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AUTHOR INTRODUCTION

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JOURNAL ARTICLE ABSTRACT

For holistic growth and development, young children need a rich and diverse play environment that affords them opportunity to engage in a range of play types. An evaluation of designated and undesignated play spaces at 63 high-rise housing developments in Pune, India led to the development of the Array of Play Diversity (APD) design and evaluation tool, which is a visual assessment chart of 40 Physical Elements and Surfaces grouped across eight Environmental Play Qualities. The APD can be used as a framework to design young children's play environments and/or as an evaluation tool to assess and improve existing play spaces.

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Array of Play Diversity: Design and Evaluation Tool for Creating Young Children's Play Spaces

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Abstract

For holistic growth and development, young children need a rich and diverse play environment that affords them opportunity to engage in a range of play types. An evaluation of designated and undesignated play spaces at 63 high-rise housing developments in Pune, India led to the development of the Array of Play Diversity (APD) design and evaluation tool, which is a visual assessment chart of 40 Physical Elements and Surfaces grouped across eight Environmental Play Qualities. The APD can be used as a framework to design young children's play environments and/or as an evaluation tool to assess and improve existing play spaces.

Keywords: children's play, affordances, play environments, play space design, evaluation tool

Introduction

Worldwide, play is fundamental to children's growth and development (Lester & Russell, 2010; Roopnarine et al., 2015; Whitebread et al., 2012). This is particularly important for young children (younger than 8), who are considered to be in a critical stage of rapid neurological development, and in a period in which health trajectories related to physical, emotional and social growth are established (Brown & Jernigan, 2012). At this stage in life, children need opportunities to engage in diverse range of play types. How we design their play environments can greatly affect their overall growth and development. While there are comprehensive evaluation tools and guidelines that support the creation of play environments for all children, there are no tools that visually assimilate the various physical elements and surfaces of play environments in a concise manner that is easy to use for designers and evaluators in their everyday practice.

For this reason, I offer an innovative design and evaluation tool titled Array of Play Diversity (APD) that visually brings together 40 Physical Elements and Surfaces (PEaS) that are grouped across eight broad Environmental Play Qualities (EPQ) categories. The tool is an outcome of baseline study of designated and undesignated play spaces at 63 high-rise housing developments and case study research of seven heterogeneous high-rise housing developments in Pune city, India. In this paper, I describe the development of the tool, the use of the APD as an analytical tool in case study research for within-case and cross-case analysis, and the potential of the APD as a comprehensive design guidance tool. I conclude by exploring prospects for the future application of the tool.

The APD can be used as an assessment tool by play researchers, and as a visual guidance tool for design professionals such as architects, landscape architects, designers, play enthusiasts and play equipment manufacturers to create rich and diverse play environments that are supportive of young children's holistic growth and development.

Diverse Play Types and Affordances

Scholars have long recognized the value of various play types and how each type of play is critical for children's growth and development (Gray, 2013; Hughes, 1999; O'Connor, 2017; Whitebread et al., 2012). In an effort to understand play types and translate them into a space that allows children to engage in a range of play, I group Hughes' (1999) 16 play types into five major categories: (1) physical play—gross motor, locomotor, object, and deep play; (2) construction play—mastery, construction, and manipulative play; (3) sensory play—fine motor, sensory, and exploratory play; (4) social-emotional play—social and communication play; and (5) creative play—symbolic, creative, socio-dramatic, imaginative, fantasy, and role play.

For children to be able to engage in this full range of play types, children must have access to rich and diverse play areas where they can *perceive* their environment in terms of the functions it *affords* (Gibson, 1979; Heft, 1988; 2001). According to Gibson (1979), "The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill" (p. 127). Drawing from Bob

Hughes and Frank King's work, the National Playing Fields Association's definition of play from more than two decades ago portrays play as "freely chosen, personally directed, and intrinsically motivated behaviour that actively engages the child" (National Playing Fields Association et al., 2000). This means that a play space needs to be an environment where children can *freely choose* with what and whom they want to play.

Taken together, designed play environments should challenge children's physical and mental capabilities and offer opportunities for children to grasp objects, climb, crawl, run and jump, so they can engage in forms of physical play such as gross motor, locomotor, object and deep play. Play environments should afford children opportunity to build with loose parts, control and master their space, and manipulate their surroundings, enabling them to engage in construction and manipulative play. Further, play environments should afford children rich sensory experiences, preferably with natural elements, so they can engage in sensory and exploratory play, and give young children opportunities to exercise their fine motor skills. Lastly, play environments should be spaces where young children are able to exercise their creativity and imagination where they can role-play with their friends, learn to empathize, cooperate and socialize with each other—thus, engaging in social and creative play.

In summary, for children's holistic growth and development, they need play environments that afford them a variety of surfaces, textures, play elements and materials so they can exercise their gross and fine motor skills, retreat when they wish to, have rich sensory experiences through touch and feel, manipulate their surroundings, exercise their creativity and imagination, and form friendships with other children.

Play Opportunities in High-Rise Housing Developments

Globally, research demonstrates that young children's play areas in urban public parks, gated communities and high-rise housing developments or estates are often limited to standardized play equipment (Atmakur-Javdekar, 2016; 2020; Gill, 2021; McKendrick et al., 2000). Researchers are well aware that during the early years (0 – 8 years of age), children need access to a range of diverse play opportunities close to their homes; at the same time, in major cities in many countries there is a trend towards building more high-rise apartments for all demographic groups, including families with young children. The Vertical Living Kids research project, which focused on understanding the environmental experiences and perceptions of children (8 – 12 years) from lower and middle-income families living in private and public high-rise housing units in Australia confirmed the trend of building standardized play spaces (Whitzman & Mizrachi, 2009; 2012). The project highlighted the problematic nature of structured play spaces for children, noting "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" (Whitzman & Mirachi, 2009, p. 25). While the Vertical Living Kids study does not address in detail the environmental experiences of younger children living in high-rise accommodation, it reveals the problematic

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When designing a space, a framework that outlines the potentiality of that space is helpful for design professionals. Besides the use of the APD as an evaluation tool for researchers, the 40 PEaS spread across eight EPQs serve as a framework to guide design professionals to design supportive play environments to meet young children's needs. This does not mean that designers should aim to include all 40 PEaS in a play environment. Instead, design professionals including architects, landscape architects and play space designers should use the APD as a starting point or as a broad guidance tool to design creative, fun and exciting play environments for young children where they are able to exercise and engage in a range of play types that are critical for their overall development (Appendix D).

Discussion, Limitations and Implications

In summary, this paper offers the Array of Play Diversity, a visual assessment and guidance tool to assist play researchers and designers to create new play spaces and improve existing play environments that meet young children's diverse play needs. The proposed APD tool is different from other play audit tools and design guidelines as it visually assimilates the various physical elements and surfaces of a diverse play environment in a concise manner, thus offering a simple yet comprehensive tool to create better play spaces for children.

During fieldwork, I did not include any public play spaces or unique play spaces to gather any additional play elements that are key for young children's play. Instead, I focused on play spaces close to where children in urban areas live (i.e., high-rise housing developments) and conducted a detailed literature review to assimilate all the PEaS that are considered essential for young children's play.

While the APD has developed from findings based on research conducted in the residential context, the identified PEaS are not unique to residential or housing developments and encompass elements and materials that are universal to the physicality of young children's play spaces. In this paper, the APD was developed during the analysis stage to visualize the data and conduct within-case and cross-case analyses. While the APD (Figure 1) can be used to conduct evaluations, I foresee a changes to the formatting of the tool so it can be used as a handy evaluation tool in the field. For this, it will be important to test the validity of the APD tool in the field for evaluation purposes.

Furthermore, the formatted APD tool for evaluation needs to be tested for assessment reliability at various types of play settings in urban areas, such as public play spaces, indoor toddler play areas, commercialized indoor play zones in malls, adventure playgrounds, play spaces in learning environments, pop-up play spaces and other unique play spaces designed for young children. During such assessments, it will be important to recognize that the number of PEaS is likely to vary, reflecting different cultures, climates and/or vegetation zones.

Lastly, the APD as a design guidance tool has been tried and is currently in use at a landscape architect's studio. Preliminary comments about the APD as a design guidance tool are that it is easy to use and that it is a valuable guidance tool for

those who are designing young children's play spaces. Additionally, design case studies of completed play spaces and their post-occupancy evaluations need to be conducted to understand how the APD can be improved as a design tool. This iterative approach to using APD as a design and evaluation tool is key to improving the APD and optimizing its role in creating successful play spaces for young children of varied abilities.

Conclusion

In this paper, I identified the physical elements and surfaces that can help create play environments that support young children's holistic growth and development. Through a detailed investigation of designated and undesignated play spaces around high-rise housing developments in a fast-growing suburb of Pune city in India, I assimilated 40 Physical Elements and Surfaces (PEaS) and eight Environmental Play Qualities (EPQs) that provide a range of affordances for children to engage in different play types. I also describe in detail the process of how I developed the Array of Play Diversity (APD) tool and its application as an evaluation and analysis tool with the help of within-case and cross-case analyses of case study sites. I created a template for design professionals such as architects, landscape architects, designers, play enthusiasts and play equipment manufacturers to use the APD as a design framework to create diverse play environments in urban areas that are supportive of young children's diverse play needs. Lastly, it is important to note that the 40 PEaS of the APD contribute to the creation of a rich and diverse play environment supporting young children's holistic growth and development, not only in residential environments but across a range of non-residential contexts such as institutional, commercial and/or public spaces.

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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*, *17*(6), 1–14. https://doi.org/10.1080/14733285.2019.1574335

Atmakur-Javdekar, S. (2016). Children's play in urban areas. In B. Evans, J. Horton, & T. Skelton (Eds.), *Play and recreation, health and wellbeing* (pp. 109–134). Springer.

Atmakur-Javdekar, S. (2020). *Young children's play in high-rise housing: A window into the changing lives of urban Indian middle-class families in Pune metropolitan area* [Doctoral Dissertation in Environmental Psychology, The Graduate Center, City University of New York]. https://academicworks.cuny.edu/gc_etds/3861

Beer, A., Delshammar, T., & Schildwacht, P. (2003). A changing understanding of the role of greenspace in high density housing: A European perspective. *Built Environment*, *29*(2), 132–143.

Brown, T. T., & Jernigan, T. L. (2012). Brain development during the preschool years. *Neuropsychology Review*, *22*(4), 313–333. https://doi.org/10.1007/s11065-012-9214-1

Chawla, L. (2020). Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss. *People and Nature*, *2*(3), 619–642. https://doi.org/10.1002/pan3.10128

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

Cole-Hamilton, I., & Crawford, J. (2012). *Getting it right for play: A toolkit to assess and improve local play opportunities*. Play Scotland.

Cox, A., J. (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.

Gibson, J. J. (1979). *The ecological approach to visual perception*. Houghton Mifflin.

Gill, T. (2021). *Urban playground: How child-friendly planning and design can save cities*. RIBA Publishing.

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

Gustat, J., Anderson, C. E., & Slater, S. J. (2020). Development and testing of a brief play space audit tool. *Journal of Physical Activity and Health*, *17*(1), 13–20. https://doi.org/10.1123/jpah.2018-0686

Hart, R. (1979). *Children's experience of place.* Irvington.

Heft, H. (1988). Affordances of children's environments: A functional approach to environmental description. *Children's Environments Quarterly*, *5*(3), 29–37.

Heft, H. (2001). *Ecological psychology in context: James Gibson, Roger Barker and the legacy of William James's radical empiricism*. LEA.

Hughes, F. P. (1999). *Children, play, and development* (3rd ed.). Allyn and Bacon.

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.

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.

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.

Loebach, J., & Cox, A. (2020). Tool for observing play outdoors (TOPO): A new typology for capturing children's play behaviors in outdoor environments. *International Journal of Environmental Research and Public Health*, *17*(15), 5611. https://doi.org/10.3390/ijerph17155611

Loebach, J., & Cox, A. (2022). Playing in "the backyard": Environmental features and conditions of a natural playspace which support diverse outdoor play activities among younger children. *International Journal of Environmental Research and Public Health*, *19*(19), 12661. https://doi.org/10.3390/ijerph191912661

Louv, R. (2005). *Last child in the woods: Saving our children from nature-deficit disorder*. Algonquin Books.

McKendrick, J., Bradford, M. G., & Fielder, A. (2000). Time for a party! Making sense of the commercialisation of leisure space for children. In S. Holloway & G. Valentine (Eds.), *Children's geographies: Playing, living, learning* (pp. 100–116). Routledge.

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 (Ed.), *Biophilic design: The theory, science, and practice of bringing building to life* (Vol. 3). John Wiley & Sons, Inc. http://www.naturalearning.org/sites/default/files/MooreCooperMarcus_Healthy.pdf

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, 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.

National Playing Fields Association, Playlink, & Children's Play Council. (2000). *Best play: What play provision should do for children*. National Playing Fields Association.

Natural Learning Initiative. (2005). *Preschool outdoor environment measurement scale POEMS*. Natural Learning Initiative. https://naturalearning.org/poems/

NSW Government. (2019). *Everyone can play: A guideline to create inclusive play spaces*. NSW Government.

O'Connor, S. (2017). The secret power of play. *TIME*. http://time.com/4928925/secret-power-play/

Roopnarine, J., Patte, M., Johnson, J., & Kuschner, D. (Eds.). (2015). *International perspectives on children's play*. McGraw-Hill Education.

Timber Play. (2025). *Simply play: Timberplay's play assessment tool*. Simply Play. https://www.simplyplay.net/survey/index.php/417164

Whitebread, D., Basilio, M., Kuvalja, M., & Verma, M. (2012). *The importance of play: A report on the value of children's play with a series of policy recommendations*. University of Cambridge.

Whitzman, C., & Mizrachi, D. (2009). *Vertical living kids: Creating supportive high-rise environments for children in Melbourne, Australia*. University of Melbourne.

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.

Yao, S., & Isami, K. (2011). Study on the characteristic about transition of children's outdoor play space in high-rise housing estate of Beijing. *Landscape Research Japan Online*, *4*, 48–52.

Yuen, B., & Yeh, A. G. O. (Eds.). (2011). *High-rise living in Asian cities*. Springer.

Zamani, Z., & Moore, R. (2013). The cognitive play behavior affordances of natural and manufactured elements within outdoor preschool settings. *Landscape Research Record*, *01*, 268–278.