Volume 109 February 2026 ISSN 0272-4944

Journal of ENVIRONMENTAL PSYCHOLOGY

Affiliated with the Division of Environmental Psychology of the International Association of Applied Psychology

AUTHOR INTRODUCTION

Dr. Sruthi Javdekar is a scholar and architect, landscape architect and environmental psychologist. She is the founder and principal architect of GRIT, an interdisciplinary consulting firm, that creates environments for children, young people and adults in urban areas. Her portfolio comprises of residential, commercial and institutional architectural projects, along with a range of large-scale landscape work including urban street plazas and high-rise high density housing landscape development.

JOURNAL ARTICLE ABSTRACT

Play is fundamental to children's physical growth, social development, and mental and emotional well-being; and how we plan, and design high-rise housing estates impacts children's ability to access and use spaces for play, thus impacting their overall growth and development. By using Lefebvre's Spatial Triad (1974/1991) as an analytical framework, this paper investigates (1) 'Conceptualized Space' or 'play areas and materiality of the play areas as conceptualized by design professionals'; (2) 'Actual Space' or 'spaces where children actually play'; and (3) 'Experienced Space' or 'caregivers' assessment of play spaces and their preferences of play materials, elements and surfaces for young children in high-rise housing estates. Comparative case-study research of seven housing estates from a baseline study of 63 high-rise housing estates was adopted to realize contrasts, patterns, or similarities across the cases. Methods included (1) semi-structured open-ended interviews with design professionals including developers (n = 4), architects (n = 4), landscape architects (n = 2) and play equipment manufacturer (n = 1); (2) In-depth field studies; and (3) semi-structured open-ended interviews with parents (n= 27), grandparents (n = 5) and nannies (n = 4) of young children. This study generates new knowledge about design and planning considerations for designated play spaces, caregivers' and designers ideas around nature based play, caregivers' preferences of play elements, materials and surfaces, and details spatial factors influencing young children's play areas in housing estates. As a way forward, the paper offers 11 guidelines to influence the design and planning of play spaces and open areas in future housing estates to fulfil young children's play needs.

To access the full paper please write to:
sruthi@gritdesignresearch.com

GRIT

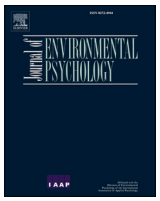
Design Home for
Vilas Javdekar Developers

Journal of Environmental Psychology 99 (2024) 102414

Contents lists available at ScienceDirect

Journal of Environmental Psychology

journal homepage: www.elsevier.com/locate/jep



Where do young children in middle-class high-rise housing estates play?A critical analysis of spatial planning and design parameters across seven heterogeneous housing estates in Pune, India

Sruthi Atmakur-Javdekar [a,b,*]

[a] GRIT: environmental design + research studio, India
[b] The Graduate Center, City University of New York, USA

ARTICLE INFO

Handling editor: Colin Ellard

Keywords:
Children's play
Housing estates
High-rise housing
Architecture
Design and planning

ABSTRACT

Play is fundamental to children's physical growth, social development, and mental and emotional well-being; and how we plan, and design high-rise housing estates impacts children's ability to access and use spaces for play, thus impacting their overall growth and development. By using Lefebvre's Spatial Triad (1974/1991) as an analytical framework, this paper investigates (1) 'Conceptualized Space' or 'play areas and materiality of the play areas as conceptualized by design professionals'; (2) 'Actual Space' or 'spaces where children actually play'; and (3) 'Experienced Space' or 'caregivers' assessment of play spaces and their preferences of play materials, elements and surfaces for young children in high-rise housing estates. Comparative case-study research of seven housing estates from a baseline study of 63 high-rise housing estates was adopted to realize contrasts, patterns, or similarities across the cases. Methods included (1) semi-structured open-ended interviews with design professionals including developers (n = 4), architects (n = 4), landscape architects (n = 2) and play equipment manufacturer (n = 1); (2) In-depth field studies; and (3) semi-structured open-ended interviews with parents (n = 27), grandparents (n = 5) and nannies (n = 4) of young children. This study generates new knowledge about design and planning considerations for designated play spaces, caregivers' and designers ideas around nature based play, caregivers' preferences of play elements, materials and surfaces, and details spatial factors influencing young children's play areas in housing estates. As a way forward, the paper offers 11 guidelines to influence the design and planning of play spaces and open areas in future housing estates to fulfil young children's play needs.

1. Background and rationale

Bronfenbrenner's ecological model of child development recognizes the need to simultaneously address both the social influences and the physical environment, including its spatial arrangement and material qualities (Bronfenbrenner, 1994). With respect to play, the materiality of the physical environment informs the quality of play and opportunities for children to play with peers and build close relationships (Brooker & Woodhead, 2012). And social influences reflect adults' management of children's play and how they inform and constrain children's access to play environments. In this sense, play opportunities include both – the physical environment and social influences that support and constrain children from exercising their right to play.

Scholars have long established the connections between play and child development, particularly with young children, until 8 years of age (Gray, 2013; Hart, 2002; Hughes, 1999; Lester & Russell, 2010; National Playing Fields Association Playlink & Children's Play Council, 2000; O'Connor, 2017). Specifically, infants, toddlers and pre-school children are at a critical stage in human life when rapid neurological development along with overall health trajectory related to physical, emotional and social growth is established. During this stage of growth, what young children need are a range of play opportunities that are available frequently and close by to enable informal supervision by parents or other caregivers. Literature indicates that parents, planners and designers are usually clear about how to provide for older children's organized games and sports and are less informed about the full range of kinds of spontaneous play opportunities that are important for young children's growth, learning and development and the kinds of physical

* The Graduate Center, City University of New York, USA.
E-mail addresses: sruthiatmakur@gmail.com, grit@gritdesignresearch.com.

https://doi.org/10.1016/j.jenvp.2024.102414
Received 9 December 2023; Received in revised form 1 August 2024; Accepted 20 August 2024
Available online 2 September 2024

environments that are appropriate for affording these kinds of play. So, how we plan and design housing environments greatly affects the degree to which we provide an accessible and appropriate environment for children's holistic growth and development.

This paper focuses on young children's play and from here onwards, 'children' specifically means, young children.

2. Appropriateness of high-rise housing for families with young children

In fast-growing cities, rapid urbanization calls for high-rise housing as a solution to accommodate a diverse range of growing urban populations, particularly the middle-classes. Yet, there is considerable debate in the literature about the appropriateness of high-rise housing for families with children due to "two-pronged sample selection effects of disadvantaged families concentrated into poor quality housing and childless adults into particular neighborhoods" (p.584, Appold & Yeun, 2007).

Post war, by mid-20th century with the advent of concrete and steel as building materials, mass housing in the form of high-rise residential buildings were envisioned as a housing solution for growing middle-class families. This was followed by the development of single-family houses in the suburbs that were socially constructed as the ideal family home with support from government policies and low-interest mortgages (Goetz, 2013). Soon, middle-class families living in high-rise housing moved to the suburbs, contributing to 'urban sprawl'; thus, leaving public housing to the racialized poor and poor building maintenance policies (New York Times, 2013). By the 1970s, government policies in European and North American cities discouraged high-rise housing buildings for families with children as they were occupied by the socially deprived and located in isolated areas that were high in crime and pollution (reviewed by Evans, 2006; Blair & Hulsbergen, 1993; Ford, 1994; Helleman & Wassenberg, 2004; Moser, 1981; Newman, 1972; Young, 1976).

Later, the introduction of glass as a building construction material afforded architects and planners to aesthetically transform the idea of poor public housing to rich condominiums with multiple in-house amenities such as gyms, spas and business zones. This led to the gentrification of neighbourhoods to make room for taller and fancier high-rise 'condominiums' for high-income groups. For example, a trend set by Australian developers is to consciously build high-rise apartments to cater to high-income groups who are a mix of Dual Income No Kids (DINKS) or 'empty nesters' (Fincher, 2007; Randolph & Holloway, 2005). Rosen and Walks (2013, 2015) and Kern (2011, 2013) confirm a similar trend of building residential apartments for childless adults in the US and Canada. However, families with children *did* live here, and subsequent research highlights the lack of play spaces (Andrews et al., 2018; Andrews & Warner, 2020; Carroll et al., 2011).

Contrastingly, research in Amsterdam, Vancouver and South-East Asian cities like Hong Kong, Singapore and Beijing state that high-rise housing estates are considered as ideal for families with children as there are a range of amenities, shared space to play and ability to socialize with their friends after school (Amarasinghe et al., 2024; Appold & Yeun, 2007; Karsten, 2003; Thomas, 2021; Yeh & Yeun, 2011; Yeun et al., 2006). Karsten's later work highlights a range of spaces in housing estates such as clubhouses, swimming pools and other amenities that act as public spaces, encouraging children's play and socialization (2015a, 2015b). Yet, studies in Malaysia continue to highlight the lack of proper play environments for children (Agha et al., 2019).

Clearly, despite the ongoing debate about the appropriateness of high-rise housing for families with children, in major cities across the world, there is a continuing trend to build taller buildings for all demographic groups. In India, the number of middle-class families is on the rise and high-rise estates have rapidly become their choice of housing. With India's growing economy, real estate developers across Indian cities are focusing on building high-rise residential buildings targeting the varied demographic of working middle class families for whom easy credit and low interest rates are readily available (Range, 2008). Here, housing estates are marketed to families as "child-centric homes" (Gera Developers, 2024) but there is no systematic research that documents how these housing estates are designed and planned specifically for children. And given the value of 'play' for young children's physical, psychological and emotional development, how we plan and design play environments are critical to the overall success of housing estates for families with children. In this light, it would be valuable to investigate the issues that support or make it difficult for children to play in housing estates, and then use this knowledge to create the best possible housing for them.

3. Issues related to Children's play in housing estates

There have been some studies within housing literature that touch upon topics related to children's lives and their play opportunities. Below, I identify four thematic areas that address issues surrounding children's play in housing estates.

3.1. Location of play areas

An old but key contribution to understanding the importance of the location of play areas in housing estates was led by Mackintosh in New York City (1982). Mackintosh investigated children's (below ten years of age) ability to play outdoors across three uniquely planned residential buildings.

(a) Single high-rise building with no opportunity for children's play;
(b) East Midtown Plaza with integrated development of plazas and elevated playgrounds on the second floor with access only to residents living in the building;
(c) Stuyvesant Town and Peter Cooper Village Development with grass, no through roads, fenced play spaces and security guards.

The study revealed that a critical factor supporting children's play outdoors is for parents to be visually connected to their children during play. The study highlighted that elevated playgrounds in East Midtown Plaza's integrated development enabled 73% of children to play outdoors, when compared to the single high-rise building and Stuyvesant Town and Peter Cooper Village Development, where only 14% and 39% of children (respectively) played outdoors.

Though Mackintosh's study is over four decades old, it still holds significance because: (1) it shows that children's ability to play outdoors is contingent upon parental supervision and this long-standing issue holds good even today; (2) it demonstrates that elevated playgrounds or play areas on podiums or at higher levels could be a possible solution to support children's play in high-rise housing; and (3) while there have been reports about the use of open spaces from older children's perspective in mixed estates (Bornat & Shaw, 2019), there is no empirical research since the 1980s that systematically compares the influence of design and planning of the physical environment of different types of high-rise housing on children's play.

3.2. Standardized play equipment

Garden city planners built play spaces in the interior enclaves of super blocks, thus coming up with a solution to keep children off the streets and safe from the ills of cities (Jacobs, 1961). Such designed play spaces (even today) are segregated from other common areas in high-rise housing estates, and offer no more than standardized play equipment (Amarasinghe et al., 2024; Andrews et al., 2018; Bornat & Shaw, 2019; Gifford, 2007; Karsten, 2012, 2015a, 2015b; Yeh & Yeun, 2011). Such play areas offer a single activity or limited physical and social experiences, thus failing to pique the interest of a child (Esbensen, 1982; Hüttenmoser, 1995). What young children need are a diverse

range of materials and elements supporting their varied play needs (Hughes, 1999), which are critical to their physical, social, emotional and cognitive well-being.

The 'Vertical Living Kids' research project that explores the environmental experiences of children (8–12 years) from lower and middle-income families living in private and public high-rise housing units in Australia states, "One of the problems in all play spaces, but particularly those around high-rise housing, is a tendency to 'over-program' space, to fill up space with play equipment rather than allowing water, sand, pebbles, and other elements that can be manipulated by children" (p.25) (Whitzman & Mizrachi, 2012). While this study does not address in detail the environmental experiences of younger children living in high-rise, it does reveal the problematic nature of standardized play spaces that are typically designed today (Gill, 2021).

Studies in housing literature capture families preferences of living in high-rise housing buildings for amenities (Karsten, 2015a, 2015b; Thomas, 2021; Yeh & Yeun, 2011) but do not address the ways in which children use the designated play areas, common areas and facilities or amenities in the housing estate for their children's play, leisure and recreation. While these studies state the provision of standardized play areas, what they do not capture is the materiality of the play environments; i.e., various elements, surfaces and materials that are used by children during their play. Interestingly, Nethercote and Horne's (2016) study focuses on understanding the material conditions and spatial design of middle-income families' lives in high-rise apartments. However, the study is limited to re-organization and adjustment of space or downsizing of "stuff" by families with young children to optimize space and improve accessibility within their apartment units.

Further, the study does not document (through text, drawings or images) any specific material conditions and design details such as different textures or play materials or spaces with varying heights and depths that are typically supportive of young children's diverse play (Doxiadis, 1975). To design better play environments in housing estates, we need to systematically document through maps and visual tools, what range of play materials and elements are used by young children and why.

3.3. Building management rules

Though housing estates have multiple common areas such as corridors, parking areas, unused open spaces and terraces, any 'play' that happens in these common areas is typically not encouraged by the building management. Some research studies highlight building rules and restrictions that discourage children from playing and socializing in common areas of the high-rise building. In some residential developments in Australia, children's play is banned in common areas (Gleeson, 2007). Typically, children's noise within and outside apartment units can produce conflicts amongst families, thus discouraging children from playing (Sherry, 2008). Interestingly, these play-related conflicts amongst families are not limited to only high-rise housing developments but are reflected in low-rise informal settlements too (Nallari, 2014).

We need to better understand what kinds of undesignated spaces children try to access for their play and why, so, those elements and spatial features could be integrated into the design and planning of future high-rise housing estates.

3.4. Reduced access to natural environments for play

It is well established that nature and natural environments provide varied opportunities for children across diverse ages and with different abilities to play (Clements, 2004; Cox, & Jeanne, 2013; Hart, 1979, 2002; Kong, 2000; C. Moore & Marcus, 2008; R. C. Moore, 1986, 1993; R. C. Moore & Wong, 2000; Williams, 1995) and the lack of exposure to nature can negatively impact children's growth and development (Louv, 2005; Zamani & Moore, 2013). Early research indicates lack of green spaces in housing estates as one of the many reasons why high-rise housing estates are considered as inappropriate living environments for children. "Tall buildings are not good living environments because residents feel imprisoned and isolated from people and other living things, or because children are deprived of direct contact with nature" (Moser, 1981, p. 35). As a result, later research suggested ways to integrate nature into low-rise residential environments to encourage children's access to green spaces. These suggestions include citywide greenway networks (Cox, & Jeanne, 2013), alleys, clustered housing and shared outdoor spaces, internal courtyards, and woonerven or home zones (Moore & Marcus, 2008), and vest pocket-parks (Hart, 2002).

Today, contemporary housing estates have beautifully designed gardens with many vertical greening elements (Tan et al., 2013), but Moser's opinion holds good even today as there are restrictions about children playing on the lawns and engaging with the natural environment. Studies show that signages in housing estates ask children to keep off the grass (Clements, 2004) or not touch plants and/or flowers. While studies indicate the presence of manicured green lawns as part of housing estates, there is no clear understanding of what other natural spaces that are made available for children and how might caregivers with young children use these spaces for play and recreation. There is a need to know how caregivers think about young children's play in natural areas to build a case for nature-based play areas or play gardens in housing estates.

Interestingly, there are multiple play tools and guidelines on designing play spaces that outline specific ways to integrate nature into the design of children's play and recreation areas (Shackell et al., 2008) but clearly, these suggestions are not fully addressed. It is then important to understand why nature-based play is not integral to the design of play spaces in housing estates. So far, there are no studies that capture designers' perspectives about the factors that influence the creation of standardized play spaces and open spaces in high-rise housing estates.

4. Conclusion

Within the ongoing debate on the appropriateness of living in high-rise housing estates for families with young children, the existing literature about children's play in housing estates largely focuses on.

(a) The availability of segregated play spaces with standardized play equipment;
(b) Restrictions imposed upon children in accessing natural environments for play within housing estates; and
(c) Rules and regulations limiting children from playing in common areas of housing estates.

While there are varied guidelines on designing interesting and creative play spaces in multiple settings (Casey, 2005; Moore et al., 1997; Shackell et al., 2008), architects and designers continue to provide standardized play areas in housing estates. There is a need to understand what factors influence the design of these standardized play spaces. Further, given that caregivers determine where, with whom, when and with what their children play, there is almost no research that focuses on caregivers' preferences on location, materiality, type and number of play spaces that they would want for their children in high-rise housing estates and how these preferences could be incorporated into future housing design.

In cities across the world, particularly in developing countries like India, the complexities of residential living in urban areas are well established by scholars in the social sciences who work with low-income communities (Bartlett et al., 1999; Chatterjee, 2006; Chawla & UNESCO, 2002; Hart, 2002; Lynch & Banerjee, 1977). In India, we have had some research on where and with what children living in low-income communities (Chatterjee, 2006; Nallari, 2014), rural areas (Chaudhary & Shukla, 2015) and low-rise residential buildings play (Oke et al., 1999). However, there has been no focus on understanding

Certain pages have been intentionally omitted from this online version.

caregivers' preference to use a play space can be best described with the help of three broad scenarios.

1. Scenario One: There is only one designated play area at the housing estate and irrespective of the size or location, everyone plays there. Here, parents complain about the small size or the poor location of the play area, but eventually bring their children to play in these play areas as that is the only place with play equipment (See Case Two – Ambar)
2. Scenario Two: There is only one play area and irrespective of the size, caregivers avoid going there because the play area is dirty and poorly maintained. Instead, parents take children to other open areas where other children are playing (See Cases One – Uru and Five – Shakti).
3. Scenario Three: There are multiple play areas and caregivers take their children to play at the one play area that is larger in size as all children come there to play (See Cases Six – Dhara and Seven – Yuj).

8. Discussion

In this section I discuss factors that influence the way play spaces and open areas are designed and used for play by young children in housing estates.

8.1. Visually connected play areas

Height of the building has a direct impact on the degree of parental supervision (Doxiadus, 1975), which controls children's ability to go outdoors and play (Hüttenmoser, 1995; Mackintosh, 1982). In Mackintosh's study, an elevated space afforded parents the chance to view their children from their apartment units and parents felt comfortable to send their children down to play knowing that they could watch them. So, the floor from which parents could visually be connected to their children mattered. Today, while some parents with caregiving support use the estate's surveillance cameras to keep an eye on their children, most of them largely rely on being visually connected to their children during play from their apartment units. In this sense, this study reinforces findings from Mackintosh's study that elevated playgrounds or play areas on podiums or at higher levels have good visual connectivity for caregivers, and is a critical factor for supporting children's play. Moving forward, it would be interesting to explore the idea of parental supervision is slowly changing from being able to physically view the child playing in play spaces to keeping track of their children on phones via surveillance cameras.

8.2. Materiality and spatial design of young Children's play

This study furthers existing research on the spatial features and materiality of children's standardized play areas. Findings reinforces concerns raised by other studies that children are provided with over-programmed (Whitzman & Mizrachi, 2012) and sterile play spaces with standard play equipment (Gill, 2007). Further, results capture the materiality of standardized play spaces from the perspectives of design professionals and caregivers, thus, bringing to light the elements, materials and surfaces that are offered and missed in young children's play areas. By doing so, this study: (1) reveals the reasons as to why certain materials are used instead of others; and (2) identifies a range of play elements, materials and surfaces that are appropriate for young children in their play areas.

8.3. Undesignated play spaces in housing estates

Findings from this study brings forward new information about undesignated spaces in housing estates that are preferred by caregivers as play spaces such as (1) plazas and wide traffic-free pedestrian walkways where children can bring their wheeled vehicles to play; and (2) 'aangan' or spacious lobbies – space immediately outside their homes to support doorstep play.

8.4. Integrating nature into designated play areas

Vertical greening in high-rise buildings is a standard practice in countries like Singapore (Medl et al., 2017) but play spaces in high-rise housing estates are characterized by standard play equipment with no reference to the natural environment. This study builds a case for the provision of nature-based play spaces in high-rise housing estates. While some parents are hesitant to let their children get dirty with mud there are others who wish to have access to natural environments for play. The mother who runs the mother-toddler program insisted that children do not need play equipment and that a well-designed play garden is essential for children. "I think outdoor play area is a must. And not really designed. I think something which is not purely designed as a play area works."

8.5. Caregivers as play catalysts

The idea of vest pocket parks was first proposed by Jacob Riis in 1897; and later, Hart (2002) proposed that residents could collaborate and facilitate these 'vest pocket parks' as "small play areas in the backyards of dense housing" (p.140). This idea by Hart suggests the idea that for young children's play, *caregivers are catalysts*. This study shows that housing estates foster a sense of community encouraging parents to start their own caregivers' groups to support the needs of young children. For example, the mother-toddler group at Case Five – Shakti is an excellent example of the same. A unique contribution of this study is that *'young children's play is as much about adults' socialization'*. Across the seven cases, caregivers expressed that they take their children down to play every evening, so, they could socialize with their friends too.

8.6. Multiple spaces for social interaction

Studies that focuses on the lives of families with children in high-rise housing developments highlight the many socialization opportunities for families with children when living in housing estates. Unlike single high-rise apartments, estates have club houses, swimming pools and other amenities within the property that act as public spaces, encouraging children's play and socialization (Karsten, 2015a, 2015b; Thomas, 2021). Nethercote and Horne's (2016) study, state that high-rise housing works positively for families with young children as it affords parents the chance to take their toddlers down to play to use shared facilities and helps build a sense of community where "privatized amenities may be co-opted to meet familial needs" (p.1591). Findings from this study reinforces earlier research by recognizing the multiple open areas and common amenities in housing estates as spaces for socialization for not just children, but also, their caregivers.

8.7. Building management rules and regulations

This study reinforces existing literature about building management rules and regulations on where children can play (Clements, 2004; Gleeson, 2007). Despite the provision of green manicured spaces, vegetable and fruit gardens and organic farms, this study shows that not all parents take their children to these spaces for play as there are building rules and restrictions about accessing these spaces. The RWA inform ways in which the overall landscape and amenities are maintained, thus, influencing children's access to these amenities.

9. Implications

9.1. Spatial planning and design guidelines

The earliest known effort to improve the quality of residential environments keeping in mind children's play dates back to the 1980s by

Esbensen where he investigated existing standards and guidelines for play areas in residential developments across 25 countries in the West. The study outlined the need for strict legislations and specific design and planning guidelines across national, regional and municipal levels to ensure the provision of play opportunities for children (across age groups) living in residential buildings (Esbensen, 1982).

An ongoing response to these studies are various reports produced by architects who are investigating children's use of outdoor spaces in residential environments and providing a few immediate guidelines for families and design professionals. Krysiak's report describes ways to incorporate existing common spaces within the housing developments to support children's active and passive play (Krysiak, 2018). Further, ZCD architects in UK continue to highlight that we are currently missing information about children's particular needs and their use of outdoor spaces in residential environments (Bornat, 2016, pp. 1–140; Bornat & Shaw, 2019; ZCD Architects & NHBC Foundation, 2017). These reports are a decent start to understanding ways to improve children's play opportunities in residential environments and indicate the need for future work to make housing estates appropriate for families with young children.

As a response, below are a set of 11 design guidelines for architects, landscape architects, spatial designers and play space designers on creating housing estates that are supportive of young children's play needs.

1 One designated play zone: Whether designated or undesignated, multiple play areas or open spaces do not work for young children's play since all adults and children in most cases come to *one* space to play and socialize. Instead, one large *designated play zone* is ideal.
2 Smaller segregated play areas: Within the one large designated play zone, smaller segregated yet adjoining play areas for infants and toddlers, and pre-school age children should be designed. These segregated areas should not be scattered across the housing estate but need to be contained within the designated play zone.
3 Age-appropriate play equipment: There is a need for age-appropriate play equipment that needs to be specifically designed for young children in the designated play zone. Particularly, for infants and toddlers.
4 Playing fields and sports courts for older children: For older children's ball games, a separate playing field located away from the designated play zone is necessary.
5 Location of play zone: Location of the designated play zone should be such that it affords visual supervision by caregivers.
6 Spaces for socialization: Adults' social networks support young children's play; and seating areas afford adults to socialize while watching their children play. There should be sufficient seating areas for caregivers within and around the designated play zone.
7 Play zone adjacent to other amenities: The designated play zone for children should be located close to other open spaces and amenities, particularly, the central lawn, clubhouse and walking or jogging track that is often used by adults.
8 Vehicle-free areas: The location of the designated play zone should be such that the spatial level (podium or ground) is free of vehicular movement.
9 Semi-open spaces: Semi-open spaces are essential for children's play, especially, during monsoons.
10 Shared small spaces close to homes: Besides designated play zone for the entire housing estate, shared small spaces for doorstep play, similar to the Aangan or spacious lobbies or wide corridors could be integrated into the space immediately outside apartment units. The minimum size of this Aangan, lobby or common space outside the apartment units is 10′ x 10'.
11 Natural environments for sensory and exploratory play: There is a need to creatively design nature close to where children play. Nature play areas or children's play gardens that afford children opportunities to engage in exploratory and sensory play could be built within the standardized play areas.

10. Conclusions

This research provides a detailed understanding of young children's play across seven heterogeneous high-rise housing estates. Children's play in high-rise housing estates is a topic on which there is limited research and it is increasingly becoming important given the global trend towards building high-rise housing developments for all demographic groups including families with children. With the help of Lefebvre's 'Spatial Triad', this study analyzes: (1) play spaces as 'conceptualized' by design professionals, (2) spaces 'actually' used by children for play, and (3) caregivers' assessment of spaces used by children for play in high-rise housing estates. This research is significant because it provides a holistic window into the current situation of children's play in housing estates as it includes the perspective of caregivers and design professionals who determine where, with whom and what young children in high-rise housing estates play. As a way forward, this study is useful for built environment professionals as it offers guidelines for making housing estates supportive of young children's play and developmental needs.

CRediT authorship contribution statement

Sruthi Atmakur-Javdekar: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Acknowledgements

I thank all the participants for being generous with their time. A heartfelt thanks to my advisor – Dr. Roger Hart and my committee members – Dr. Pamela Wridt, Dr. David Chapin and Sheridan Bartlett for their critical feedback during all stages of research. Lastly, I extend my gratitude to my external reviewers – Dr. Robin Moore and Dr. Lia Karsten – for their valuable comments.

Appendix

AIM:

To identify spatial features, layout, surface materials and design and planning elements of the high-rise housing estates that afford or restrict young children's play.

FIELD VISIT PROTOCOL:

I will walk around each open space/designated play areas in the high-rise housing development answering the questions below and taking photographs (preferably, aerial) or videos to document the spatial features and elements.

If children are using the play space, then photographs will be taken after seeking parental permission.
Further, if children are willing to speak to me, then I will ask them the following questions:
Do you like your play space?
What do you like about your play space.
Why do you like that?

FIELD VISIT GUIDE	Researcher Notes
Sketch or mark on the layout plan, areas where young children play.	
Is this a designated play space or other open areas? (e.g. parking spots, refuge areas, etc.)	
What is the age group of children using this play space?	
Where are girls and boys playing?	
Describe the available play equipment in the play area.	
Check the physical elements and surface materials in the play area:	
AREAS:	
Cut grass	
Tree(s) (climbable)	
Hardtop	
Rubberized play surface	
Wild green space but no shrubs and trees (could be grass if it is not mowed)	
Wild green space including shrubs and/or trees	
Dirt or fine gravel surface	
Sand surface	
Sand table	
Water at ground level (paddling)	
Water table	
FIXED EQUIPMENT:	
Shelter/play “house”/“store” etc	
Swings	
Slide	
Climbing frame or climbing wall	
Integrated play structure (climbing/sliding/running)	
Water spray	
MOVEABLE EQUIPMENT AND MATERIALS:	
Wheeled vehicles	
Building materials	
What unique design features exist in this space?	
Is this play space in viewing distance for parents?	
Are there any management rules posted as signage in the play area?	
Does the play area feel safe?	
Is the play area well lit?	
Is the play area used in the day or night?	
What time can you access this play space?	
Is the play area accessible easily to parents with young children?	
Are there other organized activities for young children in these play areas? What and how often?	

References

Agha, S. S., Thambiah, S., & Chakraborty, K. (2019). Children’s agency in accessing for spaces of play in an urban high-rise community in Malaysia. *Children’s Geographies*, 1–14. https://doi.org/10.1080/14733285.2019.1574335

Amarasinghe, K., Rathnayake, R., & Wickramaarachchi, N. (2024). An investigation of the open spaces and their impact on child interaction in high-rise urban environments: A case of the city of colombo, Sri Lanka. *International Planning Studies, 29*(2), 160–179. https://doi.org/10.1080/13563475.2024.2357999

Andrews, F. J., & Warner, E. (2020). ‘Living outside the house’: How families raising young children in new, private high-rise developments experience their local environment. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability, 13*(3), 263–285. https://doi.org/10.1080/17549175.2019.1696387

Andrews, F. J., Warner, E., & Robson, B. (2018). High-rise parenting: Experiences of families in private, high-rise housing in inner city Melbourne and implications for children’s health. *Cities & Health*, 1–11. https://doi.org/10.1080/23748834.2018.1483711

Appold, S., & Yeun, B. (2007). Families in flats, revisited. *Urban Studies, 44*(3), 569–589.

Bartlett, S., Hart, R., Satterthwaite, D., de la Barra, X., & Missair, A. (1999). *Cities for children: Children*. Earthscan Publications Ltd, 120 Pentonville Road, London, N1 9JN, United Kingdom (18.95 British pounda). Tel: 44-0-171-278-0433; Fax: 44-0-171-278-1142; e-mail: earthinfo@ earthscan. co. uk; Web site: http://www.earthscan.co.uk.

Blair, T. L., & Hulsbergen, E. D. (1993). Designing renewal on Europe’s multi-ethnic urban edge: The case of Bijlmermeer. *Cities, 10*(4), 293–298.

Bornat, D. (2016). *Housing design for community life: Researching how residents use external spaces in new developments*. University of East London, ZCD Architects [Research Report] https://www.zcdarchitects.co.uk/housing-design-for-community-life/.

Bornat, D., & Shaw, B. (2019). *Neighbourhood design: Working with children towards a child friendly city*. ZCD Architects.

Bronfenbrenner, U. (1994). Ecological models of human development. In *International encylopedia of education* (2nd ed., Vol. 3). Elsevier.

Brooker, L., & Woodhead, M. (2012). *Healthy environments*. Open University.

Bureau of Indian Standards. (2016). National building Code of India. *2*.

Campbell, S. (2010). Comparative case study. In A. J. Mills, G. Durepos, & E. Wiebe (Eds.), *Encyclopedia of case study research, 1* pp. 174–176). SAGE Reference. https://link.gale.com/apps/doc/CX1562500075/GVRL?u=cuny_gradctr&sid=GVRL&xid=e591a6c9.

Carroll, P., Witten, K., & Kearns, R. (2011). Housing intensification in Auckland New Zealand: Implications for children and families. *Housing Studies, 26*(3), 353–367.

Casey, T. (2005). *Inclusive play: Practical strategies for working with children aged 3 to 8. Paul Chapman*.

Chatterjee, S. (2006). *Children’s friendship with place: An exploration of environmental child friendliness of children’s environments in cities*. North Carolina State University.

Chaudhary, N., & Shukla, S. (2015). “Children’s work is to play”: Beliefs and practices related to childhood play among Indians. In J. L. Roopnarine, M. M. Patte, J. E. Johnson, & D. Kuschner (Eds.), *International perspectives on children’s play* (pp. 146–158). McGraw-Hill Education.

Chawla, L., & UNESCO. (2002). *Growing up in an urbanising world*. Earthscan.

Clements, R. (2004). An investigation of the status of outdoor play. *Contemporary Issues in Early Childhood, 5*(1), 68–80.

Cox, A., & Jeanne. (2013). *Shared-use pathways located in natural settings within the urban context: A multiple case study exploring how design affects use by children [doctor of philosophy]*. North Carolina State University.

Denzin, N. K., & Lincoln, Y. S. (Eds.). (1998). *Strategies of qualitative inquiry*. SAGE Publications, Inc.

Doxiadis, K. A. (1975). *Anthropolis: City for human development*. Norton.

Esbensen, S. (1982). An international and comparative study of children’s play space requirements in residential environments. In N. Yaniv-Nir, B. Spodek, & D. Steg

(Eds.), *Early childhood education: An international perspective* (pp. 333–343). Springer US. https://doi.org/10.1007/978-1-4613-3479-8.
Evans, G. W. (2006). Child development and the physical environment. *Annual Review of Psychology, 57*, 423–451.
Fincher, R. (2007). Is high-rise housing innovative? Developers' contradictory narratives of high-rise housing in melbourne. *Urban Studies, 44*(3), 631–649.
Ford, L. R. (1994). *Cities and buildings: Skyscrapers, skid rows and suburbs*. Johns hopkins University Press.
Gera Developers. (2024). GERA's ChildCentric homes. *GERA's ChildCentric Homes*. https://www.gera.in/childcentrichomes#:~:text=Gera's_20ChildCentric_C2_AE_20Homes_20are,best_20and_20ensuring_20their_20safety.
Gifford, R. (2007). The consequences of living in high-rise buildings. *Architectural Science Review, 50*(1).
Gill, T. (2007). *No fear: Growing up in a risk averse society*. Calouste Gulbenkian Foundation. Distributed by Central Books.
Gill, T. (2021). *Urban playground: How child-friendly planning and design can save cities*. RIBA Publishing.
Gleeson, B. (2007). Urban 45: New ideas for Australia's cities. In R. Atkinson, T. Dalton, B. Norman, & G. Wood (Eds.), *RMIT and hobart*. University of Tasmania.
Goetz, E. (2013). *New deal ruins: Race, economic justice, and public housing policy*. Cornell University Press.
Government of Maharashtra, & Urban Development Department. (2020). *Unified development control and promotions regulations (UDCPR) for Maharashtra state*.
Gray, P. (2013). *Free to learn: Why unleashing the instinct to play will make our children happier, more self-reliant, and better students for life*. Basic Books. http://books.google.co.in/books?hl=en&lr=&id=2IgkAIMG3qgC&oi=fnd&pg=PT6&dq=Free+to+Learn+:+Why+Unleashing+the+Instinct+to+Play+Will+Make+Our+Children+Happier,+More+Self-Reliant,+and+Better+Students+for+Life&ots=AW09TfAJtZ&sig=2JBAjjaXN1BT2QlbHi7_4Bp2Jk.
Groat, L. N., & Wang, D. (2002). *Architectural research methods*. J. Wiley.
Hart, R. (1979). Children's experience of place. *Irvington*. http://psycnet.apa.org.ezproxy.gc.cuny.edu/psycinfo/1980-51458-000.
Hart, R. (2002). Containing children: Some lessons on planning for play from New York City. *Environment and Urbanization, 14*(2), 135.
Helleman, G., & Wassenberg, F. (2004). The renewal of what was tomorrow's idealistic city: Amsterdam's Bijlmermeer high-rise. *Cities, 21*, 3–17.
Hughes, F. P. (1999). *Children, play, and development* (3rd ed.). Allyn and Bacon.
Hüttenmoser, M. (1995). Children and their living surroundings: Empirical investigations into the significance of living surroundings for the everyday life and development of children. *Children's Environments, 12*(4), 403–413.
Jacobs, J. (1961). The use of sidewalks: Assimilating children. In *The death and life of great American cities*. Random House.
Karsten, L. (2003). Family gentrifiers: Challenging the city as a place simultaneously to build a career and to raise children. *Urban Studies, 40*(12), 2573–2584. https://doi.org/10.1080/0042098032000136228
Karsten, L. (2015a). Middle-class childhood and parenting culture in high-rise Hong Kong: On scheduled lives, the school trap and a new urban idyll. *Children's Geographies, 13*(5), 556–570.
Karsten, L. (2015b). Middle-class households with children on vertical family living in Hong Kong. *Habitat International, 47*, 241–247.
Kern, L. (2011). *Sex and the revitalized city: Gender, condominium development, and urban citizenship*. UBC Press.
Kern, L. (2013). Reshaping the boundaries of public and private life: Gender, condominium development, and the neoliberalization of urban living. *Journal of Urban Geography, 28*(7), 657–681.
Kong, L. (2000). Nature's dangers, nature's pleasures: Urban children and the natural world. In S. Holloway, & G. Valentine (Eds.), *Children's geographies: Playing, living, learning* (pp. 257–271). Routledge.
Krysiak, N. (2018). *Where do the children play? Designing child-friendly compact cities*. Australian Institute of Architects.
Lefebvre, H. (1974). *The production of space*. Wiley-Blackwell.
Lester, S., & Russell, W. (2010). Children's right to play: An examination of the importance of play in the lives of children worldwide. *Bernard van Leer Foundation*.
Louv, R. (2005). Last child in the woods: Saving our children from nature-deficit disorder. *Algonquin Books*.
Lynch, K., & Banerjee, T. (1977). *Growing up in cities: Studies of the spatial environment of adolescence in cracow, Melbourne, Mexico City, Salta, Toluca, and Warszawa*. MIT Press.
Mackintosh, E. A. (1982). *The meaning and effects of highrise living for the middle-income family: A study of three highrise sites in New York city*. City University of New York.
Macrotrends. (n.d.). *Poona, India Metro Area Population 1950-2023*. Macrotrends. Retrieved August 19, 2023, from https://www.macrotrends.net/cities/21371/poona/population.
Mahadevia, D., & Parasher, A. (2008). Dynamics of high-tech zones in Pune: Emerging trends and impacts. In *High-tech urban spaces: Asian and European perspectives*. Manohar.
Medl, A., Stangl, R., & Florineth, F. (2017). Vertical greening systems – a review on recent technologies and research advancement. *Building and Environment, 125*, 227–239. https://doi.org/10.1016/j.buildenv.2017.08.054
Moore, R. C. (1986). *Childhood's domain: Play and place in child development*. Croom Helm. https://www.routledge.com/Childhoods-Domain-Play-and-Place-in-Child-Development/Moore/p/book/9781138563711.
Moore, R. C. (1993). Plants for play: A plant selection guide for children's outdoor environments. *MIG Communications*.
Moore, R. C., Goltsman, S. M., & Iacofano, D. S. (1997). *Play for all guidelines: Planning, design and management of outdoor play settings for all children*. ERIC. http://eric.ed.gov/ERICWebPortal/recordDetail?accno=ED447685.
Moore, C., & Marcus, C. C. (2008). Healthy planet, healthy children: Designing nature into the daily spaces of childhood. In S. Kellert, J. Heerwagen, & M. Mador (Eds.), *Biophilic design: The theory, science, and practice of bringing building to life, 3*. John Wiley & Sons, Inc. http://www.naturalearning.org/sites/default/files/MooreCooperMarcus_Healthy.pdf.
Moore, R. C., & Wong, H. H. (2000). Natural learning: The life history of an environmental schoolyard: Creating environments for rediscovering nature's way of teaching. *MIG Communications*.
Moser, M. M. (1981). Philosophy of tall buildings. In R. C. Herrenkohl, W. Henn, & C. Norberg-Schulz (Eds.), *Planning and design of tall buildings* (pp. 1–79). American Society of Civil Engineers.
Nallari, A. (2014). The meaning, experience, and value of "Common Space" for women and children in urban poor settlements in India [PhD]. *City University of New York*.
National Playing Fields Association, Playlink, & Children's Play Council. (2000). Best play: What play provision should do for children. *National Playing Fields Association*.
Nethercote, M., & Horne, R. (2016). Ordinary vertical urbanisms: City apartments and the everyday geographies of high-rise families. *Environment & Planning A, 48*(8), 1581–1598.
New York Times (Director). (2013). *A short history of the highrise* [Video recording]. http://www.nytimes.com/projects/2013/high-rise/.
Newman, O. (1972). Defensible space. *Colliers Book*.
O'Connor, S. (2017). *The secret power of play*. TIME. http://time.com/4928925/secret-power-play/.
Oke, M., Khattar, A., Pant, P., & Saraswathi, T. S. (1999). A profile of children's play in urban India. *Childhood, 6*(2), 207.
Randolph, B., & Holloway, D. (2005). A social profile of households in higher density housing in Fairfield. *City Futures Research Centre, University of New South Wales*.
Range, J. (2008). "Building India" DLF's big gamble. *Wall Street Journal*.
Rosen, G., & Walks, A. (2013). Rising cities: Condominium development and the private transformation of the metropolis. *Geoforum, 49*, 160–172.
Rosen, G., & Walks, A. (2015). Castles in Toronto's sky: Condi-ism as urban transformation. *Journal of Urban Affairs, 37*(3), 289–310.
Shackell, A., Butler, N., Doyle, P., & Ball, D. (2008). Design for play: A guide to creating successful play spaces. *The Department for Children, Schools and Families (DCSF) and the Department for Culture, Media and Sport (DCMS)*. https://www.playscotland.org/wp-content/uploads/Design-for-Play-a-guide-to-creating-successful-place-spaces.pdf.
Sherry, C. (2008). The legal fundamentals of high rise buildings and master planned estates: Ownership, governance and living in multi-owned housing with a case study on children's play. *Australian Property Law Journal, 16*, 1–23.
Tan, P. Y., Wang, J., & Sia, A. (2013). Perspectives on five decades of the urban greening of Singapore. *Cities, 32*, 24–32. https://doi.org/10.1016/j.cities.2013.02.001
Thomas, L. L. (2021). Committed and "won over" parents in Vancouver's dense family-oriented urbanism. *Journal of the American Planning Association, 87*(2), 239–253. https://doi.org/10.1080/01944363.2020.1834871
Whitzman, C., & Mizrachi, D. (2012). Creating child-friendly high-rise environments: Beyond wastelands and glasshouses. *Urban Policy and Research, 30*(3), 233–249.
Williams, S. (1995). *Outdoor recreation and the urban environment*. Routledge.
Yeh, A., & Yeun, B. (Eds.). (2011). *High rise living in Asian cities*. Springer e-Books. https://link.springer.com/book/10.1007/978-90-481-9738-5.
Yeun, B., Yeh, A., Appold, S., Earl, G., Ting, J., & Kwee, L. (2006). High-rise living in Singapore public housing. *Urban Studies, 43*(3), 583–600.
Yin, R. K. (2009). *Case study research: Design and methods, 5*. Sage.
Young, S. (1976). *Social and psychological effects of living in high-rise buildings: Ian Buchan Felll research Project on Housing*. University of Sydney.
Zamani, Z., & Moore, R. (2013). The cognitive play behavior affordances of natural and manufactured elements within outdoor preschool settings. *Landscape Research Record, 1*, 268–278.
ZCD Architects, & NHBC Foundation. (2017). Making spaces for play: On new suburban and Town developments. https://issuu.com/zcdarchitects/docs/l547_making_spaces_for_play_final_w.