

Designing Key Spaces for Autistic Children in Nigeria: Proposed Design Strategies for A Boarding School

Adeola Ajayi^{1*}, Azeezat Asunmo¹ and Olaoluwa Ezekiel²

¹Department of Architecture, University of Ibadan, Nigeria

²Cumbria Health Limited, Carlisle, United Kingdom

*Corresponding Author

Adeola Ajayi, Department of Architecture, University of Ibadan, Nigeria.

Submitted: 2026, Jun 17; **Accepted:** 2026, Sep 25; **Published:** 2026, Sep 30

Citation: Ajayi, A., Asunmo, A., & Ezekiel, O. (2026). Designing Key Spaces for Autistic Children in Nigeria: Proposed Design Strategies For A Boarding School. *J Chem Edu Res Prac*, 10(2), 01-06.

Abstract

The environment we inhabit is more than just a backdrop to our lives; for children with Autism Spectrum Disorder (ASD), it can be the difference between a day of quiet focus and one of overwhelming distress. In Nigeria, while we are seeing a positive shift in autism awareness, our architectural landscape hasn't quite caught up. Most schools and homes are still built with "neurotypical" standards in mind, often resulting in spaces filled with harsh fluorescent lighting, poor air circulation, and chaotic layouts that inadvertently trigger sensory overload in autistic children.

Using data sources which included both primary data gathered from questionnaires and observations and secondary data from scholarly literature as well as case studies from already existing spaces, this study investigates design strategies for key spaces in a specialized boarding school that prioritizes the sensory and spatial needs of its students. By focusing on three key pillars natural light, passive ventilation, and intentional sensory design the research investigates how architecture itself can serve as a therapeutic tool. Through a framework that balances neurotypical predictability with sensory integration resilience, the study proposes a design tailored specifically to Nigeria's unique tropical climate and cultural context.

The findings emphasize that when buzzing artificial lights are replaced with soft, diffused sunshine and noisy mechanical fans are swapped for natural cross-ventilation, we don't just improve a building; we improve a child's ability to learn, regulate their emotions, and engage with the world. Ultimately, this work provides a foundational guide for architects and educators in Nigeria, advocating for a built environment that supports, rather than hinders, the developmental journey of every autistic child.

Keywords: Autism Spectrum Disorder (ASD), Therapeutic Architecture, Sensory Design, Natural Light, Passive Ventilation, Nigeria, Boarding School Design

1. Background

The relationship between the built environment and humans can be traced back to early civilizations, where the influence of surroundings on human well-being was carefully understood and incorporated into healing practices. However, the development of mental health treatment centers can be associated with the remnants of the Ancient Greek wars which although it ended, left a huge pile of despair to be cleared out. This lingering feeling was later coined and termed Post traumatic stress which is one of the

earliest forms of mental disorders [1].

The influence of the built environment on mental well-being extends to a wide range of conditions, including autism spectrum disorder (ASD). Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by challenges in social communication, interaction, and restricted or repetitive behaviors, with varying severity [2]. While ASD is said to have a higher press focus and attention as compared to many other mental

disorders, the application of architectural principles in mental health spaces, particularly in autism treatment facilities, remains underdeveloped and under-researched.

In Nigeria where, mental disorders are still on a scale of acceptance and awareness. On one end of the scale, autism is coming to the limelight and research and other procedures are taking good shape [3]. On the other end of the scale autism is still a myth formed by cultural and spiritually oriented beliefs creating significant barriers to appropriate treatment and inclusive environmental design [4].

Focusing on the right end of the scale, rising awareness of autism has not been matched by the development of specialized environments tailored to these children's needs [5]. The design of educational and residential spaces is important for supporting their cognitive, emotional, and social development. This gap in provision brings the focus of this study to the development of design strategies of both educational, residential as well as treatment spaces combined as a boarding school for autistic children. Research has shown that autistic children spend a significant amount of their time in structured environments such as schools, therapy centers, and their homes [6].

In Nigeria, there is a rising number of spaces built for special needs children but these specialized facilities for autistic children often fail to address their sensory and spatial needs [7]. Many existing boarding schools, designed for neurotypical children, feature bright, uncontrolled lighting, disorganized color schemes, and poor ventilation, which can overwhelm autistic children. For instance, a child entering such a space may experience sensory overload, pressing their hands to their ears to block out stimuli, leading to anxiety and reduced learning capacity. These poorly designed spaces retard therapeutic outcomes, increasing behavioral challenges and limiting developmental progress. Moreover, there is limited research on context specific architectural solutions for autistic children in Nigeria, particularly in boarding schools where children reside for extended periods. This study seeks to address these gaps by providing more insights into designing key spaces that optimize natural light, ventilation, and sensory design to create therapeutic environments for autistic children.

2. Methodology

This study employs a mixed method design approach that integrates qualitative and quantitative approaches to recognize and understand the design needs for key spaces for autistic children in Nigeria. Qualitative data was obtained through interviews with educators, care givers and medical practitioners who interact with the children in different capacities while quantitative data were collected through properly prepared questionnaires tailored to the respondent in order to arrive at a detailed assessment to enhance therapeutic outcomes. Participants were chosen based on their roles and proximity to the autistic children so as to provide the necessary information needed which corresponds to their area of expertise. Data sources included both primary data gathered from questionnaires and observations and secondary data from scholarly literature as well as case studies from already existing spaces. The sample size of 60 participants comprising a percentage of educators, medical practitioners and care givers was adopted from the seminal architecture thesis by Mostafa (2015) titled "An Architecture for Autism," which utilized a similar cohort size to establish the ASPECTSS™ Design Index.

Semi-structured interviews were conducted with 60 stakeholders: 20 parents of autistic children, 20 educators/therapists from Nigerian autism centers (e.g., OLG Health Foundation), 20 medical professionals and 3 architects experienced in inclusive design. Questions probed sensory triggers, preferences for light and ventilation, and cultural adaptations. Site Visits and Observations were conducted to two major case studies to evaluate spatial sequencing and escape spaces. Photographic documentation and field notes captured real-time interactions, noting how natural light reduced anxiety in open areas. Participants provided informed consent, with anonymity preserved. The study adhered to ethical guidelines from the American Psychological Association (APA) for research involving vulnerable groups, and institutional review board approval was obtained from the researcher's university.

Data were analyzed using the interpretation of data collected from respondents using a spreadsheet program with a focus on descriptive statistics to identify patterns, trends and relationships that answer the research questions of the study.

3. Results

Research Question 1: Sensory and spatial needs of autistic children in key spaces

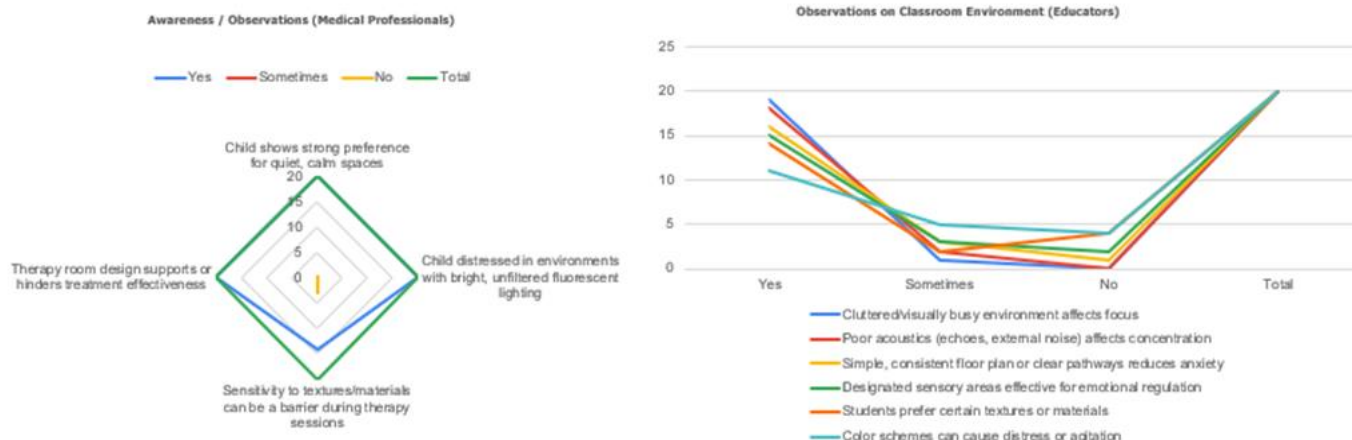


Figure 1: Data showing response from medical professionals and educators regarding the sensory and spatial needs of autistic children

Response from Medical Professionals

- The medical professionals unanimously agreed on the need for quiet, calm spaces. Swart emphasizes that excessive auditory and visual input can easily overwhelm autistic individuals, leading to anxiety, reduced attention, and behavioral distress [8].
- 100% of the medical professionals in this study observed a level of distress in autistic children in brightly lit environments. Mostafa reports that fluorescent lighting, due to glare and flicker, is a common trigger for sensory discomfort in autistic children.
- 70% of the medical professionals identified material sensitivity as a barrier during therapy sessions. Kinnealey et al. found that inappropriate textures and materials in therapy environments can reduce participation and increase avoidance behaviors [9].

Response from Educators

- Majority of educators attested to the fact that visual clutter and poor acoustics affect focus and concentration. Mostafa demonstrates that visually busy environments increase cognitive load and anxiety in autistic children, while Schafer notes that poor acoustic conditions, such as echoes and background noise, disrupt concentration and emotional regulation [10,11].

- The finding that simple, consistent floor plans reduce anxiety in 80% of children aligns with the ASPECTSS design framework, which emphasizes spatial clarity, predictable layouts, and clear circulation as essential for reducing stress and improving orientation [11].
- The effectiveness of designated sensory areas for emotional regulation, identified by 75% of educators, is supported by Ayres' sensory integration theory, which highlights the role of controlled sensory experiences in improving self-regulation and adaptive behavior [12].
- Additionally, preferences for specific textures and sensitivity to color schemes reflect established evidence that autistic children often react strongly to tactile and visual stimuli, with overly bright or high-contrast colors contributing to agitation and distress [9].

Summarily, autistic children require environments that are acoustically controlled, visually calm, spatially predictable, and sensitive to tactile and color-related stimuli. Such sensory-responsive spatial design is essential in key spaces such as classrooms, therapy rooms, and residential settings to support emotional regulation, focus, and effective learning.

Research Question 2: How can natural light and ventilation be optimized to support therapeutic outcomes for autistic children in Nigeria?

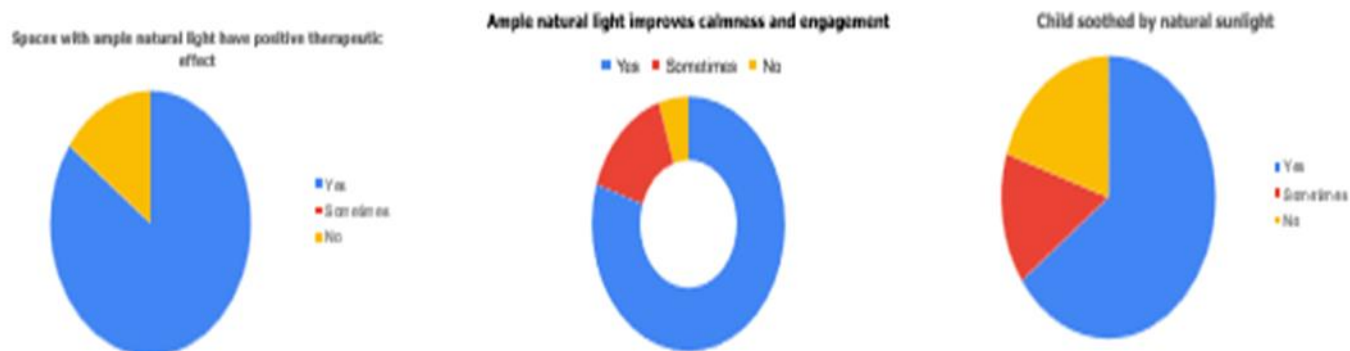


Figure 2: Data showing the impact of natural light and ventilation for better therapeutic outcomes of autistic children in Nigeria

Research also indicates that autistic children are often hypersensitive to artificial lighting, particularly fluorescent lights, which can flicker and emit auditory hums that exacerbate sensory distress [8,9]. Mostafa emphasizes that diffused natural light, achieved through shaded windows, frosted glazing, skylights, or light shelves, minimizes glare and sensory overload while maintaining adequate illumination. This aligns closely with the study's findings that spaces with ample, well-managed natural light have therapeutic benefits [5]. In the Nigerian context, where high temperatures and humidity are prevalent, passive ventilation strategies such as cross-ventilation, stack ventilation, and the use of operable windows are particularly effective [13,14]. These approaches not only improve thermal comfort but also reduce reliance on mechanical systems that may introduce noise an established trigger for sensory overload in autistic children [9].

Further studies indicate that poorly ventilated spaces with stagnant air, odors, or heat buildup can increase irritability and reduce attention in autistic children due to heightened olfactory and thermal sensitivities. By contrast, naturally ventilated environments promote calmness and sustained engagement by maintaining stable temperatures and fresh air circulation. In resource-constrained settings such as Nigeria, passive lighting and ventilation strategies also offer the added benefits of energy efficiency and resilience to inconsistent power supply.

Therefore, by integrating diffuse daylighting, effective shading, and passive ventilation strategies responsive to Nigeria's climatic conditions, educational and therapeutic spaces can significantly enhance emotional regulation, comfort, and engagement, thereby improving therapeutic and learning outcomes for autistic children.

Research Question 3: What sensory design strategies can be integrated into major spaces to create positive spatial experiences?

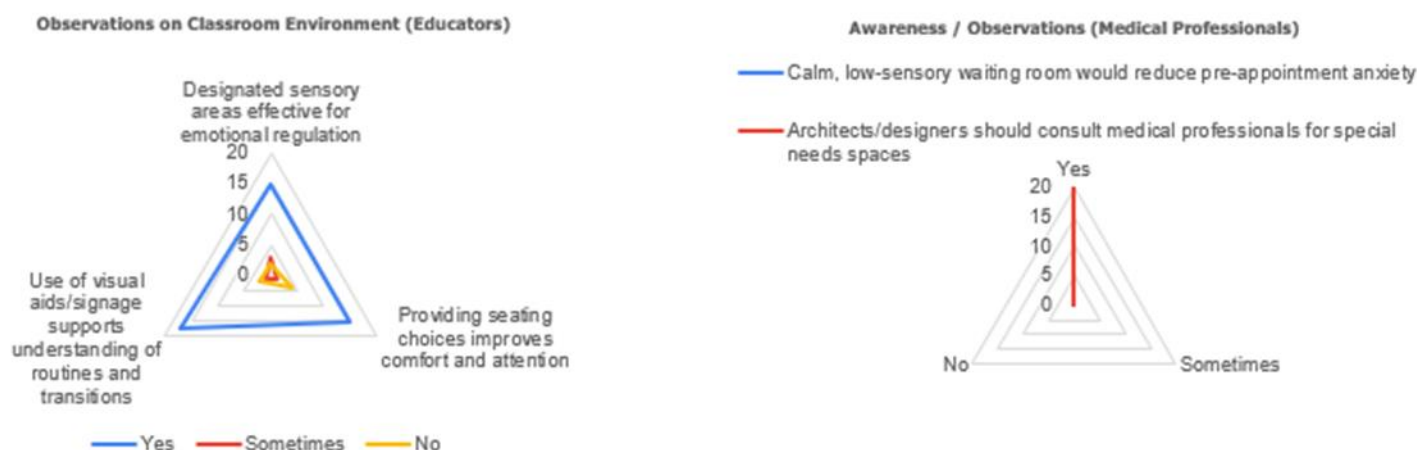


Figure 3: Data showing responses for sensory design strategies that can be integrated into major spaces to create positive spatial experiences

- Mostafa, through the ASPECTSS™ design framework, identifies calm transition spaces and low-arousal waiting areas as essential components of autism-friendly environments, noting that such spaces significantly reduce stress and improve behavioral regulation prior to therapy or learning activities. This supports the unanimous agreement among MPs that low-sensory waiting rooms reduce pre-appointment anxiety [5,10].
- Subsequent studies Kinnealey et al. confirm that access to sensory rooms or quiet zones improves attention, reduces maladaptive behaviors, and enhances participation in therapeutic and educational tasks. These findings align with educators' observations that sensory zones contribute positively to emotional regulation [9].
- Flexible and alternative seating options have similarly been shown to support comfort and attention in autistic children. Research by Fedewa and Erwin and Schilling and Schwartz found that adaptive seating, including soft seating, floor cushions, and movement-friendly furniture, improves on-task behavior and reduces restlessness in children with sensory processing differences. Such seating allows children to select postures that meet their proprioceptive and vestibular needs, reinforcing the study's findings on improved comfort and engagement [15,16].
- Autistic children often process visual information more effectively than verbal instructions [17]. Empirical studies by Dettmer et al. and Mostafa demonstrate that visual schedules, pictorial signage, and clear spatial cues reduce anxiety, improve comprehension of routines, and support smoother transitions between activities. This corroborates the high level of effectiveness reported by educators in the study [18].
- Finally, the importance of interdisciplinary collaboration between designers and medical professionals is reinforced in the literature. Ulrich et al. emphasize that evidence-based design outcomes are most effective when architects collaborate with clinicians to align spatial design with therapeutic goals. In autism-specific environments, this collaboration ensures that sensory design strategies are tailored to actual behavioral and developmental needs rather than aesthetic assumptions [19].
- Overall, empirical evidence strongly supports the study's findings that integrating low-stimulus environments, designated sensory zones, flexible seating, and clear visual guidance into major spaces can create positive spatial experiences for autistic children. These strategies collectively promote emotional regulation, reduce anxiety, and enhance engagement, forming a robust foundation for the design of effective educational and therapeutic environments.

Research Question 4: How can a boarding school design respond to Nigeria's climatic and cultural context?

Empirical evidence from both educators and medical professionals indicates that environmental responsiveness is essential for the effectiveness of spaces designed for autistic children in Nigeria. Data from the awareness and observation responses show a strong consensus that natural sunlight has a positive therapeutic effect on autistic children. A significant majority of respondents reported

that children are soothed by natural sunlight and that spaces with ample natural light improve calmness, engagement, and overall therapeutic outcomes. These findings empirically support the need for architectural designs that optimize building orientation, window placement, and shading devices to allow diffused daylight while preventing glare and heat gain, which are common challenges in Nigeria's tropical climate.

In addition, the findings demonstrate that environmental factors such as lighting, noise, and spatial organization significantly influence behavior during consultation and learning sessions. This aligns with empirical studies conducted in tropical regions, which show that passive design strategies, including cross-ventilation, deep overhangs, courtyards, and shaded transitional spaces, improve indoor thermal comfort while reducing reliance on mechanical cooling systems. Such strategies are particularly relevant in Nigeria, where high temperatures, humidity, and inconsistent power supply make naturally ventilated and climate-responsive buildings both practical and sustainable.

Cultural considerations are also empirically supported by the data, particularly the emphasis on calm, orderly, and socially supportive environments. The preference for simple layouts, clear circulation paths, and low-sensory environments aligns with Nigerian communal living patterns, where shared spaces, courtyards, and verandas traditionally serve as transitional zones that encourage interaction while offering relief from heat. The use of familiar local materials, such as timber, clay bricks, laterite, and textured finishes, can further enhance comfort and familiarity, reducing anxiety in autistic children by grounding the design in recognizable cultural elements.

Hence, the empirical findings confirm that an autism-sensitive boarding school design in Nigeria must integrate climatic responsiveness with cultural relevance. By optimizing natural light, promoting passive ventilation, using locally appropriate materials, and incorporating culturally familiar spatial forms, the proposed design can achieve both therapeutic effectiveness and contextual sustainability. This approach ensures that the architectural solution is not only evidence-based but also socially and environmentally attuned to the Nigerian context.

5. Conclusion

This study set out to investigate how architectural design can be used as a therapeutic tool to support autistic children within boarding school environments in Nigeria. The findings clearly demonstrate that autism-sensitive architecture is not merely an aesthetic or functional consideration, but a critical determinant of emotional regulation, learning capacity, and overall well-being for children on the autism spectrum. The research confirms that autistic children experience the built environment differently due to sensory processing variations, making conventional educational and residential design approaches largely inadequate for their needs.

The study concludes that calm, predictable, and sensory-regulated environments significantly reduce anxiety and behavioral distress

while enhancing focus, engagement, and therapeutic outcomes. Key environmental factors such as controlled natural lighting, effective ventilation, acoustic comfort, and clear spatial organization were consistently identified as essential components of supportive spaces. Poorly designed environments characterized by clutter, excessive noise, harsh lighting, and ambiguous circulation were found to undermine learning and therapeutic effectiveness.

Furthermore, the research establishes that integrating passive design strategies, such as daylight optimization and natural ventilation, is particularly relevant in the Nigerian context, where climatic conditions and infrastructural limitations necessitate sustainable and low-energy solutions. These strategies not only improve environmental comfort but also align with the sensory needs of autistic children. The study also highlights the importance of collaborative design processes, emphasizing that meaningful consultation with educators, medical professionals, and caregivers enhances the responsiveness and effectiveness of architectural solutions.

In conclusion, the research affirms that the design of boarding schools for autistic children must move beyond standardized educational models toward evidence-based, sensory-inclusive environments. Such an approach has the potential to significantly improve developmental, cognitive, and social outcomes, while fostering dignity, inclusion, and long-term well-being for autistic children in Nigeria.

References

1. Fornaro, M., Clementi, N., & Fornaro, P. (2009). Medicine and psychiatry in Western culture: Ancient Greek myths and modern prejudices. *Annals of General Psychiatry*, 8(1), 21.
2. American Psychological Association (Ed.). (2013). Diagnostic and statistical manual of mental disorders: DSM-5. *American Psychiatric Association*.
3. Chinawa, J. M., Bakare, M. O., & Oparaugo, C. T. (2016). Autism spectrum disorder in Nigeria: A review. *J Dev Phys Disabil*, 28(5), 785–797.
4. Daily Asset. (2025). Cultural beliefs, misinformation fuel autism myths. *Daily Asset*.
5. Mostafa, M. (2014). Architecture for autism: Autism ASPECTSS™ in school design. *International Journal of Architectural Research: ArchNet-IJAR*, 8(1), 143-158.
6. Grindle, C. F., Kovshoff, H., Hastings, R. P., & Remington, B. (2009). Parents' experiences of home-based applied behavior analysis programs for young children with autism. *Journal of Autism and Developmental Disorders*, 39(1), 42-56.
7. Mostafa, M. (2020). Architecture for autism: Built environment performance in accordance to the autism ASPECTSS design index. In *Autism 360°* (pp. 479-500). *Academic Press*.
8. Swart, G. T. (2006). Sensory perceptual issues in autism and asperger syndrome different sensory experiences different perceptual worlds. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, 15(3), 152.
9. Kinnealey, M., Pfeiffer, B., Miller, J., Roan, C., Shoener, R., & Ellner, M. L. (2012). Effect of classroom modification on attention and engagement of students with autism or dyspraxia. *American Journal of Occupational Therapy*, 66(5), 511-519.
10. Mostafa, M. (2008). An architecture for autism: Concepts of design intervention for the autistic user. *International journal of architectural research*, 2(1), 189-211.
11. Schafer, S. B. (2012). Optimizing cognitive coherence, learning, and psychological healing with drama-based video games. *Video game play and consciousness*, 287-309.
12. Ayres, A. J., & Network, P. T. (2005). Sensory integration and the child: 25th anniversary edition. Revised and updated by Pediatric Therapy Network. *Los Angeles, CA: Western*.
13. Olgyay, V. (2015). Design with climate: bioclimatic approach to architectural regionalism. *Princeton university press*.
14. Oginni, A. (2018). Comparative analysis of the thermal performance of selected public school classroom buildings in Lagos, Nigeria. In *Proceedings of the 8th International RAIS Conference on Social Sciences* (pp. 139-157). *Scientia Morality Research Institute*.
15. Fedewa, A. L., & Erwin, H. E. (2011). Stability balls and students with attention and hyperactivity concerns: Implications for on-task and in-seat behavior. *American Journal of Occupational Therapy*, 65(4), 393-399.
16. Schilling, D. L., & Schwartz, I. S. (2004). Alternative seating for young children with autism spectrum disorder: Effects on classroom behavior. *Journal of autism and developmental disorders*, 34(4), 423-432.
17. Hodgdon, L. (1995). Visual strategies for improving communication. *QuirkRoberts Publishing*.
18. Dettmer, S., Simpson, R. L., Myles, B. S., & Ganz, J. B. (2000). The use of visual supports to facilitate transitions of students with autism. *Focus on autism and other developmental disabilities*, 15(3), 163-169.
19. Ulrich, R. S., Zimring, C., Zhu, X., DuBose, J., Seo, H. B., Choi, Y. S., ... & Joseph, A. (2008). A review of the research literature on evidence-based healthcare design. *HERD: Health Environments Research & Design Journal*, 1(3), 61-125.

Copyright: ©2026 Adeola Ajayi, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.