taking behavior and provide appropriate guidance to ensure their safety while still allowing them to explore and learn.

### 3.3 Interview Findings

Questionnaire-based interviews were conducted in each playground with both the children and their parents to compare their preferences based on type of play environment. To obtain detailed insights into the requirements, desires, and worries of the parents and children about the play environment, the questionnaires were designed using a response scale ranging from 1 (never) to 5 (always). SPSS 28.0 software was used to conduct the descriptive analysis. The parents’ perspectives were analyzed using the independent samples t-tests to examine differences in playground expectations based on the children’s gender.

A total of 30 children and 30 parents participated in the interviews after each parent signed a consent form. The children included 19 girls and 11 boys. While the children aged 3-4 years were unable to effectively express themselves or focus on the questions, the children aged 5-6 years were eager to respond to the questions and express their enthusiasm about playground design. Different sets of questions were prepared for parents

and children. The responses regarding each question were then compared to identify gender-related differences in attitudes. These responses were then used for developing gender-neutral design guidelines to minimize obstacles to gender equality.

The study found that parents expressed concerns about play equipment safety, children's behavior, and playground supervision, suggesting improvements such as more benches, shaded areas, and enhanced maintenance. Interviews with children revealed their preferences and sources of joy in playgrounds, highlighting a common play environment preferred by most children regardless of gender differences.

### 3.4 User Feedback

Feedback from municipalities and intermediaries, obtained through the university-industry collaboration, was used to analyze the case study findings. This comparison indicated similarities between the data collected from the interviews and the feedback received from the manufacturer company.

The feedback was categorized in terms of the users' requirements and preferences regarding accessibility, materials used, age range, durability, diversity of play options, connection with nature, and relationship to play. Parental innovations could be minimized by enabling parents to observe their child's actions from where they were or if the children had the independence to visit the local playground by themselves. Additionally, the surrounding area of the playground should be limited as much as possible to control user profiles and minimize the presence of strangers. On the other hand, the playgrounds should facilitate interactions between children to foster socialization and playmaking. The majority of the feedback received, as mentioned by the manufacturers, focused on the types of equipment and potentially hazardous situations. The company provided the following list of the equipment that customers perceive as risky and would rather avoid:

- 1) Risks in successive play units
- 2) Chrome ghost sliding unit because the material easily heats up
- 3) Rope playing equipment
- 4) Stairs and climbing units (e.g., cat ladder) that are difficult to use due to narrow tread
- 5) High and long barrel tube slides
- 6) Unobservable equipment
- 7) Plastic joint equipment

## 4.0 DISCUSSION

The data collected in Phase 1 was used in Phase 2 for developing design guidelines and design ideas. The findings showed that the participating parents were concerned about the safety of play equipment, the behavior of other children, and supervision in the playgrounds as discussed in previous research (Ball et al., 2008; Walmsley et al., 2010; Greenfield, 2004; Stine, 1997; Tovey, 2007). They also stated their expectations and made recommendations for improving the play environment, such as increasing the number of benches and shaded areas, and better maintenance of the play equipment.

The interviews enabled the children's perspectives to be understood regarding the play environment, focusing on their favorite play equipment and what makes them happy or excited in the playgrounds. The findings identified the play environment preferred by the majority of children without gender-based differences: namely, the presence of vegetation, diverse play opportunities, and shelters and refuges. The

children reported feeling most excitement when playing with water, passing through tunnels, climbing trees or hills, and running down from high places. A set of design guidelines and design proposals were developed based on these findings.

The design guideline suggests that incorporating natural elements and promoting mixed-gender play can lead to more positive behaviors among children. According to previous research, mixed-gender play and natural environments could contribute to child development by providing diverse experiences, enabling risk-taking, promoting social skills and simulating children's creativity (Little & Eager, 2010; Boles et al., 2005; Maguire et al., 2015; Mayeza, 2016; Bagner et al., 2012; Reimers et al., 2018; Buhs & Ladd 2001).

#### 4.1 Developing Design Guidelines

A playground should be a safe area where parents can feel comfortable and facilitate their child's free time while meeting the desires and needs of the child. It is also crucial for children to have equal opportunities regardless of gender and learn to socialize uninfluenced by gender norms. Accordingly, the findings from Phase 1 were used to identify and incorporate the following gender-neutral playground design features:

- 1) Large play areas and transition spaces
- 2) Large, visible mystery spaces as transition areas,
- 3) Escape areas for children and entrance spaces for supervisors to ensure accessibility
- 4) Multi-user equipment that encourages socialization
- 5) Gender-neutral color schemes
- 6) Natural materials (e.g., wood and grass)
- 7) Slides with different heights for different age groups in the same playground
- 8) Risk/peril areas – risk management
- 9) Visibility and accessibility for supervisors
- 10) Incorporation of prospect areas for socialization
- 11) Natural risk/peril areas and prospects with topography and vegetation use
- 12) Floor signage to guide different age groups
- 13) Safety boundaries that do not prevent children's play
- 14) Lighting for night-time play
- 15) Shelters for different weather conditions

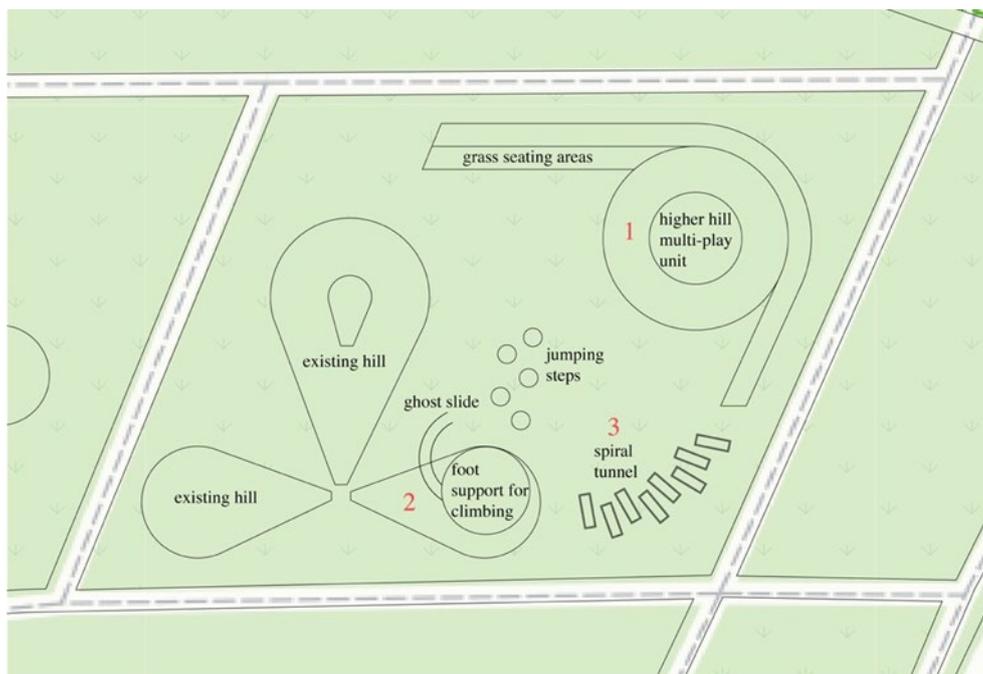
#### 4.2 Design Proposal

The research findings were used to develop gender-neutral design guidelines to ensure equal opportunities for all children during play, free from psychological and social limitations. Three design ideas were created based on the guidelines: higher hill multi-play unit; lower climbing hill with slide; and spiral tunnel. These three distinct equipment designs were based on the analysis of the research findings regarding parental concerns, children's expectations, and observed negative behaviors. The selected site for implementation was Footbridge Park, Bostanlı, because the descriptive analysis results suggested its potential for a gender-neutral playground. The three separate installations of playground equipment were strategically positioned to preserve the playground's existing three grass hills ([Figure 5](#)).

The Higher Hill Multi-play Unit was selected to address the negative attitudes caused by children attempting to use equipment for multiple purposes. Additionally, based on the interview results, it was

anticipated that bringing together different age groups to use a single equipment set could reduce bullying among age groups.

The Spiral Unit was selected based on the children's tendency to spend time in mysterious spaces like tunnels. This information was obtained through observations of children using transition areas in playgrounds as gathering spaces and expressing interest in tunnel-like spaces in the interviews. The aim was to design equipment that could function both as a tunnel and a transition area, allowing children to spend time there without disturbing each other. The equipment is placed at eye level to avoid confined and hard-to-reach spaces that might cause parental concerns. The three play equipment sets are designed as play areas that ensure visibility, easy parental access, and escape areas for children.



**Figure 5.** Plan of the proposed playground

The observations showed that parents sat on the play hills because they had no other defined seating place for monitoring their children. However, this tendency interrupted the children's play. Therefore, the proposed design incorporates a seating area in the form of grass stairs. Each step allows the children to access the multi-play unit while also serving as an exit area. This design provides an alternative for children who may not want to use the slides or ramp, allowing them to feel more freedom and less pressure.

The observations also showed that Footbridge Park is currently used by different age groups. In particular, children aged 7 or older get bored very quickly and bully others. Moreover, we designed the multi-play unit as a high hill with three levels for different age groups to prevent bullying (Figure 6). The lower section includes colored ropes, frameworks, and openings that provide both visibility and shaded and mysterious spaces for children to explore. The spiral ramp goes around the hill, leading to the highest point, where a tube slide and a prospect area are located. Additionally, LED lights are inserted into the frameworks, making the play area usable even during nighttime.

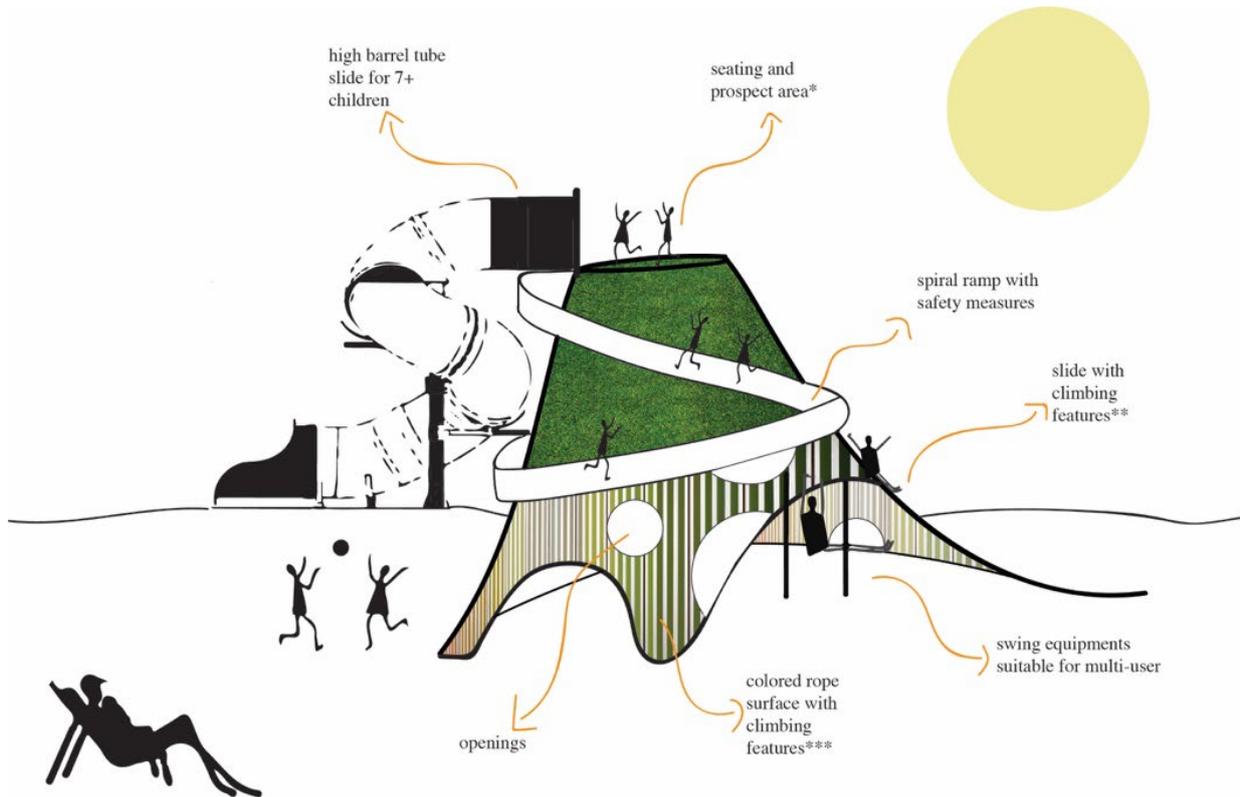


Figure 6. Higher hill for multi-play unit

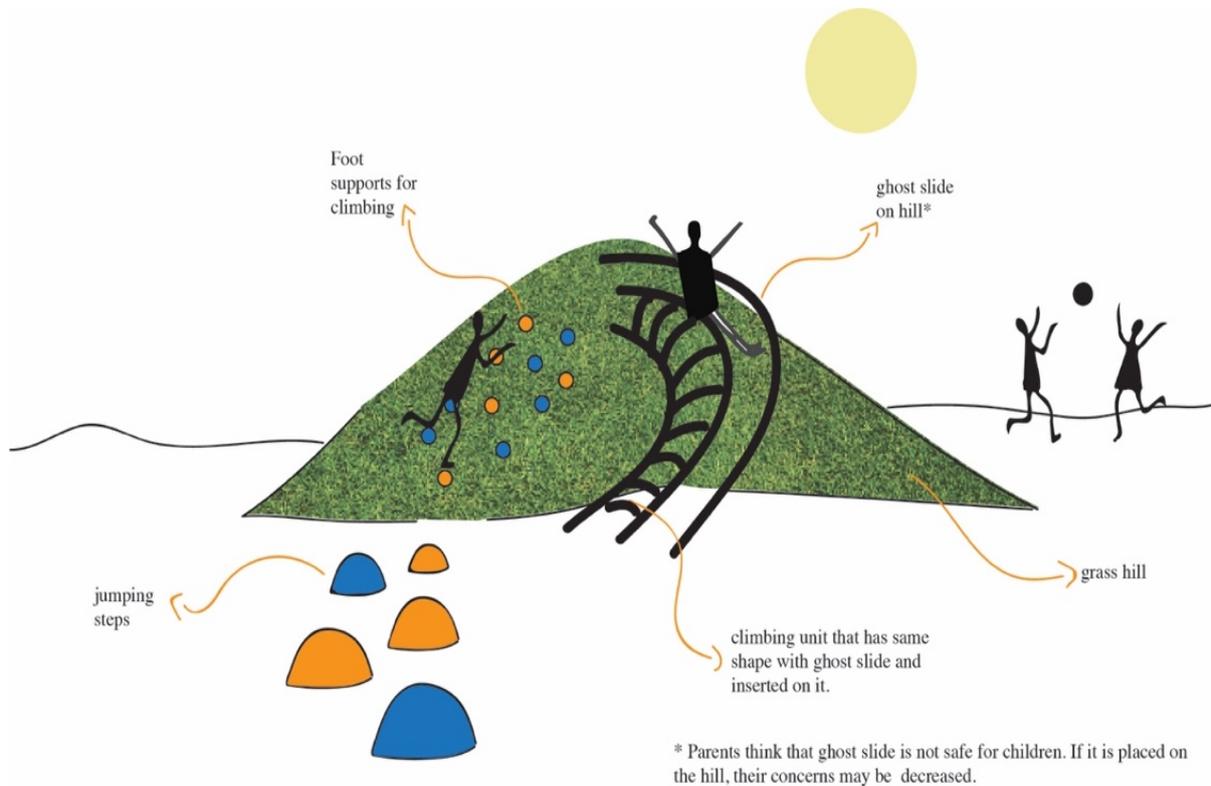
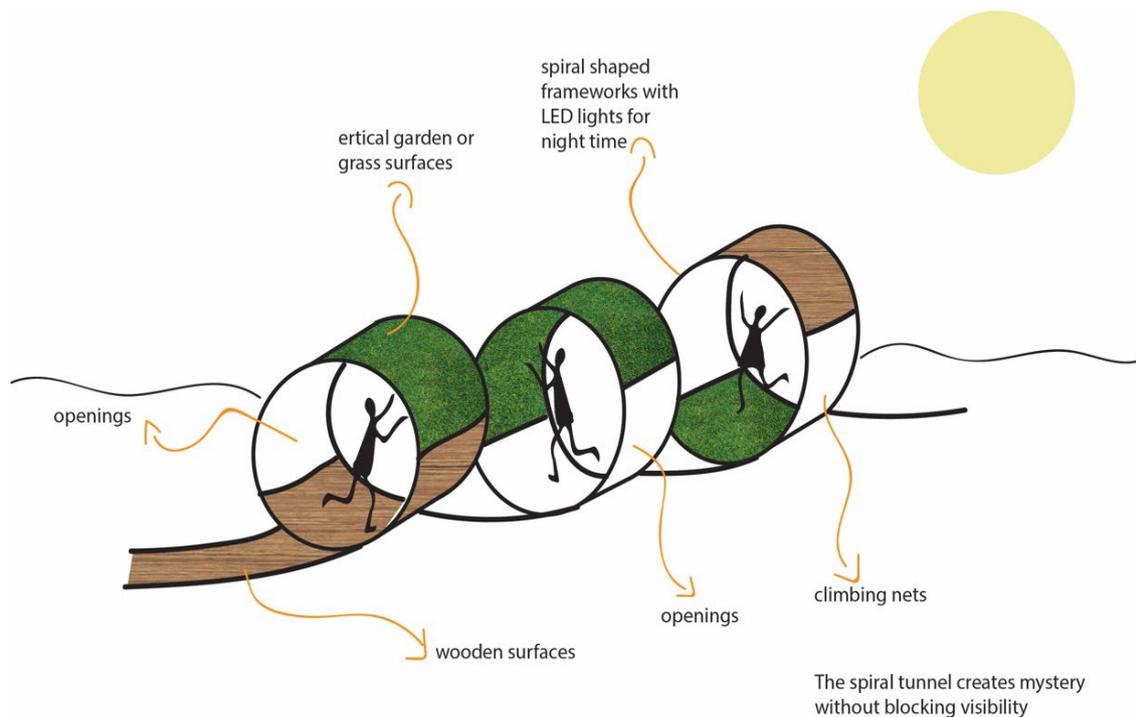


Figure 7. Lower climbing hill with ghost slide

The second piece of equipment is inserted on the existing hill, which is lower than the multi-play unit (Figure 7). The hill includes sloped climbing features and a ghost slide that supports children’s creativity and attracts attention with its abstract appearance more than traditional equipment. The observations indicated that both children and parents avoided the existing equipment because they were unsure of its functionality and perceived it as potentially unsafe. Hence, it could be helpful to reduce this perspective and support imaginative play by combining the ghost slide with the topography. The added climbing unit may help discourage children from using the slide to climb up the hill.

The last module is the spiral tunnel (Figure 8). The tunnel incorporates a grass surface to evoke a natural tunnel experience and wood for ease of maintenance. Moreover, the tunnel’s bearings are equipped with colored profiles with LED lights for enhanced visibility during night time. The interviews indicated that the children preferred to play in tunnels and engage in hide-and-seek activities. The semi-closed spiral tunnel design therefore aims to meet their expectations while alleviating concerns related to potential injuries resulting from improper use.



**Figure 8.** Spiral Tunnel

## 5.0 CONCLUSIONS

The case study reported here highlights the diverse impact of playground type, play equipment, and parental involvement on children’s play-peer preferences, play behavior, and risk-taking patterns. Some negative behaviors, like the inappropriate use of equipment, had repercussions that while not inherently negative, could disturb others. Children preferred mixed-gender play in certain natural playgrounds, fostering creativity and minimizing unintended behaviors. In contrast, traditional playgrounds often led to same-gender play, boredom, and limited activities. The type of playground equipment influenced the children’s behavior, with parents directing them towards specific choices. The study identified gender-neutral playground design criteria, emphasizing topography, vegetation, and varied play activities to provide equal opportunities. This

approach aims to encourage mixed-gender play, free risk-taking, and fewer negative behaviors. The findings offer guidance for designing play equipment and gender-neutral playgrounds, addressing negative behaviors and challenging gender norms. Future applications may extend to school environments and playscapes, promoting accessible play opportunities. The study's approach could be valuable for researchers, educators, and playground designers seeking to contribute to a gender-neutral world for children.

The case study demonstrated that children's behaviors, specifically peer preferences, play equipment use, negative attitudes, and risk-taking tendencies, vary with playground and equipment types, and parental involvement. Some behaviors that were not inherently linked to gender had negative impacts on others. For instance, while supporting motor skill development, the inappropriate use of equipment, like climbing a slide, can disturb and limit others' use. The children preferred mixed-gender groups with minimal unintended behaviors in the natural playgrounds (Footbridge Park and Hill Park). The parents watched them from a distance and joined in if their child requested this. The children creatively used the topography for diverse activities like climbing, relaxing, and socializing. In contrast, in the two traditional playgrounds (New Generation Park and Olof Palme Park), the children preferred same-gender play and the playgrounds' limitations caused negative behaviors like bullying and disturbing families and others.

The study highlights the challenge of making clear distinctions based on the playground type. Children's behavior varies regardless of the type of playground and is influenced by playground equipment and parental interventions. For example, parents tended to guide children toward low-height equipment and uncrowded areas, particularly parents with daughters. However, the interviews showed that the parents were unaware that their safety concerns impacted the children's play quality. To address this issue, we developed gender-neutral playground design criteria to foster mixed-gender play, risk-taking, and fewer negative behaviors. The criteria covered risk management, minimizing family concerns, and reducing intervention periods. The study findings emphasized the importance of topography, vegetation, accessibility, visibility, natural materials, and varied activities as key factors for equal play opportunities. Based on these, the case study developed three playground equipment sketches following the gender-neutral design guidelines.

The case study's results offer guidance for designing gender-neutral play equipment playgrounds, fostering equal opportunities in early childhood, minimizing negative behaviors, and challenging gender norms. Future directions may extend these gender-neutral design guidelines to other interior and exterior spaces, such as school environments and neighborhood playgrounds. The findings may be beneficial for researchers, educators, and playground designers committed to creating a world without gender limitations for children.

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## **SUPPLEMENTARY DATA**

Supplementary data to this article will be made available on request.

- Appendix A – Children’s Questionnaire
- Appendix B – Parent’s Questionnaire
- Appendix C – Observation Checklists
- Appendix D – Behavioural Maps

## REFERENCES

- Ånggård, E. (2011). Children’s gendered and non-gendered play in natural spaces. *Children, Youth and Environments*, 21(2), 5–33. [cross ref]
- Antill, J. K., Cunningham, J. D., & Cotton, S. (2003). Gender-role attitudes in middle childhood: In what ways do parents influence their children? *Australian Journal of Psychology*, 55(3), 148-153. [cross ref]
- Ärlemalm-Hagsér, E. (2010). Gender choreography and microstructures: Early childhood professionals' understanding of gender roles and gender patterns in outdoor play and learning. *European Early Childhood Education Research Journal*, 18(4), 515-525. [cross ref]
- Bagner, D., Rodríguez, G., Blake, C., Linares, D., and Carter, A. (2012). Assessment of behavioral and emotional problems in infancy: A systematic review. *Clinical Child and Family Psychology Review*, 15, 113–128. [cross ref]
- Ball, D.J., Gill, T. and Spiegel, B. (2008). *Managing risk in play provision: Implementation guide*. Play England. [cross ref]
- Barbu S., Cabanes G., Le Maner-Idrissi G. (2011). Boys and girls on the playground: Sex differences in social development are not stable across early childhood. *PLoS ONE*, 6(1), 16407-16415. [cross ref]
- Boles, R. E., Roberts, M. C., Brown, K. J., and Mayes, S. (2005). Children's risk-taking behaviors: The role of child-based perceptions of vulnerability and temperament. *Journal of Pediatric Psychology*, 30(7), 562–570. [cross ref]
- Boyer, T.W. (2006). The development of risk-taking: A multi-perspective review, *Developmental Review*, 26(3), 291–345. [cross ref]
- Braun, S., Davidson, A. (2016). Gender (non)conformity in middle childhood, a mixed methods approach to understanding gender-typed behavior, friendship, and peer preferences. *Sex Roles*, 77, 16-29. [cross ref]
- Brown, S. (2019). *Imaginative and pretend play: Observing the natural development of imaginative and pretend play in infancy*. Playcore. [cross ref]
- Browning, W.D., Ryan, C.O., Clancy, J.O. (2014). *14 patterns of biophilic design*. Terrapin Bright Green. [cross ref]
- Buhs E. S., & Ladd, G. W. (2001). Peer rejection as antecedent of young children’s school adjustment: An examination of mediating processes. *Developmental Psychology*, 37(4), 550-560. [cross ref]
- Cengiz C., Boz A. O. (2019). Biophilic playgrounds as playscapes in child-nature interaction. *International Journal of Scientific and Technological Research*, 5(12), 216-226. [cross ref]
- Coe, D. P., Flynn, J. I., Wolff, D. L., Scott, S. N., and Dunham, S. (2014). Children’s physical activity levels and utilization of a traditional versus natural playground. *Children, Youth and Environments*, 24(3), 1-15.
- Czalczyńska M. (2014). The impact of playground spatial features on children’s play and activity forms: An evaluation of contemporary playgrounds’ play and social value. *Journal of Environmental Psychology*, 38, 132-142. [cross ref]
- Davies, B. (2003). *Frogs and snails and feminist tales: Preschool children and gender*. (2nd ed.). New Jersey: Hampton Press.
- Edwards, C. P., Knoche, L., Kumru, A. (2001). Play patterns and gender, *Encyclopedia of women and gender: sex similarities and differences and the impact of the society on gender*. Academic Press, 2, 809-815
- European Institute of Gender Equality. (2016). *Terms: Gender-neutral*. [cross ref]
- Fagot, B. I., and Leinbach, M. D. (1989). The young child’s gender schema: Environmental input, internal organization. *Child Development*, 60(3), 663–672. [cross ref]
- Fjørtoft, I. (2001). The natural environment as a playground for children: The impact of outdoor play activities in pre-primary school children. *Early Childhood Education Journal*, 20(2), 111-117. [cross ref]
- Fjørtoft, I. and Sageie, J. (2004). The natural environment as a playground for children. *Landscape and Urban Planning*, 48(1), 83-97. [cross ref]
- Gibson, J. (2014). *The ecological approach to visual perception*. (1st ed.). Psychology Press. [cross ref]
- Grahn, P., Mårtensson, F., Lindblad, B., Nilsson, P., Ekman, A. (1997). *Ute på dagis (Outdoors in the preschool)*. Stad and Land, 145, Håssleholm, Sweden: Nora Skåne Offset.
- Granger, K. L., Hanish L. D., Kormienko O., and Bradley R. H. (2016). Preschool teachers’ facilitation of gender-typed and gender-neutral activities during free play. *Sex Roles*, 76, 498-510. [cross ref]
- Greenfield, C. (2004). Transcript: Can run, play on bikes, jump the zoom slide, and play on the swings: Exploring the value of outdoor play. *Australasian Journal of Early Childhood*, 29(2), 1–5. [cross ref]
- Harten, N., Olds T., and Dollman J. (2007). The effects of gender, motor skills and play area on the free play activities of 8-11 year old children. *Health & Place*, 14, 386-393. [cross ref]
- Hasirci, D., Edes, Z., Tatari, H., Rolla, S. (2021) Biophilic interior design: A healing/therapy environment education project. *INTED2021 International Technology, Education and Development Conference*, 61-70.

- Hasirci, D.; Demirkan, H. (2003). Creativity in learning environments: The case of two sixth grade art-rooms. *The Journal of Creative Behavior. 1<sup>st</sup> Quarter*, 37(1), 17-42. [cross ref]
- Hayball, F., Cronic, P., Kirk, A., Gibson, A. M., Ellaway, A. (2018). Exploring children’s perceptions of their local environment in relation to time spent outside. *Children & Society*, 32, 14-26. [cross ref]
- Heft, H. (1989). Affordances of children's environments: a functional approach to environmental description. *Children's Environments Quarterly*, 5(3), 29-37.
- Hofstede, G. J., Dignum, F., Prada, R., Student, J. and Vanhée, L. (2015). Gender differences: the role of nature, nurture, social identity and self organization. *International Workshop on Multi-Agent Systems and Agent-Based Simulation Conference Proceedings, 9002*. [cross ref]
- IPA. (2014). *Declaration on the importance of play*. International Play Association. [cross ref]
- Isci, B. and Hasirci, D. (2020). Children's stereotypical gendered behaviours in outdoor educational play environments. *INTED2020 Proceedings*, 48-53. [cross ref]
- Karsten, L. (2003). Children’s use of space: the gendered world of the playground. *Childhood*, 10(4), 457-473. [cross ref]
- Kellert, S. and Calabrese, E. (2015). *The practice of biophilic design*. Biophilic Design. [cross ref]
- Kid Sense. (n.d.). *What is child development?* Kid Sense Child Development Corporation. [cross ref]
- Kung, K.F. T., Li, G., Golding, J. and Hines, M. (2018). Preschool gender-typed play behavior at age 3.5 years predicts physical aggression as age 13 years. *Archives of sexual behavior*, 47(4), 905-914. [cross ref]
- Laaksoharju, T., Rappe, E., Kaivola T. (2012). Garden affordances for social learning, play, and for building nature–child relationship. *Urban Forestry & Urban Greening* 11, 195-203.
- Lester, S., and Russell, W. (2008). *Play for a change. Play, policy and practice: A review of contemporary perspectives*, London: National Children’s Bureau. Play England. [cross ref]
- Little, H., & Eager, D. (2010). Risk, challenge and safety: Implications for play quality and playground design. *European Early Childhood Education Research Journal*, 18(4), 497-513. [cross ref]
- Lumen Learning (2021). *Module 5: Early childhood: gender and early childhood*. Lifespan Development. [cross ref]
- Maguire, K. L., Niens U., McCann, M. and Connolly, P. (2015). Emotional development among early school-age children: gender differences in the role of problem behaviours. *Educational Psychology*, 36(8), 1408-1428. [cross ref]
- Mayeza, E. (2016). “Girls don’t play soccer”: Children policing gender on the playground in a township primary school in South Africa. *Gender and Education*, 29(4), 476-494. [cross ref]
- Merriam-Webster. (n.d.). Affordance. [cross ref]
- Miller, C. F., Lurye, L. E., Zosuls, K. M., and Ruble, D. N. (2009). Accessibility of gender stereotype domains: Developmental and gender differences in children. *Sex Roles*, 60(11-12), 870–881. [cross ref]
- Moore, R. C. (1993). *Plants for play: A plant selection guide for children’s outdoor environments*. (1st ed.) MIG Communications.
- Moore, R. C. (2014). *Nature Play & Learning Places. Creating and managing places where children engage with nature*. National Wildlife Federation and Natural Learning Initiative. [cross ref]
- Nogueira, P. G. I. (2017). *Biophilic playscape design: Bringing together children and nature in urban Honolulu*. [Doctoral Thesis, University of Hawai’i]. University of Hawai’i. [cross ref]
- Ondul, B., Koparan, N., Hasirci, D. (2021). Edulearn 2021. Biophilic design in preschool furniture: a refuge pod. Design proposal as an educational tool. *13th International Conference on Education and New Learning Technologies*. [cross ref]
- Perry, D. G., Kusel, S. J., and Perry, L. C. (1988). Victims of peer aggression. *Developmental Psychology*, 24(6), 807-814. [cross ref]
- Rasmussen, K. (2004). Places for children – children’s places. *Childhood*, 11(2), 115-173. [cross ref]
- Reimers, A. K., Schoeppe, S., Demetriou, Y. and Knapp, G. (2018). Physical activity and outdoor play of children in public playgrounds - Do gender and social environment matter? *International Journal of Environmental Research and Public Health*, 15(7), 1356-1370. [cross ref]
- Rock, A. (2022). 11 important types of play as your child grows. *Very Well Family*. [cross ref]
- Rönnlund, M. (2015). Schoolyard stories: process of gender identity in a ‘children’s place’. *Childhood*, 22(1), 85-100. [cross ref]
- Ruth, L. C. (2008). Playground design and equipment. *Whole Building Design Guide*. [cross ref]
- Sandseter, E.B.H. (2007). Categorising risky play – How can we identify risk-taking in children’s play? *European Early Childhood Education Research Journal*, 15(2), 237–52. [cross ref]
- Saragih, J.F.B. and Subroto, T.Y.W. (2023). Child-friendly school: Female students’ strategies for equality in accessibility of school playground. *Journal of Asian Architecture and Building Engineering*, 22(4), 2047-2057. [cross ref]
- Shutts K., Kenward B., Falk H., Ivegran A., Fawcett C. (2017). Early preschool environments and gender: Effects on gender pedagogy in Sweden. *Journal of Experimental Child Psychology*, 162, 1-17. [cross ref]
- Stine, S. (1997). *Landscapes for learning: Creating outdoor environments for children and youth*. John Wiley and Sons Inc.
- Storli, R., Hagen, T. L. (2010). Affordances in outdoor environments and children’s physically active play in pre-school. *European Early Childhood*

*Education Research Journal*, 18(14), 445-456. [[cross ref](#)]

- Taşçı, B. G. (2010). Sokağın günümüz koşullarında çocuk oyun alanı olarak ele alınması ve değerlendirilmesi. [Master's thesis, Dokuz Eylül University]. *Dokuz Eylül University Institutional Open Academic Open Archieve*. [[cross ref](#)]
- Thorne, B. (1993). *Gender play: Girls and boys in school*. (1st ed.). Rutgers University Press.
- Titman, W. (1994). *Special places – Special people: The hidden curriculum of school grounds*. (1st ed.). Surrey: *World Wide Fund for Nature, Winchesters: Learning through Landscapes Trust*.
- Tovey, H. (2007). *Playing outdoors: Spaces and places, risk and challenge*. (1st ed.). *Open University Press*.
- UNCRC. (2013, April 17). *General comment no. 17 on the right of the child to rest, leisure, play, recreational activities, cultural life and the arts (Art. 31)*. The United Nations Committee on the Rights of the Child. [[cross ref](#)]
- Van Truong, M., Nakabayashi, M., & Hosaka, T. (2022). How to encourage parents to let children play in nature: Factors affecting parental perception of children's nature play. *Urban Forestry & Urban Greening*, 69, 127497. [[cross ref](#)]
- Walmsley, M., Bagia, R. and Eager, D. (2010). *Project management for engineers*. (1st ed.). *McGraw-Hill Australia*.
- WHO. (2020). *Physical activity*. [[cross ref](#)]
- Witt, S. (1997). Parental influence on children's socialization to gender roles. *Adolescence*, 32(126), 253-259.
- Zosuls, K. M., Ruble, D. N., Tamis-LeMonda, C. S., Shrout, P.E., Bornstein, M.H. and Greulich, F. K. (2009). The acquisition of gender labels in infancy: Implications for gender-typed play. *Developmental Psychology*, 45(3), 688-701. [[cross ref](#)]