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EXPLORING CHILD-FRIENDLY ENVIRONMENTS THROUGH MIGRANT CHILDREN'S OUTDOOR ACTIVITIES AND ENVIRONMENTAL AFFORDANCES IN A CHINESE URBAN VILLAGE

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Abstract

Urban village accommodated a large number of migrant families in Chinese rapid urbanization, but the outdoor environments often fail to support migrant children's daily activities and development. Migrant children living in these dense environments commonly experience limited access to safe, diverse, and child-friendly outdoor spaces. More importantly, little is known about how environmental affordances shape their outdoor activities. Guided by affordance theory, this study explores the relationship between the outdoor environment and migrant children's activities in Liutan Village which is an urban village in Wuxi City, China. A qualitative approach was employed which combined children's mapping, walkabout interviews and non-participant observations. Twenty-four migrant children aged 8-12 years participated in this study. The results show that migrant children mainly engaged in cognitive activities in the urban village. The playground afforded the most balanced mix of affordances, while the hanging garden and grassland provided more limited and uneven affordances. As a result, migrant children adapted their play behaviours to available conditions. It revealed the environmental deficiencies that constrained their opportunities for play, learning and social interaction. This study highlights the need for child-friendly environmental design that better supports the holistic development of migrant children in urban villages.

Keywords: Migrant Children, Urban Village, Affordance Theory, Child-friendly Environment, City of Wuxi

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INTRODUCTION

China's urban villages originate from rural settlements, and their name can be literally understood as "village encircled by the city." They emerged during China's rapid urbanization in the 1980s and 1990s. To accommodate the growing demand for new construction land, local governments requisitioned farmland on the urban fringe while retaining the residential plots within village boundaries. This strategy minimized compensation costs and political resistance (Buckingham & Chan, 2018). As cities expanded, these villages became embedded within urban areas and functioned as transitional neighbourhoods between rural and urban areas. Following land requisition, villagers rebuilt or renovated houses for rental income, primarily targeting migrant workers. To maximize economic returns, the newly built houses were usually of poor quality and lacked overall planning. Urban villages generally presented narrow interior roads, face-to-face buildings, and a cluttered physical environment (Liu et al., 2010).

Although urban villages are widely known for their poor sanitation, overcrowded conditions, disordered landscape, and generally untidy environment (Sun & Zhao, 2023), they continue to attract large numbers of low-income migrants because rental housing is highly affordable (Buckingham & Chan, 2018). Better medical services and educational resources in nearby urban areas encourage many migrant workers to bring their children to live in these communities. According to the Chinese Action Plan for Strengthening the Care and Protection of Migrant Children, over 13 million migrant children of compulsory school age attended urban schools in 2024. However, these migrant children face unequal access to resources and opportunities due to national structural and systemic barriers (Bengoa & Rick, 2020). They have limited access to safe, accessible, and developmentally supportive outdoor environments in urban villages (F. Wang et al., 2017). All these in turn constrain migrant children's physical, social, and cognitive developments.

Outdoor activities are widely recognized as essential for children's physical, social, cognitive, and emotional development (Santoso, 2023). The outdoor environment not only provides a physical site for their outdoor activities, but also shapes what they are able to do by affording functions, safety conditions, spatial diversity and sensory qualities that influence the types, richness, and frequency of their activities (Fjørtoft, 2004; James J. Gibson, 1979). In this regard, UNICEF emphasizes the provision of child-friendly environments that are safe, accessible, inclusive, developmentally supportive, and responsive to their needs, rights, and capabilities (UNICEF, 2004).

However, little is known about how environmental affordances affect migrant children's outdoor activities. Existing studies on China's urban village focus on the redevelopment, management and migrant children's education (Lai

et al., 2021; Ma & Wu, 2020; Stefano Zaccaria, 2020; Yuan et al., 2021). However, the reciprocal relationship between migrant children and outdoor environment in urban village is often overlooked. With the growing number of migrant children and the introduction of China's Guideline on Promoting the Development of Child-Friendly Cities in 2021, this research gap has become increasingly important. Because it provides a foundation for building child-friendly communities, enhancing children's outdoor activity experiences, and supporting their social integration.

From the ecological perspective, affordance theory builds a bridge between migrant children's behaviours and child-friendly environments. Based on this, the taxonomy proposed by Heft (1988) provides a functional classification of environmental features that helps researchers interpret why certain places support specific children's activities. It links actualized affordances to the physical properties of the environment. To reveal the transactional relationship between migrant children and outdoor environment in Chinese urban villages, this research attempts to investigate the types of migrant children's outdoor activities and environmental features that support their behaviours from the perspective of affordance theory of ecological psychology.

LITERATURE REVIEW

Affordance Theory

Affordance theory, first proposed by Gibson (1979), offers a lens for understanding the functional relationship between individuals and their environments. In his view, environments are not passively constructed by people but rather action possibilities emerging from the interaction between environmental properties and individual abilities (Morgenthaler et al., 2023). Environmental features afford specific opportunities for action, and these opportunities depend on individual capability. Thus, affordances are invariant and individual behaviours are constrained or extended based on how the surrounding environment is perceived (James J. Gibson, 1979).

In affordance theory, environmental functionality is understood from both physical and social aspects (Baggs, 2021). It provides an effective framework for analysing migrant children's interactions with daily outdoor environments. In this research, the functional significance of the outdoor environments for migrant children in urban villages will be examined to gain insight into how migrant children engage with different outdoor settings.

Taxonomy of Affordance

Gibson's theory offers a way to understand the functional meaning of environments by examining the behaviours they support from the perspective of environmental psychology. Based on this, Heft (1988) developed a taxonomy to

describe the functionally significant properties of children's environments. Drawing on seminal books including 'One Boy's Day' (Barker & Wright, 1951), 'Children's Experience of Place' (Hart, 1979), and 'Childhood's Domain' (Moore, 1986), Heft synthesised observed links between environmental features and children's activities into a preliminary taxonomy of outdoor affordances. Kytta (2002) expanded this taxonomy by adding social affordance as a new affordance type which was defined as opportunities for interaction provided by surrounding people. It includes the opportunities to play various games, make noise, and share or follow adults' affairs. Table 1 presents the ten functional categories will be used in this study.

Table 1: Taxonomy of affordances in 10 categories

Author	Category	Examples of affordances
Heft (1988)	1. Flat, relatively rigid, smooth surfaces	Afford running, skating, etc.
	2. Graspable/detached objects	Afford drawing, throwing, etc.
	3. Attached objects	Afford sitting, jumping on, etc.
	4. Non-rigid attached objects	Afford swing, etc.
	5. Climbable features	Afford climbing, looking out, etc.
	6. Shelter	Afford microclimate, privacy, etc
	7. Mouldable material	Afford pouring, modifying
	8. Water	Afford splashing, floating, etc
	9. Aperture	Afford locomoting, etc.
Kytta (2002)	10. Affordances for sociality	Afford chatting, learning, etc.

Three Types of Children's Outdoor Activities

Children's activities are usually categorized into physical, social, and cognitive activities (Uzzell, 1988). Physical activities involve bodily movements and are closely linked to children's motor development, physical fitness, and health like running, playing, and structured physical education (Malone & Tranter, 2003; Martinez-Merino & Rico-González, 2024). Social activities emerge through interactions with peers, family member, and the wider community, where children learn how to communicate, cooperate, and navigate social relationship (Malone & Tranter, 2003; Opstoel et al., 2020). Cognitive activities relate to how children think, remember, communicate, and solve problems, developing through maturation and daily experiences (Martinez-Merino & Rico-González, 2024). The three types of activities are interconnected and develop dynamically during childhood (Kuzik et al., 2020). Engagement in one type often supports developments in the others.

Child-friendly Environment

The concept of a child-friendly environment has gained increasing attention in urban planning and design (Niu et al., 2025; Zhang et al., 2021, 2023). UNICEF defines such environment as safe, accessible, and inclusive settings that support

children's daily play, learning and social interaction. From the perspective of planning, such environments provide appropriate spaces and features that enable children's regular outdoor activities. Key attributes identified in previous studies included open space, a combination of man-made and natural elements, safety, and visibility (Morgenthaler et al., 2023; Tang & Woolley, 2023; X. Wang et al., 2024). These attributes shape how children perceive and actualize the environment affordances. However, the child-friendly principle can hardly be actualized due to the temporariness, exclusion, and privatized survival in Chinese urban villages (Lai et al., 2021). Consequently, children's outdoor activities are often constrained in the urban village (F. Wang et al., 2017), particularly in terms of physical play and social interaction. Thus, it is necessary to apply the perspective of a child-friendly environment to understand migrant children's outdoor experiences in urban villages.

RESEARCH METHODOLOGY

Case Study Site

This study was conducted in Liutan village, Wuxi City, Jiangsu Province, China (Figure 1). Wuxi City is a major industrial and economically advanced city in Chinese eastern coast (Figure 1). Its strong manufacturing base has attracted over 2.2 million migrants according to the 2020 Census. In 2022, Wuxi recorded a GDP of 146.51 billion RMB and the highest per capita GDP in China. It was recognized as a first-tier city by China Business News and was officially included in the national list of child-friendly city in 2023 (The CPPCC Wuxi Committee, 2023). This policy heightened concern for migrant children's well-being in urban villages, particularly their access to supportive outdoor environment.

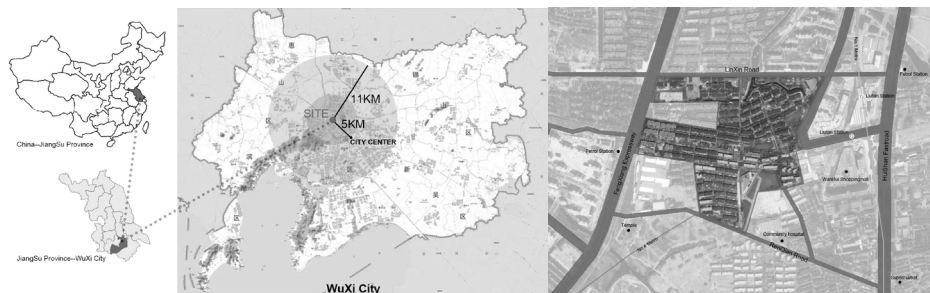


Figure 1: The location of study area in WuXi city(left); Master plan of Liutan village(right)

Liutan village is the largest remaining urban village in Wuxi and is considered a typical example. It is characterized by its long history, various building styles, convenient location between the city centre and the industrial zone, as well as high accessibility (Figure 1). Due to these characteristics, it has

become an ideal choice for migrant workers and their children. Therefore, Liutan village provides an important context for examining how urban-village outdoor environment supports or constraints migrant children's outdoor experiences.

Research Design

This study adopts qualitative methods to explore migrant children's outdoor play experience in Liutan village. Twenty-four migrant children (17 boys and 7 girls) were purposively selected based on the Chinese national definition of migrant children. All participants were rural-to-urban migrant children aged 8-12 years who had lived in the Liutan village for over six months. All participants were required to understand and respond to basic instructions from the class teacher. They were also required to express thoughts, opinions and needs. Children with cognitive or communicative impairments, or psychological or behavioral issues, were excluded.

Two primary school teachers in the research team conducted the initial screening, as they had access to students' background information. Ethical approval was obtained from Universiti Sains Malaysia (USM; protocol no. USM/JEPeM/PP/25040379). Participation was voluntary. Written parental consent and child assent were obtained prior to data collection. Verbal assent was also obtained from all participants. All data were anonymized to protect participants' privacy and confidentiality.

Three qualitative methods were used to collect the data. Mapping was conducted first to visually present migrant children's activity places and spatial preferences. Then walkabout interviews were conducted at the mapped locations to explore activities and place experiences in context. Finally, non-participant observation was undertaken in familiar settings to document actual play behaviours and to cross-check earlier data.

DATA COLLECTION

Data collection was conducted between August and October 2025. Before the mapping activity, assistants prepared snacks to help the migrant children relax. The objectives and procedures of this study were explained using process cards. Each child received a map, an aerial image, and a pen. A 3D real-scene map was displayed to assist place identification. Children individually marked their regular outdoor play places on the map with guidance provided when necessary.

After the mapping activity, each child participated in a walkabout interview at the places they had identified. The child guided the assistant to the location and described the activities undertaken, playmates, materials used, and reasons for using the place. Field notes and audio recordings were used to document the interviews. Each mapping and walkabout session lasted approximately 15 minutes.

Finally, non-participant observation was conducted at the identified play places after school on weekdays and throughout weekends for one week. An observation guide was used to record play activity, peer interactions, and spatial use. Each child was observed once for approximately 20 minutes. Observers remained unobtrusive and did not interfere with ongoing activities.

ANALYSIS AND DISCUSSION

Migrant Children's Outdoor Activities in Urban Village

The data collected through migrant children's mapping, walkabout interview and non-participant observation are summarized in Table 2. Among all identified 120 activities, cognitive activities accounted for the largest proportion which was 46% of all responses (n=55). Physical activities occupied 28% (n=34) while social activities represented 26% of all (n=31).

Table 2: Types of migrant children's activities in Liutan village

	Number of activities reported by migrant children			Total
	Physical activities	Social activities	Cognitive activities	
Number	34	31	55	120
Per cent	28%	26%	46%	100%

The results suggest that migrant children mainly engaged in exploratory and imaginative activities such as catching insects, collecting specimens, picking flowers, and playing with animals. The dominance of cognitive activities suggests that the outdoor environments in urban villages may offer fewer opportunities for physical and social activities. This may be explained by the limited availability of play facilities and open spaces which restrict the affordances for running, climbing, and muscular actions. This is consistent with Fan et al. (2025), who linked lower levels of physical activity to fewer outdoor playfields and inadequate equipment. Xiao and Han (2019) also noted that urban village often provide insufficient space for children's physical and social activities. These findings highlight the importance of improving outdoor environments to support children's diverse play experiences.

Mapping the Spatial Affordances of Outdoor Environment in Urban Village

By integrating the activity data collected through walkabout interviews and spatial information generated from migrant children's mapping, Figure 2 illustrates the spatial concentration of migrant children's outdoor engagement within the urban village. Totally, three primary concentrations of migrant children's outdoor activities were identified. The most intense hotspot appeared around the playground where presented 71 activities. It was followed by hanging garden and grassland where 66 and 60 activities were recorded respectively. Figure 3 further analyses the physical, social, and cognitive activities in the three

places. In the playground, physical (n=21) and social activities (n=22) appeared at similar levels, while cognitive activity was slightly higher (n=29). In Hanging Garden, cognitive activity (n=41) clearly dominated over physical (n=12) and social activities (n=13). Similarly, cognitive activity (n=40) in the Grassland exceeded physical (n=11) and social activities (n=9).

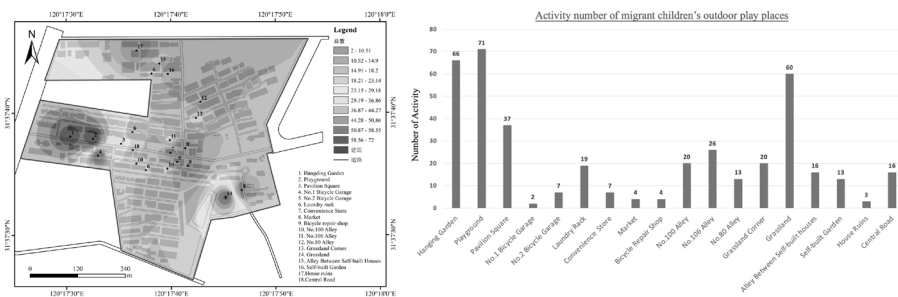


Figure 2: The distribution of migrant children's outdoor activities in Liutan village

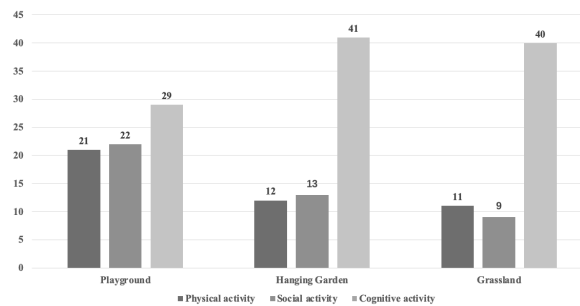


Figure 3: The three types of activities in Playground, Hanging Garden and Grassland

The spatial distribution suggests that migrant children's outdoor activities are shaped by the affordances of different places in Liutan village. The playground presents a relatively balanced pattern of activities (Figure 3). Its flat rubber surface, fixed play structures, fitness equipment and a racetrack afforded diverse functional possibilities that supported crawling, racing, structured play, and team games requiring space, stability, and spatial boundaries (Figure 4). This supports Gibson's (1979) assertion that environmental properties specify possible actions. The playground was also perceived as a social arena. Children repeatedly described it as a meeting point where friendships formed and play decisions were made. As a girl said, "See you at the old place tomorrow! Then we decide what to play." It reflected that migrant children felt safe in the playground. As Aziz and Ahmad (2012) stated that an enhanced sense of safety supports children's

social interaction, and Q. Zhang et al. (2021) similarly argued that higher perceived safety improves the usability of outdoor spaces.

In contrast, the Hanging Garden and Grassland strongly afforded cognitive activities (Figure 3). The natural and semi-natural elements such as vegetation, varied terrain and flowerbeds invited migrant children's exploration (Figure 4), team play and imaginative engagement, consistent with previous findings on the value of natural play environments (Ridgers et al., 2010). They performed more creative, constructive, and imaginative activities such as making bird nests, modifying microtopography, contacting nature, feeding insects, planting flowers, and collecting specimens. The lower levels of physical and social activities in these two areas implied that children primarily used these settings for exploration and imaginative play. These findings further demonstrate that outdoor environments with natural features offered richer affordances for in Liutan village.

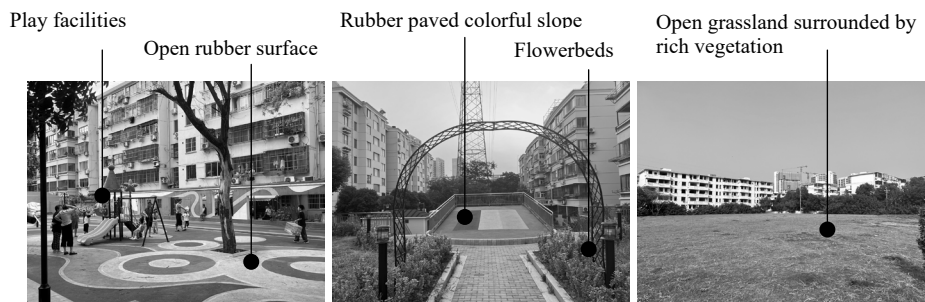


Figure 4: New built playground in Liutan village(left); Hanging Garden with paved surface and natural flowerbed(middle); Grassland with open and level terrain(right)

Interpreting Activity Hotspots via Functional Taxonomy

Since a single activity often involves multiple environmental functions, each observed activity was further broken down into micro-actions. These micro-actions were then categorized into one or multi-categories of functional taxonomy. Consequently, 263 affordances were extracted from the data (Table 3). The category of flat, relatively rigid, smooth surfaces presented the largest number ($n=96$) which suggested that surfaces were the most popular functional features in Liutan village. Graspable or detached objects ($n=55$) and affordances for sociality ($n=50$) showed the similar recordings. Attached objects ($n=39$) appeared to offer additional possibilities for physical engagement. In contrast, only a small number of mouldable materials ($n=4$), water-related features ($n=3$) and non-rigid attached objects ($n=1$) were observed. Climbable features ($n=1$) were almost absent, and no aperture-related affordances were identified.

Table 3: Relationships between categories of functional taxonomy, environmental features, and activities

Category	Environmental features	Activities
1. Flat, relatively rigid, smooth surfaces (N=96)	Rubber surface, paved ground, concrete roads, racetrack	Diverse locomotor activities, sports games, role play games, explorative play, and team games
2. Graspable/detached objects (N=55)	Animals, insects, vegetation, soil, stones, bricks, balls, chess, chalk, skipping rope, collected materials, toys, bottles and cans.	Catching insects, feeding insects, playing with animals, making grills, drawing, loose-parts play
3. Attached objects (N=39)	Flowerbeds, benches, fitness equipment, playground structures	Sitting, lying, hanging, swing, sliding, jumping, displaying and sensory experience
4. Non-rigid attached objects (N=1)	Swing	Swinging
5. Climbable features (N=1)	Rockery	Climbing
6. Shelter (N=14)	Pavilion, building overhangs, tree shade	Taking a rest, sensory experience
7. Mouldable material (N=4)	Soil, snow, sand, paper	Modifying microtopography, snow building, moulding paper
8. Water (N=3)	Puddles after rain, small water accumulation areas	Trading water
9. Aperture (N=0)	-	-
10. Affordances for sociality (N=50)	Open space, semi-open space, seating areas	Sharing secrets, learning dialect, holding a lecture, grocery shopping, visiting shops and markets, attending knowledge corner, group study, team games

The distribution of affordances presents an uneven trend and a clear dominance of surfaces in the urban villages. It indicates that migrant children's activities were strongly shaped by the availability of flat, relatively rigid, smooth surfaces in crowded, narrow, and irregularly built Liutan village. That may explain why playground, hanging garden and grassland are the three highest valuable activity locations on the hotspot map. The three places enabled migrant children to actualize a wide range of essential movements, including running, skipping, hopping, crawling, lying, dancing, jogging, racing, jumping and walking. Multiple studies have suggested similar association (Morgenthaler et al., 2023; Tang & Woolley, 2023; X. Wang et al., 2024), reinforcing that flat paving surfaces and large site scales enhance children's engagement by facilitating easier navigation and various play options. Particularly, playgrounds with rubber surfaces further enhanced perceived safe and children's confidence to perform more vigorous actions. As a 10-year-old boy explained, *"I don't need to worry about getting hurt or bleeding when I practice skateboarding in the playground"*

because of the soft ground.” This aligns with Storli et al. (2024), who reported that rubber surfaces are positively associated with children’s play. Additionally, the openness of these areas improved visibility and parental supervision. It further encouraged children’s use, even in limited spatial resources (Zhang et al., 2023).

The second-highest category of affordances was graspable objects, which included animals (i.e., dogs, cats, ducks, chicken), insects, vegetation (i.e., flowers, branches, leaves, vines), soil, stones, bricks, balls, chess, chalk, skipping rope, collected materials, toys, bottles and cans. These objects afforded diverse actions, such as catching, feeding, searching, manipulating, twisting, throwing, drawing, grabbing, tapping, and constructing. For example, they moved bricks and stones to create improvised seating, and used long branches to establish game boundaries. It indicates that migrant children can differentiate the affordances of various natural elements. Such natural features stimulate curiosity and support various forms of play (Fjørtoft, 2004).

They also actively explored and creatively transformed available materials to serve different play purposes. For instance, empty plastic bottles were repurposed in multiple ways. In pseudo-football game, an empty bottle functioned as a football or was filled with soil to act as bowling pins, while balls and larger bottles were similarly repurposed. These practices indicate that children not only perceived the affordances of single objects but also combined and reconfigured multiple affordances to support evolving play scenarios. This capacity for autonomous material play aligns with studies highlighting its role in improving children’s agency and creativity (Ernst & Burcak, 2019).

The affordance for sociality emerged from migrant children’s interactions with material elements and the broader social context in the urban village. For instance, in war-themed games, migrant children teamed up, negotiated rules and roles, and collected environmental objects (e.g., toys, branches, rope, bottles, cards), attributing special functions to them. These activities required communication and shared interpretation of how materials should be used. Beyond this, migrant children also engaged socially with local residents through grocery shopping, visiting shops and markets, learning dialect, and exchanging daily information. The findings suggest that migrant children actively perceived and utilized environmental opportunities for sociality. It aligns with Kytä, (2003) concept of social affordance, which enhances children’s cooperation, communication, and strategic thinking.

However, it is notable that six categories show low affordances. It suggests that the outdoor environment in Liutan village provides migrant children with a narrow range of functional affordances. This finding reveals that migrant children encounter limited spatial variation, minimal natural features, and few designed play structures within the urban village. Pan and Du (2021) pointed out that such outdoor environment functions primarily as practical functions for daily

use rather than as areas for children to relax, explore, and interact with others. The absence of environmental features such as climbable elements, mouldable materials, and water further restricted opportunities for children's physical skills, sensory learning, problem-solving, and emotional growth (Morgenthaler et al., 2023; Ramsden et al., 2025).

Taken together, the findings indicate that playground, hanging garden, and grassland emerged as key activity places because they concentrate the most valuable environmental affordances within the urban village. Their relatively open surface and combination of natural and man-made graspable objects support a wider range of movement-based and object-based play. It explains why playground and hanging garden enabled more diverse activities. This is consistent with Watts (2022), who found that children prefer and benefit most from play setting combining natural elements with designed structures. These affordances appeared to create favourable conditions for spontaneous social interaction by facilitating shared movement and material engagement (Hazlehurst et al., 2023).

Nevertheless, environmental affordances appear limited at the scale of the urban village as a whole. Most places observed in Liutan village support basic movements and offered limited opportunities for more varied play experience. As a result, many opportunities for physical challenges and social engagement remain underdeveloped.

CONCLUSION

This study demonstrates migrant children's good adaptability and creativity even in the urban village with constrained space and limited resources. The imbalance in affordance categories suggests that outdoor environment has great potential for improvements in the aspects of physical play and social interaction.

From a child-friendly environment perspective, the dominance of practical functions in urban villages often comes at the expense of migrant children's developmental needs. Thus, targeted design and planning interventions are needed to improve surface quality and quantity, diversify material affordances, and strengthen social affordances in urban village. These improvements are essential for creating a safe, diverse, and inclusive outdoor environment that supports the holistic development of migrant children in urban villages.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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