Impact of the Physical Qualities of Intentional and Adaptive Outdoor Play Space on Play Choice and Behaviour of Children in Urban Housing Schemes in Sri Lanka.

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Abstract

Over the past decade, the rapid urban growth, housing scheme construction, and relocation of underserved settlements in the city of Colombo and its immediate suburbs have significantly influenced the play choices and behaviours of urban children. This study assesses the current state and physical quality of both intentional and adaptive outdoor play spaces in selected housing scheme neighbourhoods, focusing on their impact on children's play choices and behaviours. Data were collected from children aged 3 to 12 years residing in Bambalapitiya Flats as an intentional play space and Mihindusenpura Flats as an adaptive play space, employing mixed methods such as behavioural mapping and researcher-administered questionnaires. Analysis using the 7Cs model and the Tool for Observing Play Outdoors (TOPO) revealed the qualities of outdoor play spaces, indicating children's play behaviour and choices. The finding concludes that in the context of intentional play spaces designed by adults, while adults may conceive and plan these spaces, children ultimately select and adopt these areas for play. Spaces with strong indoor-outdoor connectivity facilitated a greater variety of play. The predominant engagement in physical play by male children aligns with historical studies, reinforcing the notion that gender influences play preferences and variety. Further investigations into the impact of social factors on child play behaviours in housing settlements are recommended.

Keywords: Child play choices, Child play behaviours, Physical qualities, Intentional outdoor play spaces, Adaptive outdoor play spaces.

01. Introduction

This research aims to investigate the physical qualities of urban outdoor play spaces for children, with particular emphasis on both intentional and adoptive outdoor play spaces within housing settlements in Colombo and its immediate suburbs. It will further examine the impact of these play spaces on play choice and play behaviour of children. The term "urban outdoor play spaces" refers to designated areas in urban settings that are specially designed or modified for children to

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play. These spaces can be found in playgrounds, parks and other shared areas, within housing settlements. Solving the problem of children in undefined common spaces is a complex issue and these children cannot be marginalized by society. Therefore, it is crucial to explore and understand the significance of play spaces, for the development of both children and society.

02. Need of the research

The rapid urban growth, construction of housing settlements and urban regeneration projects in the city of Colombo and its immediate suburbs over the past decade have profoundly affected the behavioural patterns and physical and psychological development of children in urban settings. According to Agrawal (2021), some policies fulfil the needs of children in urban areas, but their requirements have been neglected. Consequently, this affects the quality of outdoor play spaces in urban contexts. These housing settlements often include intentional play areas, but these spaces commonly come with various problems and challenges. Furthermore, the outdoor play areas that do exist are often unsafe, not easily accessible, and located far from the community. As a result, there is growing concern about the availability and quality of outdoor space for children in residential areas in urban contexts. The environment is a resource for this type of play, providing both props and stages. For example, Moore (1989) claimed that the richness of physical elements in the settings and their interrelationships should stimulate curiosity and trigger imaginative associations. Today, built environments respond precisely to children's social conceptions but fail to make a significant contribution to defining childhood.

03. Review of literature

Child is a term used to refer to a young person. This definition has changed over time and has established different meanings across cultures and The United Nations Convention on the Rights of the Child considers children to be between 0 and 18 years old. Play is an important part of childhood. Children engage in many different forms of play, including games, and physical and imaginative activities, which contribute to their overall development and behavior.

3.1 Importance of play

The impact of outdoor learning environments on children's play, behaviour and development has received increasing attention in recent years. Indeed, it is increasingly recognized that outdoor play experiences effectively stimulate young children's development (Barbour, 2006). Great theorists such as Piaget, Erikson and Vygotsky all agreed that children play to learn on their own. Play, especially outdoor play, is extremely important for children's development, health, and well-being (Vygotsky, 1978). Piaget shows play as a behaviour that emerges from the combination of skill, knowledge, and understanding to create a learning experience.

3.2 Children’s play behaviour

Pellegrini and Bohn’s (2005) research shows that activities that are hard both mentally and physically play a significant role in enhancing the socio-emotional qualities of children and it is beneficial to understand them to accept both the victories and losses. The gender-specific needs are also very important for the development of the child and are considered alongside the

educational needs, underscoring the pivotal role of play in overall child development (Bodrova and Leong, 2005).

3.3 Outdoor play spaces

3.3.1 Importance of outdoor play spaces

When children are involved, children choose places that offer safety, socialization, exploration, and personal involvement (Chawla, 1992). Exceptional spaces help children develop their identities, test social relationships, engage in problem-solving, and become independent and aware of the environment (Dovey, 1987; Ellis, 2004b); Hart, 1979; Moore, 1990; Powell, 2007; Sobel, 2002). In recent decades, outdoor play has been energized as an aim to promote physical movement and fighting off chance variables such as obesity, hypertension, and dyslipidemia. A recent systematic survey analysing the relationship between outdoor play, physical action, and stationary behaviour found positive impacts of time spent outside on physical activity and wellness results (Gray, Gibbons, Larouche, 2015).

3.3.2 Types of outdoor play spaces

Outdoor play spaces can be recognized as intentional and adaptive play spaces according to the designed category. Intentional play spaces are designed environment that support and enhance children's learning and development. Children in urban environment creatively repurpose place for activities known as adaptive play spaces due to limited infrastructure, children imaginatively transform unplanned spaces such as roads, parks, and corridors into lively playgrounds.

3.3.3. Qualities of outdoor play spaces and the 7c's model

The Seven C's paradigm ties the physical characteristics of outdoor play places to the understanding of the developmental requirements of young children.

Character	• Architectural character type (modern, organic, modular, re-use) • Overall feeling of the space (Joyful, Mystery, Exiting, Dull)
Context	• Degrees of transparency between the space and its surroundings • Thermal delight - degrees of sun and shadow • Views afforded by the play space • Space per children ratio • Interaction with the neighbourhood
Connectivity	• Indoor outdoor connectivity • Pathways
Change	• Different size subspaces • Change of material
Chance	• Messy zone and sense of mystery
Clarity	• Sub spaces
Challenge	• Hazardous or challenge • Natural elements climb • Drains • Height variation • Walls high and wide enough to step onto

and place-based observations were successfully carried out with the TOPO tool. Researchers suggest a systematic scanning approach for these investigations, in which a kid is examined for around 15 seconds, after which up to two play types (and subtypes, if applicable) are chosen that

best encapsulate the core of the play episode. The first five play types are physical play, exploratory play, creative play, play with rules, and expressive play. Mostly aligns with play categories that are also included in other play typologies. The next three play types bio play, restorative play, and digital play are exclusive to the TOPO and newly derived categories that highlight play behaviours that are especially prevalent outside and play environments are evolving in the twenty-first century. The last and ninth category is called "non-play," which enables observers to categorise actions that are typical of outdoor play settings but are not usually thought to be play activities.

04. Scope and limitation

When conducting the survey, it is important to observe children's reactions to the questions and their interaction with the play space. However, this task was challenging because children's behaviour often changes when meeting strangers. Given the complexity of dealing with a wide age range and their varying characteristics, the focus was narrowed to this specific age group. The housing schemes considered in this study encompass a variety of social, religious, socio-cultural, and economic factors. Thus, the case study was selected based on both the intentional and adaptive design approaches.

05. Methodology

Two housing schemes were selected through the pilot study and, Bambalapitiya Flats was selected to represent an intentional approach to outdoor play space and Mihindusenpura Flats represented adaptive outdoor play areas in the urban environment. According to the studies of Muela et al. (2019), Zamani (2016), also, Brussoni et al. (2020) suggest that children aged 3 to 12 prefer activities that are active and challenging. Hence, the study focuses on this age group, selecting participants from both genders who engage in outdoor play in these housing schemes. For the data collection process, a sample of 30 children from both case studies was invited to tour the housing scheme and the interview with children were asked to mention their preferred play spaces, express their likability of those spaces, and describe the types of play they engage in there. Then, the most favoured four outdoor play spaces identified by the children were listed for further in-depth research.

Selected play spaces are analysed under the seven characters (7Cs) which integrate the unique physical qualities of outdoor play spaces, using methods such as observations, drawings, interviews and questionnaires. Children's play behaviour and play choice, age and gender categories of the users in the selected outdoor play spaces are analysed using a framework, collapsed version, TOPO-9 model that utilized under placed based protocol of TOPO model using the methods of activity mapping, and observations. Children’s play behaviour was observed and mapped and the observations into 15-second play episodes under the recommended practice for using TOPO, and two play types that best characterize each episode collected and analysed cooperate with the 7Cs model.

Considering the selected outdoor play space in housing schemes, activity mapping takes a major role in collecting data for the TOPO model and investigating how children engage with their dwellings and surroundings and what area play type they do with their surroundings and collected data according to Cox, Loebach, & Little (2020). Activity mapping takes a part of quantitative aspects and helps to understand the play choice of the space in housing schemes. To map the behaviour of children, identified play areas have been started to visually scan the zone until a child is observed; after observing them for 10-15 seconds, recorded data about that play event according to Loebach, and Cox (2020). All the observations were done at the weekend when

children mostly used their play spaces in the housing scheme. Children's drawings were used as a method to analyse child perception, imagination, child choice and overall feeling (character, 7Cs) of the outdoor play space, and also analyse the chance (7Cs model). Interviews and questionnaires with children took approximately 15-20 minutes each because according to Borgers and Hox, children aged between 4-8 years have a short attention span. Interviews were used as a method to collect data which allowed children to verbally understand the questions and the questionnaires were used to analyze the data which could not be verbally expressed and related to the 7Cs model, such as feelings of thermal delight (context, 7Cs), overall feeling of the space (character, 7Cs). The questionnaire was open-ended and close-ended.

06. Presentation of data and analysis

7.1 Case study 01 - Study of intentional outdoor play spaces (Bambalapitiya Flats)

Bambalapitiya Flats, selected for its designated playground, and park with equipment represents an intentional approach to outdoor play spaces. Clear physical boundaries, mixed residential and commercial properties, and a diverse mix of residents from different socioeconomic backgrounds were observed. Play ground is the only larger space in the area especially demarcated for residential children.

According to the activity map, tours and observation can identify what areas children regularly use as play spaces. Those are,

A. The playground - Intentional
B. Park with equipment - Intentional
C. Corners space of the neighbourhood - Adaptive
D. Front yard of residential buildings – Adaptive

Those spaces discussed under the 7Cs and TOPO model below.

The first criteria in 7Cs – Character; Investigating the architectural character type of the play spaces, can identify all the character types of play areas and most of the play areas are under the organic category (50%) and also considering the activity map and observations, children's most favoured types of play areas are organic and modular. The highest overall feeling about the 'joyful' can be recognised in the park with equipment (70%) and the lowest showcase on the corner of the neighbourhood (30%).

Second criteria in 7Cs – Context; In the Bambalapitiya flats, play spaces are well-integrated into the community, with varying degrees of connectivity. The central playground and park have the highest level of integration due to their central location and visibility, allowing residents to easily supervise their children while engaged in household tasks. Conversely, the play space located at the corner of the neighborhood has the lowest level of integration due to obstructions from residential blocks and storage buildings, limiting its accessibility and connection with the rest of the community.

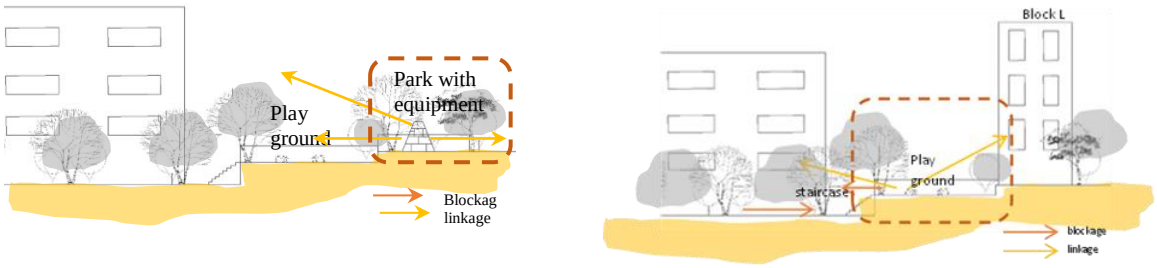


Fig. 03 - Linkage and blockage through long section of the playground and park with equipment. (According to observations) (Source- Author)

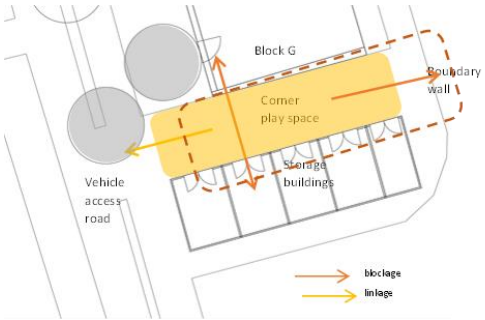


Fig. 05 - Linkage and blockage through section of front yard of the houses (Source - Author)

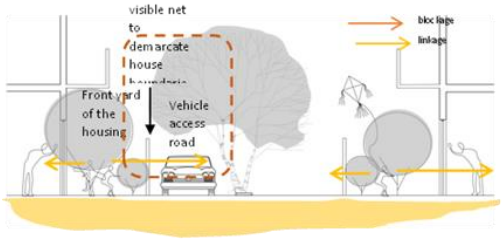


Fig. 06 - Corner play space had blockages with the blind wall of residential blocks and storage buildings act as dead spaces (Source-Author)

Considering the thermal delight of the play spaces, according to the questionnaire and observations, most of the children choose to play in sunny areas more than shady areas, such as playgrounds and parks with equipment. Park with equipment has the latest space per child ratio compared to the others. The playground has a massive area for play compared to the other play areas but has a significant number of spaces per child ratio, other play areas had a massive space per child ratio, because of the lack of use of children**.**

Play areas, such as playgrounds and parks with equipment can be recognized as the most appreciated spaces because of views of adult behavioral patterns, clear views of facades of residential blocks, which contain balconies and windows, and vehicle access roads. Analyzing the interaction with the neighborhood, playground the park with equipment, and the front yard of the neighborhood have the highest interaction aligns with Jane Jacob's (1961) concept of “eye on the street”, residents who are naturally drawn to a life of the street, and who, in the course of their activities, monitor the street, were shown in those spaces.

The third criteria in 7Cs – Connectivity; Children like to play even in front yards of residential areas which have narrow spaces because they have a considerable physical and visual interconnection with their neighbourhood and surroundings. Playground and park with equipment have a visual connection with balconies and the opening of block L. Considering the pathways Playground, and park with equipment have the highest level of connectivity through the ways that are directed through the housing scheme.

The fourth criteria in 7Cs – Change; Analyse the observation, parks with equipment have more sub-play spaces considering others. However, the front yard of the residential area creates some unique and variant play spaces because of the quantity of play spaces and children use the staircase as a play space. An important observation, when increasing the number and the variety of play spaces, play hours become much longer. Considering the change of materials, the park with equipment and the front yard of the residential area consists of high material variety and it increases the playtime.

The fifth criteria in 7Cs – Chance; low conditions for the watery area in a particular housing scheme. Analysing the children’s drawings, the green, yellow and blue patches display their imagination about outdoor play spaces. Investigating the sense of mystery considering the physical height of children, the corner of the neighbourhood has blind walls, which limit children’s view, and decrease the sense of mystery but the topography of the playground and, the park with equipment creates barriers to observing the activities on the road and encourage children to investigate and increase their sense of mystery.

Table 15 - Outdoor play spaces in Bambalapitiya refer to as messy zones, which places to dig, watery places and sand areas according to observations (Source- Author)

Place Case study 01	Place to dig	Watery area	Sand area	Loose parts
Playground	Yes	No	Yes	Yes
Park with equipment	Yes	No	Yes	Yes
Corner of the neighbourhood	No	No	No	No
Front yard of residential area	Yes	No	Yes	Yes

Sixth criteria in 7Cs – Chance; the study aligns with the study of subspaces in criteria two in 7Cs model.

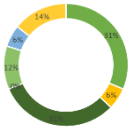
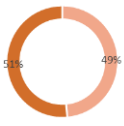
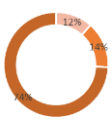
Seventh criteria in 7Cs – Challenge; comparatively these settlements conclude with challenges more than hazardous.

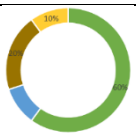
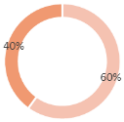
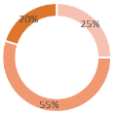
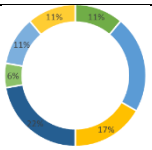
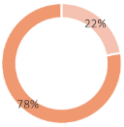
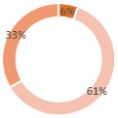
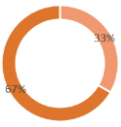
Table 16 - Overall conditions of challenges in Bambalapitiya flats according to the observations (Source - Author)

Place Case study 01	Hazardous or challenge	Natural elements climb	Drains	Height variation	Walls high and wide enough to step onto
Playground	Challenge	Yes	No	Yes	No
Park with equipment	Challenge	No	No	Yes	No
Corner of the neighbourhood	Challenge/Hazardous	No	No	No	No
Front yard of residential area	Challenge	Yes	Yes	Yes	No

Analysis according to the TOPO model; Analysing the activity mapping and TOPO model, with not much difference between female percentage and male percentage in playground and park with equipment. The front yard of the residential area has, a high gender difference (male 22%, female 78%) because this play space can identify as only female prominent play space and the corner of the neighbourhood represents no gender difference (male 100%) because this play space can identify as only male consistent play space. Considering the play type, all were engaged in physical play type (100%). The results of play types reveal that the children were using the playground front yard of the resident area, as an outdoor play space very differently and the park with equipment with not much difference.

Table 17 - Summary of the analysis of play space in Bambalapitiya flats according to the collapsed version of TOPO model (Source - Author)

Play space - Case 01	Play type	Gender of the children	Age category
	physical, exploratory, imaginative, play with rules, bio play, expressive, restorative, digital, non	male, female	3-5 years, 6-8 years, 9-12 years
Play ground			

Park with equipment			
Corner of the neighborhood			
Front yard of residential area			

7.2 Case study 02 - Study of adaptive outdoor play spaces (Mihindusenpura Flats)

Mihindusenpura was established as a movement initiative inside the urban regeneration program. The underserved networks at Slave Island, the CGR domain, Kolonnawa, Wanathamulla, and Dematagoda are being relocated. The basketball court, which is located in front of the housing scheme, can be identified as the intentional residential play space in flats and is oriented between Dematagoda train yard and the housing scheme. According to the activity map and observation can identify what area children regularly use as play spaces. Those are the,

A. Basketball court – Intentional
B. Edge of the railway line – Adaptive
C. Play space between two blocks – Adaptive
D. Courtyard of the residential area– Adoptive.

Those spaces are discussed under 7Cs and the TOPO model below.

First criteria in 7Cs– Character; Most play areas fall into the reuse category, with children adapting spaces like the basketball court for various play activities. Observations and activity maps reveal that children favor these organically repurposed spaces. The area between two blocks is where children express the highest level of joy (75%), while the courtyard of the scheme is perceived as the dullest compared to other play spaces.

Second criteria in 7Cs – Context; According to the observation, the basketball court is located at the entrance of the Mihindusenpura flats and it is at a distance from the residential area. However, this play space linkage the main vehicle access road with high pedestrian density and makes the connection between pedestrians and children. The railway line from the train yard creates a dangerous situation during playtime. Another side of the road is also an outdoor play space for children, which is named as the edge of the railway line and creates a visual and sound sequence, social interaction, and contextual integration. The Courtyard of the scheme encloses the residential area, which acts as a visual, physical, and sound barrier with the surroundings. At the same time, residents will be able to take care of them while engaging in household work.

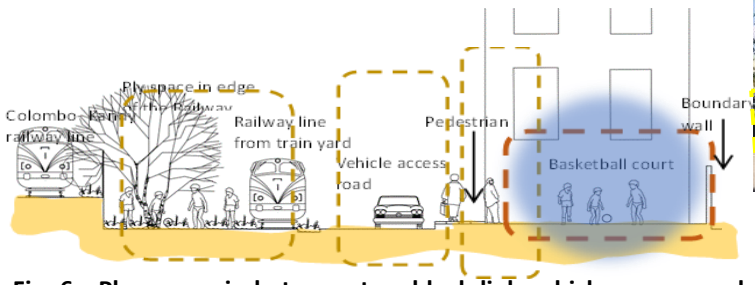


Fig. 6 - Play space in between two block link vehicle access road (Source - Author)

Fig. 7 - Vehicle stopped edge of the road (Source-Author)

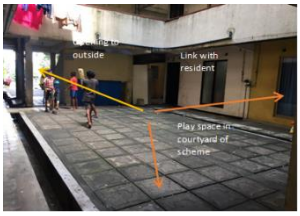


Fig. 9 - Courtyard of scheme, enclose with the residential area (Source - Author)

Fig. 8 - Play space linkage main vehicle access road and free land beside railway line (Source – Author)

According to the questionnaire and observations, most of the children in Mihindusenpura flats chose to play in sunny areas more than shady areas and courtyard space is the solitary shady place space. Considering the play spaces such as the basketball court, edge of the railway line, and between two blocks have the same area of available spaces without much difference. The courtyard of the scheme has less area compared to the others. Because of that, children choose free play space such as Between 2 blocks. Analysing the view from the play area courtyard of the scheme has a view of the inside of the houses, and at the same time, children can observe what adults do.

Third criteria in 7Cs – Connectivity; According to interviews, children like to play on the basketball court, the edge of the railway line, and between 2 blocks compared to the Courtyard scheme, because of the considerable physical and visual interconnection with their neighbourhood and surroundings. Courtyard scheme has a high interaction with indoor and outdoor spaces but the least physical, and visual connection with their surroundings.

Fourth criteria in 7Cs – Change; Children's drawings show the sub-play space under the mango tree on the edge of the railway line, which they use to play. The front of the Courtyard of the scheme contains drawings on the interlocking floor and it increases the playtime with fun activities. The edge of the railway line has a high material variety, which contains sand, grass, and steel from the railway line.

Fifth criteria in 7Cs – Chance; the edge of the railway line, and between 2 blocks have significant places to dig and sand area. The housing scheme has an exciting watery area of the canal, a corner of the scheme and its green colour because of the pollution. Analysing the children's drawings, the watery spaces in drawings are blue colour, which they wish to have. The edge of the railway line has a visible net to demarcate the railway line and housing scheme and considering the topography of the area, the railway line is located at the upper level of the play space. This level difference also increases the sense of mystery because children when playing instinctively observe the train.

Table 8- Overall condition of 'messy zone' in Mihindusenpura flats under the 7Cs model (Source-Author)

Place case study 02	Place to dig	Watery area	Sand area
Basketball court	No	No	No
Edge of the railway line	Yes	No	Yes
Between 2 blocks	Yes	No	Yes
Courtyard of scheme	No	Yes	No

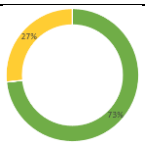
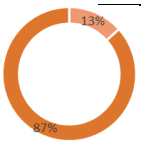
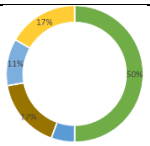
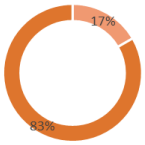
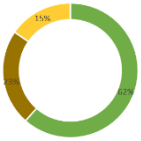
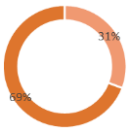
Sixth criteria in 7Cs- Clarity; the study aligns with the analysis of sub-spaces in criteria two.

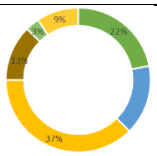
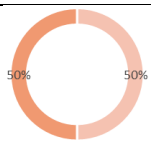
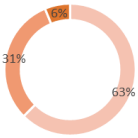
Seventh criterion in 7Cs - Challenge; Comparatively these settlements conclude with hazardous more than challenges.

Table 9 - Overall conditions of challenge in Mihindusenpura flats according to the observations (Source - Author)

Place case study 02	Hazardous or challenge	Natural elements climb	Drains	Height variation	Walls high and wide enough to step onto
Basketball court	Challenge/ hazardous	No	No	No	No
Edge of the railway line	Challenge/ hazardous	Yes	No	Yes	Yes
Between 2 blocks	Challenge/ hazardous	No	No	no	No
Courtyard of scheme	Challenge	No	Yes	Yes	No

Table 10- Summary of the analysis of play space in Mihindusenpura flats according to the collapsed version of TOPO model (Source - Author)

Play space- case 02	Play type	Gender of the children	Age category
	physical, exploratory, imaginative, play with rules, bio play, expressive, restorative, digital, non	male, female	3-5 years, 6-8 years, 9-12 years
Basketball court			
Edge of the railway line			
Between 2 blocks			

Courtyard of scheme			

Analysis according to the TOPO model; analysing the activity mapping and TOPO model, play space expects courtyard can recognize children without gender difference (male 100%) because this play space can identify as only consistent play space. The majority were engaged in physical play. Considering the age category, older children were participating in play because of safety issues. Considering the courtyard, the gender category was not prioritized and the majority of the age was 3–8 years because parents were able to take care of the children. Considering the overall analysis, adapted play spaces in Dematagoda flats, these areas exhibited high-quality outdoor play space attributes, including robust neighbourhood interaction, substantial physical, visual, and sound connectivity, exposure to various adult behavioural patterns, a plethora of sub-play spaces, and the availability of messy zones. However, these spaces predominantly attracted male children and were restricted to older age groups due to safety concerns. Nevertheless, play spaces with good indoor-outdoor connectivity and other favourable attributes displayed increased play varieties, a lack of gender prioritization, and a majority of children aged 3–8 years.

07. Conclusion

The findings conclude that in the context of intentional play spaces designed by adults, while adults may conceive and plan these spaces, children determine the ultimate selection and adoption of play areas. This selection process is influenced by a range of factors, including age category, gender, and social status, wherein children assert their agency in choosing and adopting these spaces according to their characteristics and preferences. When analysing the play types in most adopted play spaces, a predominance of physical play was observed, primarily among male children interacting within the neighbourhood, which aligns with prior studies by Van Alstyne (1932), Parten (1933), Shure (1963), and Cullen (1993), while males gravitated towards physical play. Primarily composed of youngsters aged 3-8 years, play spaces with high indoor-outdoor connection and other favourable characteristics showed enhanced play variety and a lack of gender bias, consistent with Jane Jacobs' (1961) idea of an "eye on the street", where inhabitants actively observe activities because they are accustomed to living on the streets and taking part in daily life. Conversely, play spaces with lower levels of physical, visual, and acoustic connectivity showed limited diversity in play types, gender representation, and age range among participating children.

Emphasizing indoor-outdoor connectivity is crucial, enabling a seamless transition between play areas. By cultivating an understanding of social factors shaping child play behaviour, architects can implement designs that support inclusivity and culturally sensitive play experiences. Further research is recommended to investigate the impact of social factors on child play behaviours in middle-income housing settlements.

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