

Research Article

The Role of Home Designs in Supporting Stunted Children's Motor Development: A Case of Stunted Children's Houses in Surabaya

Azharine Purwa Jingga, Purwanita Setijanti*, and Dewi Septanti

Faculty of Civil, Planning, and Geo Engineering, Institute Technology of Sepuluh Nopember, Surabaya, Indonesia

ORCID

Purwanita Setijanti: <https://orcid.org/0000-0001-8274-8853>

Abstract.

A house is the first environment in which a child experiences the world. It is the primary environment for children to undergo growth and development through the activities and interactions that occur in it. In the motor development stage, children tend to act based on their perceptions of what is provided by their environment. This can be explained through the concept of affordance, where affordance is understood as the potential provided by the environment for users to behave, act, and to perform in it. This becomes a problem when a house is inhabited by children with developmental barriers – in this case, motor development. One example of a child with motor barriers is a stunted child. To promote fine and gross motor development, particular attention must be given to the architectural proportions of dwellings, notably for a stunted child who faces obstacles to physical exercise. To meet the needs of stunted children, this research aims to determine the functionality of residential spaces based on elements that facilitate children's motor activities. By employing a phenomenological approach that focuses on the interactions of stunted children in their homes which impact behavior and activities, the research findings probe at the idea of a stunting-friendly housing environment. The study employs a qualitative strategy and a naturalistic paradigm, prioritizing participant knowledge—that is, parents of stunted children—in its research design. Parents of stunted children who dwell in houses are the study participants. To see how kids interacted with their house environment, observations and interviews were done. The research's conclusions encourage the idea of a straightforward, handicapped-accessible residential space that can be used in houses occupied by stunted children.

Keywords: housing, affordance, motor development, stunted children, behavior

Corresponding Author:
Purwanita Setijanti; email:
psetijanti@arch.its.ac.id

Published: 19 November 2024

Publishing services provided by
Knowledge E

© Azharine Purwa Jingga et al. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the 1st ICCDBS Conference Committee.



1. Introduction

As a result of the frequent interactions between the house as settings and children as user, the house environment can be a resource with potential to accommodate stimulus to children's development. The availability of toys and supportive elements is an essential indication of the average quality of the house environment. The affordance concepts can help children learn motor skills at home, which will promote their growth and development. This assertion is bolstered by a number of prior research investigations, one of which examined the positive association between motor and cognitive development and motor affordances in the household [1]. The research reinforces the findings of the study from Prieske et al., which addresses children and affordance in playgrounds, the results state that considerations such as how children's motor abilities can be enhanced by environmental interventions and the variations in action abilities among children must be taken into account when designing playgrounds [2]. While study from [3] conducted to elaborate space affordance and the adaptive response in children with autism which demonstrated that a design is required based on an amalgamation of the space's physical attributes and the object's holistic qualities. According to studies on children's needs for outdoor play areas in urban community streets, child-friendly street layout and design must be taken into account in order to meet kids' spatial needs [4]. Therefore, child behavior-based design is necessary to achieve children's spatial needs.

From an affordance standpoint, Gibson used the term affordance to refer to the idea of possibilities for action that depend on the current fit between the physical properties of the body and the physical features of the environment [5]. In line with this, the research outlined generally illustrates the connection between children's motor activity development and planned settings. In the meanwhile, this has to do with several developmental difficulties that early life experiences face. Stunting is one of the factors that is currently causing concern when it comes to child development. One of the countries making efforts to lower the frequency of stunting is Indonesia. According to clinical definitions, stunting is a disorder that impairs a child's growth and development and is characterized by weight and height below average. Recurrent infections and malnutrition are two common triggers for this illness [6, 7]. Despite the large number of research, only few of them address the connection between special needs for children with stunting and architecture. Given the Indonesian government's efforts to carry out the mainstreaming initiatives started by UNESCO to lower the prevalence rates of stunting, this issue has become critical. Literally speaking, stunting is a health issue linked to poor motor development (gross and fine). Stunting must be avoided

or treated with nutritional control and physiotherapy, which tries to promote motor development. Children's motor development requires intense stimulation, which parents must provide at home. Given that behavior has an impact on the process of gross and fine motor skill development, the residential home plays a significant part in this [8 - 11]. In the last decade, many studies have focused on play spaces and spatial behaviour characterised by children's motor activity. However, research that specifically addresses spatial behaviour in children with motor barriers (in this case, stunted children) has not been widely conducted. This research has an urgency to be researched, considering that a large portion of the development of stunted children occurs in their house. Based on this assertion, the goal of this study is to gather empirical data regarding the impact of residential space on the motor activities of stunted children by utilizing home components that can promote the motor development of stunted children.

Particular consideration should be given to stunting, particularly in light of the effects it causes. Children that are stunted will have cognitive deficits as a result of their disorders, which will affect their motor skills and impede their physical development. Stunting falls under the category of disabilities because of this limitation of physical growth. The claim made by Delphie that kids with developmental disabilities can be classified as special needs kids supports this [12]. Particularly in residential institutions, children with special needs require specialized care or involvement in their surroundings. According to [13] accessibility must be used to build a bridge between an individual and their surroundings. Accessibility is not just determined by a person's physical state but also by their immediate surroundings. Creating a sustainable, inclusive environment is just as important as providing high-quality homes for the development of an accessible environment.

Because it places a strong emphasis on participant experiences, this research is qualitative and adheres to a naturalistic paradigm [14, 15]. To perform the research, observations were made of the living environments of children who were stunted and the correlation between stunting and behavior in the home. Owing to the restricted observational settings, the parents or guardians of the kid will be required to fill in a logbook to obtain more detailed data. To gain a deeper understanding and identify the requirements that children with stunting have in their homes, interviews will also be done. The research questions can be derived from the background that has been described, to what extent can a narrow and stuffy house facilitate affordance and accessibility for motor play activities for stunted children?

2. Literature Review

2.1. Affordance and Children Motor Development

The physical environment and human behavior are mutually dependent, according to architectural studies. Beginning with how people interact with their environment, the environment has a significant impact on human growth and development [16]. This phenomenon can be explained by the theory of affordances. The reciprocal interaction between the qualities utilized to support activities results the formation of affordances. Humans can detect the mutual relationship's qualities, and the environment's design can affect how a space can be used [17]. As for children, the primary environment that plays the biggest role in development and supports play activity is their house space, due to the persistent interaction between them.

To examine relations between preschool children's exploration of space and spatial attributes of the playing space in the context of formal urban houses, we applied an ecological psychology theory developed by James J. Gibson as the framework of the study [5]. The foundation of this strategy is the concept of affordance, following the idea that objects and spaces provide opportunities for action relative to what a person can perceive and perform [5]. The term "affordance" refers to the idea that the physical environment has specific qualities to both reach and restrict social connections and human activities in urban and social geography [18].

A study conducted by Harry Heft identified affordances from surrounding qualities for children's play and discovered a variety of affordances involving materials, objects, and geometric patterns that might serve a variety of purposes [19]. Thus, when a child acknowledges new stimuli in their environment and responds to them by, for example, moving toward, reaching for, looking at, or manipulating them, they learn new skills and gain new knowledge about their surroundings, which then allows them to notice new opportunities for action [20]. The theory of affordance can therefore be used to explain how the child can afford play activities with the assistance of their immediate environment.

Numerous studies have demonstrated how a home's affordances are designed to support a child's developmental needs. According to research by Carnemolla & Bridge, house adaptations are beneficial and important for assisting individuals with special needs who need specialized care [21]. According to Cunha et al., there are four implicit mentions of affordance modifications for residential elements for children with motor

developmental disabilities [22]. These include spaces that allow for comfortable play activities in a sitting, standing, or laying down position, as well as moving around on the floor. For children aged three to eighteen months, residential residences are considered affordable in this study. Fees clarified that affordance will facilitate activities such as running, leaping, and walking for infants up to 36 months of age [23]. These results lead to the conclusion that offering comfortable play areas, areas for sitting and standing, unstructured floor play, and room for walking, running, and jumping are all important ways to create a living environment that can enhance kids' motor development.

2.2. House as a Setting for Children's Motor Activities

The home becomes the setting or container for children's activities in developing their motor skills. The house is equipped with elements and spaces to form it. Elements within a building –in the context of this research, a house, can be known as the interior. According to Ching, interior forming elements can be seen based on vertical elements, namely walls and horizontal elements, namely floors and ceilings [24]. Meanwhile, complementary elements of space formation can be understood as building utilities that are able to fulfil the achievement of aspects of comfort, safety, health, and mobility inside the house. Meanwhile, the space filling element is furniture or furnishings. According to Rapoport, there are three parts of the space element which are explained as follows; firstly, fixed features which are the elements that are static or fixed and cannot be removed. For example, floors, walls, ceilings [25]. Second, semi-fixed features which are elements that are free, the result of changes made by humans. For example, furniture, window blinds, and other fixtures. Third, non-fixed features – elements that are free and related to the displacement of the space (proxemics), the position and posture of the body of the space user (kinesics), the body's reaction and self-behavior towards the occupied space.

Based on the description of the theory, it can be said that the elements forming the space of the house are limited to the presence of walls, floors, and ceilings. The explanation of the space forming the house is strengthened by the Decree of the Minister of Settlements and Regional Infrastructure where at least the house must have three divisions of space which include bedroom, multipurpose room, and

a bathroom or toilet. The standard of space availability is a reference for the procurement of houses that can support the activities and needs of humans as occupants.

In this research, the elements of space that will be studied are related to walls and floors as well as elements of space fillers, namely furniture, which are able to afford motor activities for children in the developmental period. In relation to Rapoport's theory of space division based on features, this research will focus on semi-fixed features and non-fixed features to show adjustments to the condition of stunted children with the environment of activities in their house. Meanwhile, the observed spaces include the availability of bedroom and multipurpose rooms that can accommodate the motor activities of stunted children.

3. Methodology Research

3.1. Research Design

It takes a phenomenological approach within a naturalistic paradigm to shed light on a phenomenon because the participants in this study are the primary informants [15]. The phenomenon seen in this study is how children occupy space with their play activities in the indoor playing space of their house area and what surrounding attributes can create affordance in children's play activities. Because the knowledge in this study paradigm is based on information from participants, specifically parents who live with stunted children, it leads to a naturalistic paradigm. This study was conducted based on one case of a house with stunted children.

3.2. Source of Data

Data were derived from the house of 3 stunted children aged 6 years, 5 years, and 2 years who have received nutritional assistance from the Surabaya City Government through the Puskesmas (public health centers), and has been determined to be recovered from the problem of stunting from the dimension of nutritional adequacy. This research focuses on the participants' home conditions, because one of the successes of stunting-free children is assessed from their home environment. Thus, this research would obtain empirical evidence and in-depth knowledge about how children with stunting occupy their homes within their limitations and obstacles. Due to this reason, the present study chose the house of these stunted children as the house met the

criteria required by this research. The house was selected after several visits to several Puskesmas in East Surabaya. This region was declared officially free from stunted children as they had been supplied with nutritious meals. It was not very easy for the researchers to get the permission to access the family of stunted children in this region for the reasons of official protection to the privacy of the family. However, Puskesmas Klampis Ngasem finally agreed to give the access after the researchers convinced to keep all identifications of the target participants closed.

From the journey of visiting several Puskemas in East Surabaya, a house sized 36 m² occupied by 8 people including father, mother, grandmother, grandfather, aunt, and three children under the age of 6 years was selected to be the source of the data for this present research.

3.3. Data Collection

This research was conducted by observing children's play activities in the house. To deepen the knowledge of children's, play experiences, guided interviews were conducted with the parents. In this research, the type of behavior map used is place-centered maps to see how humans organize themselves in a place. This technique is used to see how humans use or accommodate their behavior in a particular time and place situation.

Observations were also conducted during the day on two different days within two weeks of each meeting. In each session, the observation was conducted for 30 minutes.

3.4. Data Analysis

Based on the results of these observations, behavioral mapping was carried out by making a plan of the room used along with a description of each interaction with its environmental attributes and the length of time of interaction. After making behavior mapping and setting based on the results of observations and interviews, descriptive analysis is used to describe the condition of the house with motor activities that can be reached by children. The analysis explains what elements and spaces have the ability or inability to reach children's motor activities. Based on this analysis, the concept of space and elements of the house that can afford children's motor activities can be formulated. Finally, the aspects researched during the observation period was explained through the following Table 1.

TABLE 1: Summary of Operational Definition.

Aspect	Sub-aspect	Operational Definition	Indicators	Source of Data
Affordance	Space and elements for comfortable play Space and elements for play in sitting position, space and elements for play in standing position Space and elements for free play on the floor Space and elements for running, walking, and jumping	Availability of space and supporting elements that can afford activities to develop the child's motor skills.	Space availability and conditions (regarding colors and dimensions) Supporting elements availability and conditions (regarding material and colors)	Observation and interview to participants and their house

4. Results and Discussion

4.1. Results

The location of the subject of this study is a house with three stunted children in East Surabaya. Children who are indicated to be stunted have been given nutritional improvement assistance from the nearest health center, so it can be assumed that the child's nutritional problems have been resolved. This study focused on how stunted children can perform motor activities with the limitations they have from internal and external factors.

The observation portayed the house by precisely presenting the size, the existing livability and room utilities, and elements as well. The house sizes of 4 x 9 meters covering 36 m², has three bedrooms measuring 2.3 meters' x 1.7 meters and one bathroom. In terms of livability standards, this house has met the standards because it has three main spaces, namely, the availability of bedrooms, multipurpose rooms, and the presence of latrines. On the facade of the house, there is a door with a fixed window facing the alley road, while on the terrace area of the house, functioned as a laundry area and a place to dry clothes (see Figure 1).

From the result of direct observation to the house of the respondents, it is revealed that there are possible functionalities that can be generated. Functionally, this house has managed to accommodate the primary needs of its residents despite the limited amount of space. As a play area that involves children's motor skills, the role of the house can be described in the table below (See Table 2).



Figure 1: Documentation of Participant’s house (Source: Writer’s documentation, 2023).

TABLE 2: Summary of Participant’s Activity.

	Participant 1	Participant 2	Participant 3
Place-centered behavior map			
Description	6 years old, male	5 years old, male	2 years old, female
Activities			
Jumping	The child walks while jumping over the grout lines of the tiles in the house	The child walks while jumping over the grout lines of the tiles in the house	-
Play in comfortable position (lying down, face down)	Children playing gadgets in the room in a lying position	-	The child plays with her mother in a lying position
Play in sitting position	Children playing gadgets in the room in a sitting position	Children play with cardboard boxes in a sitting position	Children play with dolls in a sitting position
Play in standing position	Child grabs items from top of cupboard	Child grabs items from top of cupboard	-
Free play on the floor	-	Children roll on the floor on foam mats	Children roll on the floor on foam mats
Walking and running	Children run and walk in the hallway	Children run and walk in the hallway	The child learns to walk in the hallway of the room while holding on to the wall

Those activities can be categorized based on the types of affordances as described by Heft [19], through its ability to function as elements that rely on the skills and experiences of the people utilizing it, the environment can support activities. Heft's concept of affordance can be applied to home or environmental design to comprehend how rooms or piece of furniture physical attributes might support or stimulate a child's motor actions, such walking, jumping, or crawling. By offering objects or features that facilitate desired actions and interactions, designers can build an environment that helps children's motor development by taking affordances into consideration.

These activities can be grouped according to the kinds of affordances or abilities that an environment provides and how often they occur, based on the specific activities and activity patterns previously defined (see Table 3). The following table explains how affordances are categorized and what elements or spaces belong with them:

TABLE 3: Affordance categories and occurrences in the case of house with three stunted children.

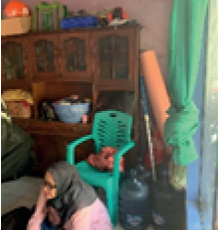

Affordance	Occurance	Activities	Documentation
Lay-on-able features/surface	A mat A foam bed On the ceramic floor	Taking a break Watching television Playing gadgets	
Sit-on-able feature	A mat A foam bed Stool Terrace	Eating Playing gadgets Sitting while looking outside the house Sitting with legs folded	

TABLE 3: Continued.

Affordance	Occurance	Activities	Documentation
Run-on-able surface/Walk-on-able surface	Aisle Terrace Multifungsional space	Walking while jumping Playing chase or running races	
Jump-over-able feature/Jump-up-on-able feature	Grout lines on the floor Mat and floor borders	Jumping the ceramic grout line Jumping the line between the mat and the floor	
Sit-on-able object	A galoon A toy in the form of car Broom	Climb the galoon and play balance training	
Tiptoe-able-feature	Cupboard	Picking up a plate on a high shelf	

Based on the analysis above, children’s motor activities are intertwined by utilizing the space and items in the house. For example, children can create their play activities

in maintaining balance using galloon objects, where children ride galloons and try to maintain balance or hit the galloon body so that it makes sounds. In gross motor movement activities such as jumping, the house does not provide leveling floor or stairs to jump over, but children are able to take advantage of the floor surface by jumping over the ceramic grout line or the dividing line between the floor and the foldable mattress. This indicates that even in limited conditions, children's motor activities can be established within the house environment. The formation of motor activities in the house environment can be done by paying attention to children's activity patterns, in this case stunted children. This statement is in line with the findings by Heft, where the potential provided by the environment is based on the ability and experience of its users [19]. Based on the behavior mapping that has been described, it can be seen that the areas that tend to be used are the room area, hallway, and multipurpose room (living room).

Based on the observations that have been made, the room tends to be used for children's activities because it is able to provide an area that is private. So that children feel they have visual and sound barriers (physically), avoidance of sight or visual (behaviorally), and distance (spatially). Activities that occur in the room include resting, changing clothes, or playing gadgets that require focus. This indicates that the child needs barriers over their body as a way to achieve privacy. Walls and rooms can afford children privacy by secluding themselves from other members in the house.

Meanwhile, the narrow hallway of the house can function as a racetrack when two children are running or walking in the hallway at the same time. Thus, the hallway can afford walking, running, and even racing activities with their sibling. The ceramic floor surface can afford those activities for children. Additionally, the ceramic tile lines can accommodate jumping activities for children since the house doesn't have any leveling or height differences either in the flooring or furniture. This indicates that as a provider of supporting facilities for children's motor movements can be through fixed-features from the elements of the house, including floor and walls material or textures as mentioned by Rapoport [25].

In the multipurpose area, there is the widest space inside the house. This spaciousness can afford the space for maneuvers in children's activities such as playing with galloon, playing with cardboard box, playing in sitting positions, eating, jumping, and rolling over a mattress. The multipurpose area is equipped with foam mat to cover some ceramic surfaces. The area is about 2 meters x 3 meters, and there is no furniture like chairs or tables, all activities in sitting positions and receiving guests are done in a "lesehan" way, which means sitting on the floor covered with a foldable mat.

5. Discussion

The house is narrow and stuffy, considering the high occupancy. This shows that facilitating affordance perceptions are needed to make some judgments on improving the accessible environment of narrow and stuffy house. Similar to a study about participants' judgement of affordance [26], the study claims that the perception should not only consider extrinsic perceptual like distance, size, shape, or color, but it should also involve a perception to other dimensions like a relation between an element with body dimension. In this study, affordance is facilitated by measuring body dimensions including height, weight, frontal width, sagittal width to determine the passable doorways. The present study has identified some possible changes to improve affordance and accessibility at the same time.

From the existing data, the house has able to facilitate affordance for stunted children playing activities. As described in table 3, the house can facilitate some actions regarding the development of gross motor. The affordance for gross motor include lay-on-able features/surface, sit-on-able feature, run-on-able surface, walk-on-able surface, jump-up/over-able feature, and tiptoe-able feature. However, the affordance supporting the playing activities do not go in line with the accessibility. Therefore, it needs to be improved by several arrangement of house elements like placing furniture against the walls to create more space to move, replacing unnecessary furniture, that is used for sitting and placing items-such as chairs and tables, with foldable mats or rugs.

This present study has identified some elements that potentially support the affordance. Elements like lined ceramic floors can serve as a "jump-over-able feature" that facilitates jumping activities. The presence of foldable mats enables the function to "sit-on-able object" so that children can engage in seated play or free play on the floor. Unusual items in their room can be used to play, such as a gallon and cardboard. The presence of these items can serve as facilitators for children's imaginative play. Unfortunately, all the elements supporting the affordance fail to serve accessibility. Children prefer play out than inside their home, all the supporting elements for affordance cannot be utilized to facilitate the gross motor development inside home. Therefore, arrangement of this narrow and stuffy house need arrangement to support activities by providing sufficient space so that children can still make use of their house to optimize their motor growth, All the arrangements made is to fulfill affordance categories that will result improve accessibility for narrow and stuffy house. Similar to a study on improving the utility of smart house by facilitating affordance factors, Cho & Choi has able to uncover that applying affordance categories can make a smart house used more efficiently and comfortably [27].

6. Conclusion

A child with stunting requires accelerated development of motor skills through activities involving physical movement. One way to stimulate a child's motion is through their home environment, even in a narrow and stuffy house with limited resources. Elements like lined ceramic floors can serve as a "jump-over-able feature" that facilitates jumping activities. The presence of foldable mats enables the function to "sit-on-able object" so that children can engage in seated play or free play on the floor.

Children can make use of unused items in their room to play, such as in this case, using a galloon and cardboard as props or even costumes. The presence of these items can serve as facilitators for children's imaginative play. The room can support such activities by providing sufficient space. In the case of a simple house with limited space, the limited area can be maximized through appropriate furniture arrangement. Additionally, the arrangement of furniture plays a significant role in a limited space house. It is advisable to place furniture against the walls to create maneuvering space for children to run and play inside the house. In addition to the arrangement, the selection of furniture inside the house should be considered based on the available space. In this research case, the chairs and tables in the living room are replaced with foldable mats, which will create more space for movement, and people will sit on the floor. Furthermore, sitting on the floor is already a local cultural practice or as commonly known as 'lesehan'.

In conclusion, a narrow and stuffy house can provide rooms for children's motor activities by considering both permanent or fixed features such as walls or floors, and non-fixed features such as play objects or easily movable furniture. This can be achieved through the careful selection and arrangement of furniture. These results advance our knowledge of how inexpensive, easily adapted homes can enhance the motor activity of children who are stunted while also taking cultural norms, resource availability, and affordability into consideration. Further research is needed to take a larger sample of family participants with stunted children, to see the spatial adaptation patterns of various participants in processing their limited space. Apart from that, further research is needed to be able to produce simple house and furniture designs that are able to afford children's motor activities.

Acknowledgements

We sincerely thank the families that volunteered to be part of this research. Their collaboration and willingness to freely share their knowledge and perspectives have greatly enhanced our comprehension of the difficulties and opportunities involved in creating house that support the motor activities of children who are stunted. We thank

the children who participated enthusiastically in the study. Their eagerness to participate in a range of motor activities and their flexibility in responding to changes in their surroundings were essential in obtaining important data for this investigation.

References

- [1] A. Zoghi, C. Gabbard, M. Shojaei, and S. Shahshahani, "The impact of home motor affordances on motor, cognitive and social development of young children," *Iran. J. Child Neurol.*, vol. 13, no. 2, pp. 61–69, 2019, doi: 10.22037/ijcn.v13i2.17044.
- [2] B. Prieske, R. Withagen, J. Smith, and F. T. J. M. Zaal, "Affordances in a simple playscape: Are children attracted to challenging affordances?," *J. Environ. Psychol.*, vol. 41, pp. 101–111, 2015, doi: 10.1016/j.jenvp.2014.11.011.
- [3] P. Atmodiwirjo, "Space affordances, adaptive responses and sensory integration by autistic children," *Int. J. Des.*, vol. 8, no. 3, pp. 35–47, 2014.
- [4] D. Guo, Y. Shi, and R. Chen, "Environmental affordances and children's needs: Insights from child-friendly community streets in China," *Front. Archit. Res.*, vol. 12, no. 3, pp. 411–422, 2023, doi: 10.1016/j.foar.2022.11.003.
- [5] J. J. Gibson, *The Theory of affordances*. Hillsdale: Lawrence Erlbaum Associates, Inc, 1979.
- [6] K. Rahmadhita, "Permasalahan stunting dan pencegahannya," *J. Ilm. Kesehat. Sandi Husada*, vol. 11, no. 1, pp. 225–229, 2020, doi: 10.35816/jjskh.v11i1.253.
- [7] T. Siswati, T. Hookstra, and H. Kusnanto, "Stunting among children Indonesian urban areas: What is the risk factors?," *J. Gizi dan Diet. Indones. (Indonesian J. Nutr. Diet.*, vol. 8, no. 1, p. 1, 2020, doi: 10.21927/ijnd.2020.8(1).1-8.
- [8] I. Babik *et al.*, "Socioeconomic status and home affordances moderate effects of motor delay and intervention," *J. Appl. Dev. Psychol.*, vol. 87, no. August 2022, p. 101563, 2023, doi: 10.1016/j.appdev.2023.101563.
- [9] J. D. DiTosto, K. Holder, E. Soyemi, M. Beestrum, and L. M. Yee, "Housing instability and adverse perinatal outcomes: a systematic review," *Am. J. Obstet. Gynecol. MFM*, vol. 3, no. 6, p. 100477, 2021, doi: 10.1016/j.ajogmf.2021.100477.
- [10] K. Esser *et al.*, "Housing need among children with medical complexity: A cross-sectional descriptive study of three populations," *Acad. Pediatr.*, vol. 22, no. 6, pp. 900–909, 2022, doi: 10.1016/j.acap.2021.09.018.
- [11] M. Weitzman, A. Baten, D. G. Rosenthal, R. Hoshino, E. Tohn, and D. E. Jacobs, "Housing and child health," *Curr. Probl. Pediatr. Adolesc. Health Care*, vol. 43, no. 8, pp. 187–224, 2013, doi: 10.1016/j.cppeds.2013.06.001.
- [12] B. Delphie, *Pembelajaran anak berkebutuhan khusus dalam setting pendidikan inklusi*. Bandung: PT. Refika Aditama, 2006.

- [13] R. Imrie, *Accessible Housing: Quality, Disability and Design*. Oxon: Routledge, 2016.
- [14] L. Groat and D. Wang, *Architectural Research History*, vol. 4, no. 1. 2013.
- [15] L. Groat and D. Wang, *Architectural research methods*, vol. 21, no. 1., pp 215 - 257, 2013.
- [16] J. M. Laurens, *Arsitektur dan perilaku manusia*. Jakarta: Gramedia Widiasarana Indonesia, 2004.
- [17] J. Lang and W. Moleski, *Functionalism revisited: Architectural theory and practice and the behavioral sciences*. 2010.
- [18] E. Marco, M. Tahsiri, D. Sinnett, and S. Oliveira, "Architects' 'enforced togetherness': new design affordances of the home," *Build. Cities*, vol. 3, no. 1, pp. 168–185, 2022, doi: 10.5334/bc.189.
- [19] H. Heft, "Affordances of children's environment: A functional approach to environmental description," *Child. Environ. Q.*, vol. 5, p. 29, 1988.
- [20] H. (Ine) M. J. A. van Liempd, O. Oudgenoeg-Paz, R. G. Fukkink, and P. P. M. Leseman, "Young children's exploration of the indoor playroom space in center-based childcare," *Early Child. Res. Q.*, vol. 43, pp. 33–41, 2018, doi: 10.1016/j.ecresq.2017.11.005.
- [21] P. Carnemolla and C. Bridge, "Housing design and community care: How home modifications reduce care needs of older people and people with disability," *Int. J. Environ. Res. Public Health*, vol. 16, no. 11, 2019, doi: 10.3390/ijerph16111951.
- [22] A. B. Cunha, A. F. Miquelote, and D. C. C. Santos, "Motor affordance at home for infants living in poverty: A feasibility study," *Infant Behav. Dev.*, vol. 51, no. September 2017, pp. 52–59, 2018, doi: 10.1016/j.infbeh.2018.03.002.
- [23] B. S. Fees, E. Fischer, S. Haar, and L. K. Crowe, "Toddler activity intensity during Indoor free-play: Stand and watch," *J. Nutr. Educ. Behav.*, vol. 47, no. 2, pp. 170–175, 2015, doi: 10.1016/j.jneb.2014.08.015.
- [24] F. D. K. Ching, *Arsitektur: Bentuk, ruang, dan tatanan*. John Wiley & Sons, Inc., 2007.
- [25] A. Rapoport, *The meanings of the built environment: A nonverbal communication approach*, no. 1989. Tucson: Arizona Press, 1990.
- [26] J. M. Franchak, D. J. van der Zalm, and K. E. Adolph, "Learning by doing: Action performance facilitates affordance perception," *Vision Res.*, vol. 50, no. 24, pp. 2758–2765, 2010, doi: 10.1016/j.visres.2010.09.019.
- [27] Y. Cho and A. Choi, "Application of affordance factors for user-centered smart homes: A case study approach," *Sustain.*, vol. 12, no. 7, 2020, doi: 10.3390/su12073053.