ISSN Online: 3006-4708
ISSN Print: 3006-4694

SOCIAL SCIENCE REVIEW ARCHIVES

https://policyjournalofms.com

Designing for A Spectrum: A New Framework for Autism-Sensitive Schools to Foster Equality and Learning

Ar. Suleman Sareer [1], Ar. Adnan Ahmad Khan [2], Ar. Dr. Omer Shujat Bhatti [3]

[1] Professional Architect & Graduate of CECOS University, Peshawar KPK. (Author & Primary Researcher)
[2] Head of Department, Department of Architecture, CECOS University, Peshawar KPK. adnankhan@cecos.edu.pk (Co-Author)
[3] Associate Professor & CoD, Department of Architecture, School of Architecture & Planning, University of Management & Technology, Lahore. (Corresponding & Co-Author) omer.shujat@umt.edu.pk

DOI: https://doi.org/10.70670/sra.v3i4.1154

Abstract

Autism Spectrum Disorder (ASD) functions as a neuro-developmental condition which produces difficulties in communication, sensory processing and social interaction. This thesis studies how architectural designs are vital in developing educational and therapeutic environment which meet autism-sensitive requirements. Despite a global increase in autism diagnosis rates, reliable data about autism spectrum disorder prevalence in Pakistan remains unavailable. Statistics from 2020 indicate that Pakistan Autism Society estimates autism affects 350,000 children throughout the nation. This research focuses on addressing the autistic children needs that includes accessibility, sensory-sensitivities and therapeutic needs while linking proposed notions to SDGs in health, education and equality. It reveals that autism-friendly design advances independence, inclusion and learning thereby fostering quality of life for autistic children. Key recommendations include sensory-sensitive design, compartmentalization, spatial organization, transitions and quiet zones.

Keywords: Autism, Architecture, Autism Spectrum Disorder, Sensory Environment, Architectural Design, Autism-Friendly Environment.

Introduction

Autism, also known as Autism Spectrum Disorder (ASD), includes a diverse group of neuro-developmental conditions associated with brain development (WHO, 2023). It is a disability condition where individual challenges in social interaction and reciprocal communication, along with limited and repetitive activities, behaviors, and interests (Ostblom, 2022). These conditions are categorized by varying degrees of difficulty in social interaction, communication, and patterns of repetitive behaviors. Other features may include atypical sensory responses and challenges with transitioning between activities (WHO, 2023). Globally, approximately 1 in 100 children is diagnosed with autism (WHO, 2023), though some estimates suggest this figure could be 1 in 160 children (Caniato, 2021). ASD often emerges in early childhood but is frequently diagnosed much later (Zahid et al., 2025). The needs and abilities of individuals with autism vary significantly, ranging from those who can live independently to others requiring life-long care and support (WHO, 2023; Altenmuller-Lewis, 2017).

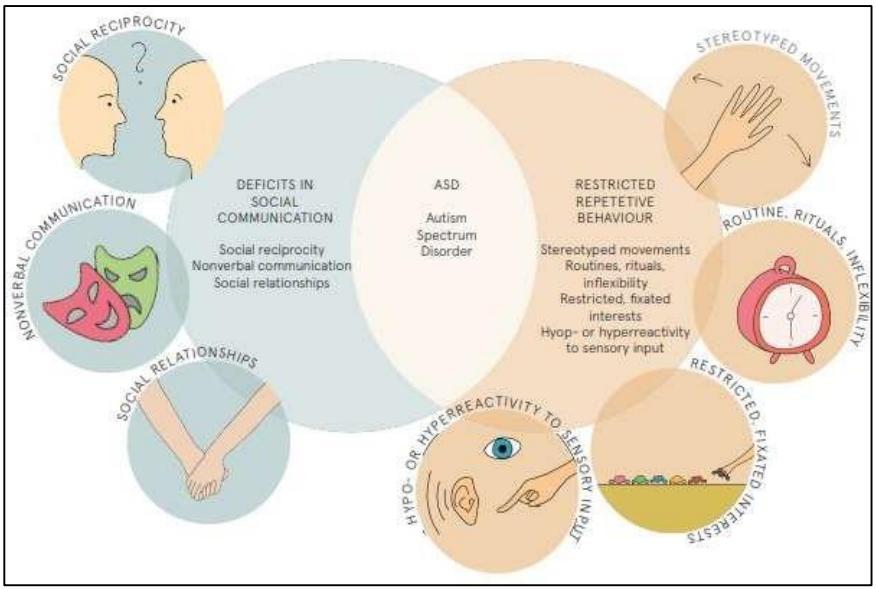


Figure 01 Symptoms of Autism

Research has revealed that the brain of an autistic individual differs from a 'neurotypical' brain. There is no typically specific autistic brain structure and the variation exists among individuals (Bhatti et al., 2024). Current research indicates that autistic traits result from changes in how various brain regions develop and connect with each other (Ostblom, 2022). Autistic individuals often experience co-occurring conditions such as epilepsy, anxiety, depression, and attention-deficit-hyperactivity disorder. Their sensory experiences can be atypical, including heightened sensitivities to stimuli, which may stem from brainstem abnormalities (Caniato, 2021). These sensory and behavioral traits necessitate tailored approaches in education, therapy, and environmental design to support their well-being (Omer et al., 2024).

The impact of autism extends beyond the individual, influencing families, caregivers, and broader societal structures. Challenges include difficulties in education, employment, and societal integration, compounded by limited awareness and support systems (Bhatti et al., 2022). Societal attitudes and government policies play a critical role in shaping the quality of life for autistic individuals (WHO, 2023). Understanding and accommodating the diverse needs of people with autism are essential for fostering inclusive societies. Due to having difficulty with executive functions, weak central coherence, poor mentalization and different sensory processing - they experience high level of stress, anxiety and sense of being misunderstood. For this reason, we aim to build a space that provides autistic-friendly environment, where autistic individuals are offered therapeutic support and mental, and emotional well-being – a space customized according to the needs (Ostblom, 2022).

Autism Spectrum Disorder (ASD) is a growing concern globally, and Pakistan is no exception. Despite a global increase in autism diagnosis rates, there is a lack of reliable data on the incidence of ASD in Pakistan. In 2020, the Pakistan Autism Society estimated that approximately 350,000 children in the country are living with autism. However, the actual number might be higher due to the underreporting and also lack of awareness (Asghar, et al., 2023; ASP). Research conducted in Karachi revealed that while 75% of participants had heard of autism, only a small percentage understood its symptoms or were aware of autism care centers in the city (Bhatti et al., 2025). This lack of awareness reflects a broader challenge across the country, where families face significant hurdles in accessing diagnostic and therapeutic services (Asghar, et al., 2023) and parents frequently bear the emotional and financial burden in silence, while children struggle with the challenges of autism without proper support (ASP).

Hence it was felt a strong need to explore how these challenges for autistic people could be helped through role of architecture played through research exploration and design intervention. Hence following problem statement was set forth:

Autistic children often face significant barriers in traditional educational and therapeutic settings due to sensory sensitivities, social challenges, and a lack of customized support structures. These barriers can limit their ability to engage meaningfully in learning, socialization, and self-development, leading to isolation, stress, and limited growth. This research seeks to address the need for an inclusive, specialized environment that combines therapeutic and educational support within an autism-friendly architectural design, that promotes the well-being, independence, and full development of autistic children.

Research objectives were as under:

1. To recognize their challenges and explore the impact of architectural elements in their intervention process.
2. To reduce stress and create a calming environment tailored to the sensory needs of autistic individuals.
3. To support independence by designing spaces that encourage self-reliance and exploration.
4. To promote social activities through thoughtfully designed zones that foster interaction and collaboration.

The scope of this research focused on addressing the autistic children needs that includes accessibility, sensory-sensitivities and therapeutic needs. The study is limited only to the autistic individuals and their needs. Also, the treatment types for autism might be limited due to not having highly-specialized technologies and it is only designed for school going children's.

Literature Review

Understanding the Concept of Autism & its implications

Autism Spectrum Disorder (ASD) is a developmental disorder that occurs throughout life (Mostafa, 2008) and is more frequently diagnosed in boys, but the gender difference could be explained by the fact that girls with this disorder are not diagnosed until adulthood (Ostblom, 2022; Altenmuller-Lewis, 2017). The disorder has a genetic aspect, and it develops as a result of the variations in the formation and interconnection of brain regions (Ostblom, 2022), going beyond the historical myths, such as the one suggesting refrigerator mother (Fitzgerald, 2013). Although it is incurable, symptoms may be alleviated with the help of behavioral and educational and skills-training interventions that can aid in development of language and social skills (Altenmuller-Lewis, 2017).

Figure 02 Three functional levels of autism

The symptoms of autism should be observed during the early development but they may not become fully evident until the social demands are beyond the capabilities of a child (Bhatti et al., 2024). These symptoms have to be significant impairing to the functioning and cannot be attributed to other developmental delays to be diagnosed formally (Ostblom, 2022). In order to indicate the broad range of needs, ASD is divided into three levels: Level 1 (High-functioning Autism, needs support), Level 2 (Autism, needs substantial support), and Level 3 (Severe Autism, needs very substantial support) (Rudy, 2024). The particular support requirements increase with the level, with Level 1 involving environmental modifications and group therapy, Level 2 speech and behavioral therapy, and Level 3

intensive and targeted communication and daily living strategies. This gradation highlights the sense of the spectrum of ASD that points to the individual experience of every person, which is frequently reflected in the saying of the community, which is one that says, If you have met one autistic person, you have met one autistic person (Flannery and Wisner-Carlson, 2020; Ostblom, 2022).

Autistic people experience fundamental difficulties within three main areas of socialization and communication, namely: social reciprocity, non-verbal communication and relationships. Challenges in social reciprocity include fewer interactions initiated, minimal sharing of emotions, and infrequent imitation of other people (Batool et al., 2024). They may not grasp and utilize non-verbal communication cues, such as gestures, eye contact, and facial expressions, and may be experienced in young children by limited pointing or showing, and by more subtle impairments in an adult with well-developed language. Moreover, relationships are difficult to establish, sustain, and comprehend as autistic people struggle to adjust to different social norms as stipulated by age, gender, and culture (Topper, 2024; Ostblom, 2022; Kansas). In addition to social interaction, one of the prominent features is sensory processing differences, including hypersensitivity, or an over-response to certain stimuli (such as bright lights, loud noises, or a specific texture), and hyposensitivity, or an under-response, which can result in such behaviors as making loud noises, repetitive behavior, or lacking awareness of internal sensations (hunger, pain, and so on) (Mentel and Bujniewicz, 2024; Ostblom, 2022). Moreover, monotony, an unwillingness to change routine, and highly developed special interests are characteristic features; although these characteristics may become a problem, they are also deemed as possible strengths and a fresh outlook among people with autism (Ostblom, 2022).

There are various therapies to reduce the symptoms of Autism Spectrum Disorder (ASD) and maximize abilities, and the general guideline of that type is to make each person dependent and enhance the quality of life through a specific approach to treatments (NIH, 2021). Two of the most popular behavioral and communication-oriented interventions are Applied Behavior Analysis (ABA) that involves data-driven methods to develop social and communication skills and ensure that difficult behaviors are suppressed through the promotion of action-consequence relations (EBH, 2023; Reid, 2024), and Cognitive Behavior Therapy (CBT) which offers pragmatic tools of emotional regulation and coping mechanisms and allows individuals to cope with anxiety and depression upon realizing the relationship between their thoughts and behaviors (EBH, 2023; Reid, Moreover, such treatments as Speech-Language, Occupational, and Physical therapy focus on the fundamental developmental domains; SLT improves verbal and non-verbal communication (Reid, 2024), Occupational therapy helps in sensory processing and motor coordination and activities to achieve social benefit (EBH, 2023; Reid, 2024), and Physical therapy cultivates motor skills used in posture and coordination (Reid, 2024).

In addition to standard clinical environments, a number of other alternative and physically-oriented treatments have considerable benefits as they use the special workplace and activities (Bhatti et al., 2024). Aquatic physiotherapy or hydro-therapy involves applying the characteristics of water, including its resistance, temperature, and buoyancy in order to improve motor activity, strength, and coordination and decrease sensory difficulties (CLH Healthcare; Amy, 2019; Healis Autism Centre, 2024). Equally, research has demonstrated that Equine therapy enhances core impairments of behaviour and communication and that after therapeutic horseback riding sessions, some improvements of self-regulation, motor planning, and language occur (Srinivasan, Cavagnino, and Bhat, 2018; Gabriels, et al., 2012). Other activity-based interventions are Cycling therapy that strengthens muscles, enhances balance and coordination, and increases confidence (Noble, 2023) and Gardening therapy that offers safe and calming environment that stimulates the senses and promotes the development of communication, motor skills and socialization (Autism Specialty Group, 2022).

Autism & Architecture

Autism Spectrum Disorder (ASD) is a complicated neurodevelopmental disorder, which is marked by communication, socialization, and repetitive behavioral difficulties, and distinctive sensory sensibilities, which require well planned environments to improve the quality of life and learning

(Mostafa, 2008). Although the knowledge of ASD has increased, architectural design standards specifically aimed at this population group are still not properly developed, which creates a very important gap (Altenmuller-Lewis, 2017; Mostafa, 2008). The main assumption is that architecture can be proactive in alleviating sensory discomfort and enhancing the results through the organization of the environment due to the use of spatial solutions that provide a variety of conditions with different degrees of stimulus intensity (Gaiani, Fantoni, and Katamadze, April 2022). This fast changing sphere is concerned with the existing hypersensitivity or hyposensitivity in the ASD, in which special design solutions are needed to improve the functionality and comfort of a space (Gaiani, Fantoni, and Katamadze, April 2022; Mostafa, 2008). One of the frameworks of this endeavor is the ASPECTSS index by Magda Mostafa that offer principles of the autism-friendly design, including acoustics, spatial sequencing, safety, sensory zoning, transitions, compartmentalization, and escape spaces (Bhatti et al., 2025). The supplementary measures are the ability to create a flexible learning environment with adjustable design (Gaiani, Fantoni, and Katamadze, April 2022), the availability of an opportunity to be connected to the outside area, such as a courtyard that can be sensory (Mostafa, 2014; Gaiani, Fantoni, and Katamadze, April 2022), and the introduction of safety measures to ensure that risks to individuals with the tendency to elop are reduced through the use of secure layout and controlled access (Fitzgerald, 20

Spatial Organization and Sensory-Sensitive Design.

The most important depends on sensory-sensitive design since autistic people are characterized by different sensorial sensitivities (hypersensitivity or hyposensitivity) that directly affect their behaviors (Altenmuller-Lewis, 2017). Autistic-friendly built environment follows the necessary guidelines of sensitive design to provide comfort, efficiency, and productivity (Fitzgerald, 2013) and the control over such sensory factors as acoustics, lighting, coloring, texture, and temperature is strictly limited. Among the most decisive factors, there are acoustics and lighting, as good acoustics established due to soundproofing and sound-absorbing materials decrease the amount of sensory overload and form a more relaxed interior, which positively impacts learning, attention ability, and response time (Altenmuller-Lewis, 2017; Mostafa, 2008; Mentel and Bujniewicz, 2024). In the same manner, lighting design should be able to moderate both natural and artificial sources to prevent glare and flickering with such solutions as vertical glass elements above eye level to be effective (Gaiani, Fantoni, & Katamadze, April 2022; Altenmuller-Lewis, 2017; Fitzgerald, 2013). The calming and neutral colors, dull pastels, non-reflective surfaces, and the absence of too complex patterns is further used to make the visual environment soothing (Altenmuller-Lewis, 2017; Raafat and Almaz, March 2024). Space arrangement has a great effect on behavior and comfort. Learning to focus and minimise distractions is achieved through compartmentalization, which involves the separation of space into particular areas that are used in particular activities (Mostafa, 2008). It includes a logical, sensorial-compatible structure in which low-stimuli functions (e.g., classrooms) are segregated, and high-stimuli functions (e.g., music rooms) are also segregated, and services, such as kitchen and bathrooms, are kept a distance away from student areas (Altenmuller- Lewis, 2017). The concept of a gradient design with transitional areas that are characterised by changing the texture/lighting enables the reduction of anxiety and easier navigation (Mostafa, 2014; Gaiani, Fantoni, and Katamadze, April 2022). In addition, anticipated environments are facilitated by apparent zoning, visual wayfinding, and de-cluttering (Raafat and Almaz, March 2024), and single-way circulation patterns to prevent congestion and disturbance (Mentel and Bujniewicz, 2024; Altenmuller-Lewis, 2017).

Facilitating Behavior, Interaction and Safety.

Considerate design should also be able to meet sensory-seeking behavior and facilitate socialization and safety. These include offering areas with quiet zones and sensory rooms with textured walls and weighted blankets to relax and provide sensory input and movement-friendly parts to perform such activities as swinging (Raafat & Almaz, March 2024). To create a social interaction, the design must be balanced between large open spaces to work in groups and smaller spaces that are enclosed to

provide a one-on-one interaction or a retreat (Fitzgerald, 2013). Mobility issues and absence of danger awareness are a primary cause of safety concerns; it is managed through controlled exits, non-slippery floors, soft-edged furniture, and durable and easy to wash materials to allow sensory-seeking behaviors, as well as relaxing soft furniture (Raafat and Almaz, March 2024; Fitzgerald, 2013). Architectural research establishes that architecture greatly influences behavior; as an example, acoustic changes and spatial segmentation used by Mostafa in schools resulted in the recorded increase of attention span, response time and temperament change (Mostafa, 2008). The presence of the escape spaces gives an essential option of recalibration of sensory reactions in the overstimulated process (Mostafa, 2008; Mentel and Bujniewicz, 2024), whereas the compartmentalized classroom designs minimize distractions and enhance predictability, as well as precondition focused learning because of the restriction of visual accessibility (Mostafa, 2008).

Application of Inclusive Design and Biophilic Principle.

Designing an autism-friendly interior would be a flexible measure that helps to promote inclusion and consider the needs and requirements of individuals at various times. This entails the appropriate spatial support and architectural development of buildings, which are equally reachable as well as economical in their design considerations, informed by the principles of equitable usage, elasticity, simplicity, and error tolerance (Raafat and Almaz, March 2024). In the design of learning environments, such principles as layering with entry sequences, the creation of microclimates of sensory refuges, and the use of introverted designs with central courtyards can be used to promote social interaction and make nature a part of the design (Raafat and Almaz, March 2024). The buildings within buildings idea creates miniature and manageable micro-climates that are useful in privacy and sound control. A neuro-atypical educational spaces study by Gaiani, Fantoni, and Katamadze (2022) suggests an incremental plan, considering the intensity of interaction, and locating a courtyard in the center of the spatial system with buffer zones among academic and leisure fields and soft boundaries between outside and inside. Mentel and Bujniewicz (2024) describe their case study of the Northern School of Autism in Melbourne as an example of these principles with shape defined by avoiding crowding, a corridor-like arrangement of classes, windows to prevent glare, and the use of sound-absorbing material and color transitions. Biophilic design, which brings the users in touch with the natural world by including water features, indoor plants, and natural materials, has been proven to be calming down (Raafat and Almaz, March 2024). Lastly, there are some standards and bylaws, which offer quantifiable requirements such as the area requirements (2-3 sq.m per child), the lighting (LED between 2700K and 6500K), a muted color palette, the acoustical mitigation, and detailed specifications on the accessibility, safety, and spatial sequencing, so that toilets and kitchens are not in the learning areas.

Case Studies & Analysis

An analysis of the case studies of Oasis School for Autism (Lahore), Bridges Autism Center (Peshawar), We Care Autism Academy (Peshawar), and New Struan School (Scotland) indicates that there exist several strategies to the development of autism-friendly learning environments, such as comprehensive and purpose-built facilities, and more practical and adapted ones. The two most holistic and model-oriented models are the Oasis School and New Struan School. Oasis employs a single-story, introverted design which features a central courtyard as a buffer zone, rigidness of spatial sequencing to partition high and low-stimulus functions, judicious color scheme. Equally, New Struan School, as an intended dedicated purpose building, is characterized by a definite T-structure, with an atrium core, state-of-the-art acoustic solutions such as soundproofed masonry walls, compartmentalized classrooms and secure and landscaped play areas. Conversely, the Bridges Autism Center and We Care Autism Academy are functional, though in a narrower, modified environment. Bridges successfully employs the compartmentalization technique in the rooms to design low-anxiety groups and artificially controls lighting, whereas We Care, a basement facility, gives more priority to the reduction of the direct sunlight and offers a relaxing lawn area despite having a considerably small area.

Figure 03 Case studies

The points of comparison are critical. The control of lighting and safety is universal in all case studies whereas the purpose-built facilities (Oasis and New Struan) are exceptional to carry out more comprehensive architectural plans such as spatial sequencing, buffer, and introverted designs to make up the whole experience. An element of bridges and New Struan is compartmentalization to minimize distractions, which is not available in Oasis and We Care. It is worth noting that there is an advanced acoustic treatment in New Struan case study which is a specific and high-lighted aspect unlike the other facilities indicating that there is an area where enhancement can be carried out. The comparison emphasizes that although some core sensory needs such as lighting and safety cannot be reduced, the installation of superior architectural principles such as sequenced circulation, sensory zoning, and special acoustics is a matter of whether the space was designed specifically to a ground-up or modified based on an existing building, where the former allows a more holistic, integrated therapeutic space.

Based on the above review of literature and exploration with reference to the selected context and set forth objectives of the design based research exploration, it was further decided to opt for a site analysis of the selected site to see its potential usage for the design of the anticipated facility.

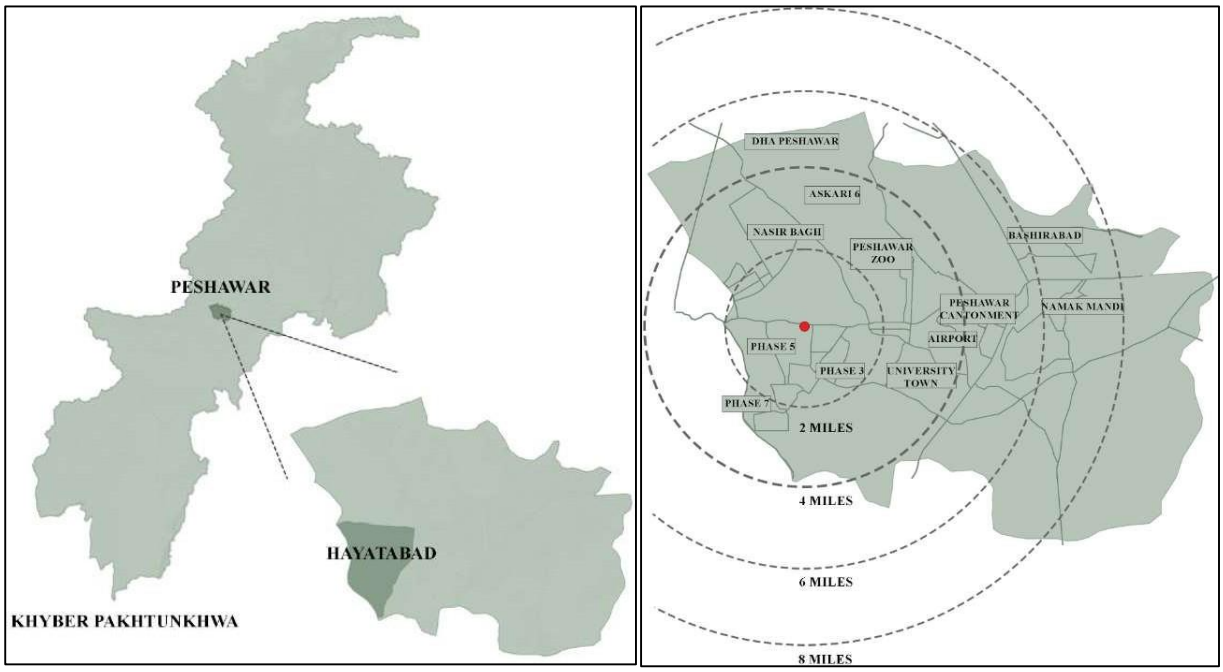
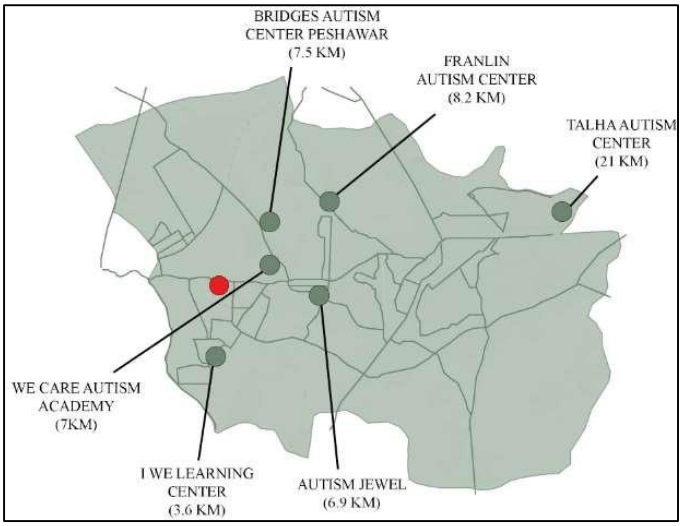
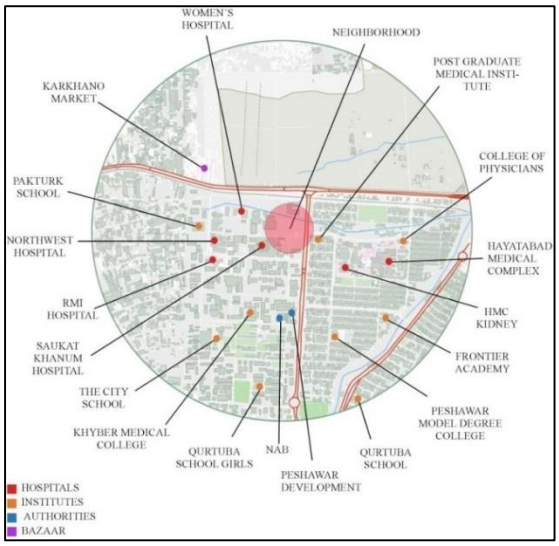


Figure 04 Location and Distance of Site

Peshawar is the capital city of the province. The site is located in Phase 5, Hayatabad, Peshawar in the Khyber Pakhtunkhwa province of Pakistan. Peshawar covers a total area of 1472.0 square kilometers. The total population of the district is 4,758,762. Site locations and travel distances are shown above in figure -------.





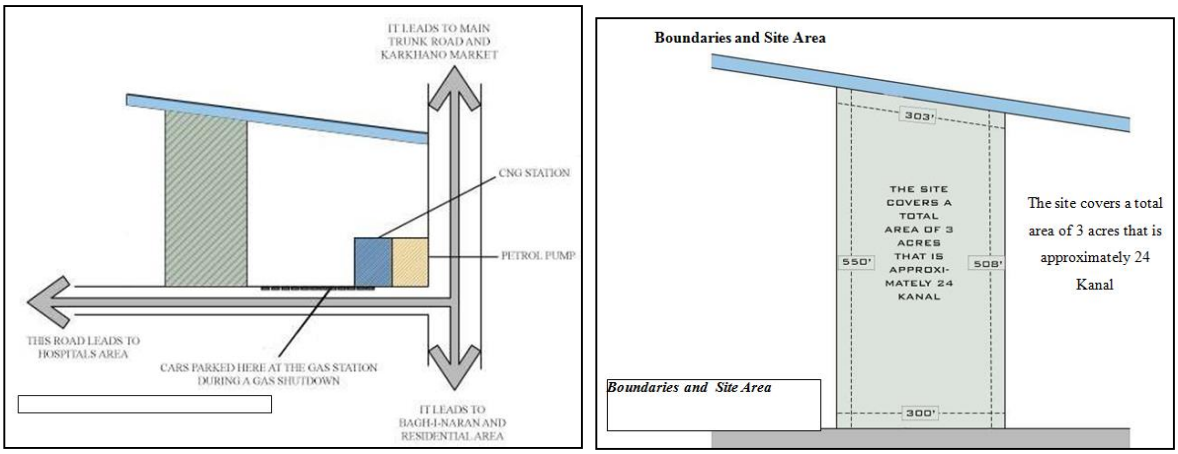


Figure 05 Details of Selected Site & analysis

The site covers a total area of 3 acres that is approximately 24 Kanal. This site is owned by health department, but is under the Peshawar Development Authority. According to PDA, the setbacks are that in front a space of 30ft (3.1m) should be kept clear. Building rear should have 15ft (2m) area clear whereas for sides, 10ft (3m) area should be kept clear. The covered area should be maximum 65% of the plot/ site. The maximum height of the building excluding water tank and staircase shall not exceed 5 storey's. The total size of the road is 30ft, with each road of 15 ft whereas the pedestrian path is 8 ft each. The difference between the highest and lowest points is 5 feet, or 60 inches. Site has undulating landscape with high elevations on the north and west side. It is suitable for construction with minor alterations made to this site. Peshawar soil is piedmont soil, and lacustrine soil. Piedmont soil is well- drained soil, provides stable foundation.

Lacustrine is fine- grained and fertile soil, needs compaction for heavy structures. Peshawar covers a total area of 1472.0 square kilometers and has a population density of 22,000 people per square kilometer. The total population of the district is 4,758,762. Regarding Hayatabad, a suburb of Peshawar, population of Hayatabad Township IS over 350,000. On the back side, there is floodway. So, the view is open. On the west side the view is blocked due to the 3- story building. On the east side, the plot is vacant. On the front, the view is open as there are no high- rise buildings. Summers are extended, intensely hot, and clear, while winters are chilly and partly cloudy. Temperatures range between 5°C and 40°C, with rare instances of dropping below 1°C or exceeding 45°C. Peshawar has a very moderate pattern of rain with average of 840mm per year. Rain is experienced more during summer especially July and August. Whereas, winters are bit drier. In Peshawar, from May to June, wind is mostly from West. From June to October, it is from South with 78% peak and it is from north from October to May. Humidity starts from July to September, and hits its peak in August reaching 70% of humidity. In a nut shell the overall site analysis in the form of SWOT analysis for the project is shared below in table 01.

Table 01 SWOT Analysis

Strengths	Weakness
• Proximity to Medical Facilities - immediate medical attention if needed. • Collaboration opportunities with hospitals for research, therapy • Established Infrastructure Proximity to hospitals – awareness and support about autism	• Noise and air pollution due to proximity to hospitals Overcrowding – high traffic due to hospitals Accessibility to hospitals might reduce the privacy or seclusion needed for individuals with autism

Opportunities	Threats
• Enhanced Community Integration - bridge the gap b/w medical care and community support for ASD people • Funding or support from both governmental bodies and NGOs focused on healthcare and autism advocacy. Innovative Design Solutions	• Stigma and Misconceptions around autism or challenges in designing spaces • Market Resistance as design might not align with mainstream architectural trends or demands Competition - Other might already be offering specialized spaces for autism

Analysis of Data:

In Pakistan, total 350,000 children are affected by Autism but male-to-female ratio in Pakistan is 4:1. According to 2021, global diagnosis rate increased to 1 in 100 children. The prevalence of hyperactivity and hypoactivity in Autistic individuals can vary. Around 40%-70% autistic children exhibit hyperactive behavior, of what the aggregate is 55%. Boys are more prone and shows more symptoms of ASD and its related impairments. The global autism prevalence from 2012 to 2021 year shows steady increase over time. In 2012, it was 62 per 10,000 individuals and in 2021, it rosed to 100 per 10,000 individuals.

Design Evolution

Concept Development

Puzzle is used as a design concept referring to the uniqueness and individualism of each autistic person. Individuals with autism interprets and experiences the world in their own unique way. One approach towards it is, each puzzle represents an autistic individual waiting for the rest of the picture to fill in — be it through contact with other children on the spectrum or with neurotypicals. The architectural scheme should respond to this interrelatedness, in which the blocks work together to create a cohesive, supportive, and enriching home for children to live, learn, and grow. It promotes "fit-in" environment where each child feels welcomed and comfortable.

Another approach is considering different blocks of the school as puzzle piece and each block has a different purpose (i.e. classrooms, therapy areas, recess). The places are segmented yet interconnected, encouraging structured exploration and social interaction. Each puzzle piece presents specific function (zone) within the school. The design would contain 3 major zones i.e. low-stimulation, moderate stimulation and high-stimulation zones. The end product is going to be a Fit-In Environment where every single aspect is designed to suit the autistic children and create a predictable, engaging and socially fulfilling environment for those on the spectrum. The design needs to be intuitive, flexible, and based on a robust understanding of the ways autistic people perceive and engage with the world around them.

Major aspects shape the design of the building as it acts as the basic requirements for creating autism-friendly environment. These aspects define essential elements to be part of the design for building school and center for individuals with ASD. It should address the main concern related to accessibility, sensory-sensitivities and therapeutic needs. To achieve this, it is important to focus on zoning, spatial organization, sensory consideration, integration of nature and way finding. Zoning is dividing different activities based on the stimulation level and then placing them in a way that high-stimulation and low-stimulation are not placed together to avoid the triggering the children. High-stimulation includes physical therapies, washroom, and play areas, moderate includes educational zone, art and creativity and also occupational therapy whereas low-stimulation includes diagnosis rooms and therapy rooms. Spatial organization ensures that the layout should be arranged based on accessibility, similar functions to be placed together and that therapeutic areas to be placed close to nature. As autistic children face difficulty while navigating, it is important to provide proper signages, visual cues, transition spaces, and curved corridors. Due to sensory sensitivities, sensory

consideration regarding lighting, acoustics, color and texture, and smell and ventilation is must to avoid sensory overload. Another aspect is the building should offer direct access to nature, gardens and sensory play spaces to improve relaxation social engagement.

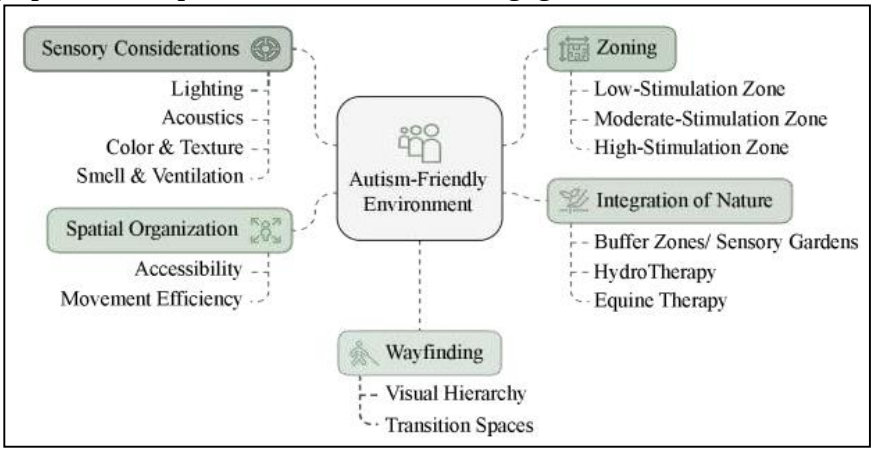


Figure 06 Key Design Aspects Integrated

While designing a space for autistic individuals, it is important to use Magda Mostafa's ASPECTSS index as it serves as a foundational framework for autism-friendly design, focusing on acoustics, spatial sequencing, safety, sensory zoning, transitions, compartmentalization, and escape space. For acoustical mitigation in low-stimulus zones require high acoustical control to enhance the focus level, with proper measures are implemented i.e. sound-absorbent materials and blinds, acoustics-block use, and double glazing. At macro-level, wall-mounted sound-absorbent materials to be used and for flooring use vinyl or carpet tiles. For outdoor areas, use tactile surfaces as it helps in enhancing sensory engagement. Generally, the floor surfaces must be low-slip such as cork floors, and wood floors. The color palette used for Autism-friendly building is neutrals, earth, muted and pastel tone colors for soothing sensory effect. Soft gradient colors should be used to differentiate the spatial boundaries. Lighting sensitivity also persists in autistic individuals for that reason while using artificial lighting, it should range from 2700K to 6500K. Doors should be soft-close doors to avoid door slamming (Raafat & Almaz, March 2024).

Proposed Design

Figure 07 Proposed Master Plan

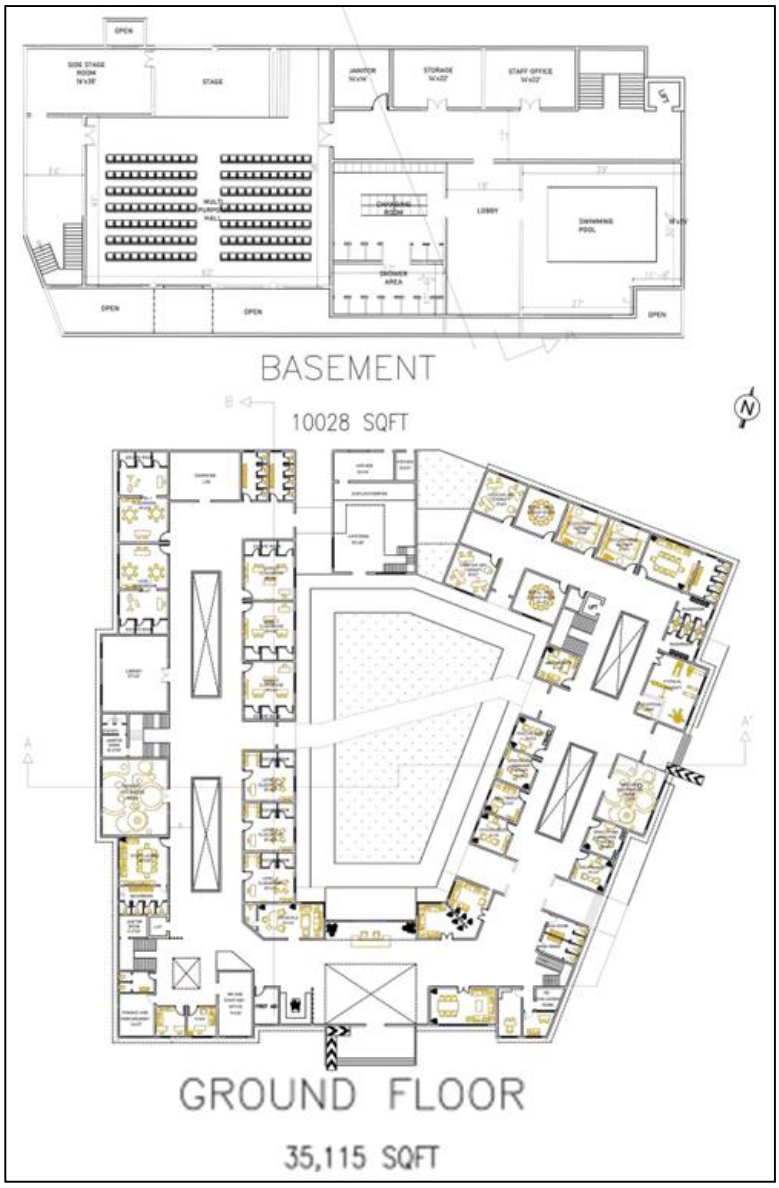


Figure 08 Proposed Basement & Ground Floor Plans

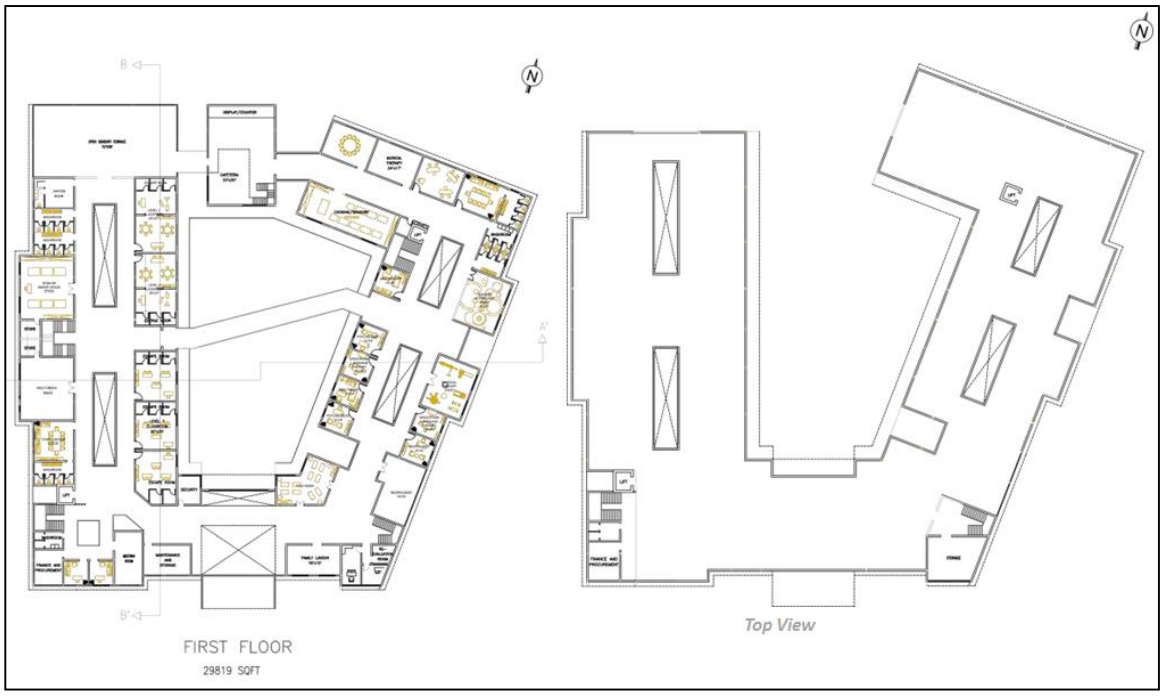


Figure 09 Proposed First Floor Plan & Roof Plan

Figure 10 Proposed Renderings of the Design

Research Findings

Key research findings mainly included that the crucial role of a conscious and understanding design approach that transcends functionality to meet specific sensual, emotional, and developmental requirements of autistic children. The study confirms the effectiveness of applying special, evidence-based architectural principles, such as sensory-sensitive designing to alleviate overstimulation, strategic zoning and spatial compartmentalization to achieve predictability and cut down distractions, and nature integration and safe out-of-doors environments to achieve relaxation. Also, the use of structural framework like the Aspects index is a critical and structured methodology to establishing environments that enable autonomy and safety. Through a strictly adhered alignment of these architectural interventions to the global interests which have been spelt out in the Sustainable Development Goals (SDGs), especially those focused on health, education, and fewer inequalities, the project has highlighted its wider applicability and influence to the society. Finally, this study will assume that an inclusive architectural paradigm is not a luxury but a necessity. The resultant design is not just a building; but a proactive act of care and dignity; a place of empowerment, which goes out of its way to help neurodiverse children to flourish hence making the case of an inclusive built environment as its core principle.

Research Conclusions

The exploration and design of a school and rehabilitation center for autistic children presented in this thesis underscores the critical role architecture plays in shaping inclusive and therapeutic environments. Through comprehensive research, literature review, case studies, and design development, the study confirms that a thoughtfully crafted space tailored to the sensory, emotional, and developmental needs of children with Autism Spectrum Disorder (ASD) can significantly enhance their quality of life, learning outcomes, and social integration.

By implementing sensory-sensitive design principles, zoning strategies, spatial compartmentalization, and nature integration, the proposed design provides a holistic solution that promotes calmness, predictability, and autonomy. Emphasis on safety, accessibility, and therapeutic functionality ensures that every aspect of the built environment contributes to the well-being of its users. The integration of the ASPECTSS framework by Magda Mostafa and alignment with the Sustainable Development Goals (SDGs) further solidify the project's relevance and potential societal impact.

Ultimately, this research advocates for an architectural paradigm that goes beyond functionality to embody empathy, inclusivity, and dignity for autistic individuals. The design is not just a building—it is a statement of care, a space of empowerment, and a step toward a more inclusive society where all children, regardless of their neurological differences, are given the opportunity to thrive.

References:

Altenmuller-Lewis, U. (2017). Designing Schools for Students on the Spectrum. The Design Journal, 2215-2229.

Asghar, B., Asghar, F., Riaz, E., Iqbal, Z., Fatima, S. M., & Fatima, H. (2023). The rise in autism spectrum disease: is the Pakistani population aware of the symptoms? nternational Journal of Surgery: Global Health 6(5).

ASP. (n.d.). Autism Society of Pakistan. Retrieved from Autism Society of Pakistan: https://autismpak.com/

Caniato, M. (2021). Recent Advances on Indoor Comfort for Autistic Individuals. Architecture and Autism. Sensory Perception an Independent Living , (pp. 23-26). Triste.

CLH Healthcare. (n.d.). Hydrotherapy: What are the Benefits for Autism? Retrieved from CLH Healthcare: https://clhgroup.co.uk/learning-centre/wellbeing/hydrotherapy-what-are- the-benefits-for-autism#:~:text=Hydrotherapy%20can%20improve%20social%20behaviours&text=Research%20has%20shown%20that%20aerobic,spinning%2C%20and%20head%2Dnod ding.

Fitzgerald, M. (2013). Recent Advances in Autism Spectrum Disorders - Vol II. Rijeka, Croatia: InTech.

Flannery, K. A., & Wisner-Carlson, R. (2020). Autism and Education. Child Adolesc Psychiatr Clin N Am., 29(2), 319-343.

Gabriels, R. L., Agnew, J. A., Holt, K. D., Shoffner, A., Zhaoxing, P., Ruzzano, S., . . . Mesibov, G. (2012). Pilot study measuring the effects of therapeutic horseback riding on school-age children and adolescents with autism spectrum disorders. Research in Autism Spectrum Disorders, 6(2), 578-588.

Kansas, U. o. (n.d.). Social difficulties in autism spectrum disorder. Retrieved from TheUniversity of Kansas: https://educationonline.ku.edu/community/social- difficulties-in-autism-spectrum-disorder

Li, Z., Yang, L., Chen, H., Fang, Y., Zhang, T., Yin, X., . . . Lu, M. (2022). Global, regional and national burden of autism spectrum disorder from 1990 to 2019: results from the Global Burden of Disease Study 2019. Cambridge University Press.

Manchala, S. (2014). Center for Autistic Children an Architectural Intervention.

Mentel, K., & Bujniewicz, Z. (2024). Designing for pupils with the autism spectrum disorder, case

study of the Northern School for utism, Melbourne, Australia. MATEC Web of Conferences 396, 08004.
Mostafa, M. (2008). An An Architecture for Autism: Concepts of Design Intervention for the Autistic User. International Journal of Archietctural Research, 2 (1), 189-211.
NIH. (2021). What are the treatments for autism? Retrieved from NIH: https://www.nichd.nih.gov/health/topics/autism/conditioninfo/treatments
Ostblom, L. (2022). An Autism-Friendly Architecture. KTH Royal Institute of Technology.
Spectrum. (n.d.). Global AutismPrevalence. Retrieved from Spectrum: https://autismprevalence.thetransmitter.org/?min_yearpublished=&max_yearpublished=&yearsstudied_number_min=&yearsstudied_number_max=&min_samplesize=&max_samplesize=&min_prevalenceper10000=&max_prevalenceper10000=&studytype=&keyword=&timeline_type=publishe
Srinivasan, S. M., Cavagnino, D. T., & Bhat, A. N. (2018). Effects of Equine Therapy on Individuals with Autism Spectrum Disorder: A Systematic Review. Rev J Autism Dev Disord, 5(2), 156–175.
Batool, S., Omer, A., & Bhatti, S. (2024). Unlocking the Metaverse Potential : Evaluation of Public and Private Higher Educational Institutions in Pakistan on adoption to Futuristic Technologies * Corresponding Author. Pakistan Languages and Humanities Review, 8(2).
Bhatti, O. S., Ghufran, A., Shah, A., & Iqbal, M. A. (2024). Unveiling the potential of Epidemic-Resilient Architecture through cultural integration & responsiveness for developing countries : A Virtual Reality Exploration in Pakistan with focus on enduser participation in healthcare. Remittances Review, 09(No. 1), 2277–2304.
Bhatti, O. S., Mujahid, S., & Hamid, S. A. (2024). Therapeutic Transformation through Healing Environment . Evaluation of Post Surgical Facilities Optimization in Selected Tertiary Healthcare Facilities in Post Covid-19 KPK , Pakistan. Journal of Health and Rehabilitation Research, 4(3), 706–712.
Bhatti, O. S., Usman, M., & Zahra, R. (2025). Optimizing Healthcare Spaces In Post-Covid19 : An Environmental Evaluation Of Outpatient Department Design At DHQ Teaching Hospital ,. International Journal of Human and Society, 5(01), 78–103.
Omer, A., Bhatti, S., Madiha, A., Jahangiri, I., Iftakhar, A. N., Design, E., & Design, E. (2024). INTERACTIVE SPATIAL EVALUATION FOR ENVIRONMENTAL ENHANCEMENT : CROSS COMPARISON OF SELECTED OLD AGE HOMES FOR SUSTAINABLE USAGE . Remittances Review, 6588(March), 689–706.
Omer Shujat Bhatti, Muhammad Zahid Ilyas, Rida Zahra, F. K. (2025). Built for Crisis! Exploring User Satisfaction With The Emergency Department Environment in a Selected Teaching Hospital. Review Journal of Neurological & Medical Sciences Review, 3(1), 175–210.
Shujat Bhatti, O., Anjum, N., & Abid, M. (2022). Spatial Design Evaluation of Accident and Emergency Department Optimization: a Case of Capital Hospital G-6, Islamabad. Journal of Research in Architecture & Planning, 32(2), 48–59. https://doi.org/10.53700/jrap3222022_5
Zahid, R., Bhatti, O. S., & Javed, H. (2025). HIV HEALTHCARE FACILITY INTEGRATION. BUILDING THE CASE FOR BUSTING THE MYTHS & OPTIMIZING HIV PATIENT TREATMENT IN HOSPITALS. The Research of Medical Science Review, 3(1), 544–558.
Amy. (2019, August 18). Some of the many benefits of swimming and aquatic therapy for those with ASD/other abilities. Retrieved from Autism Swim.
Cleveland Clinic. (2021, November 5). Types and health benefits of hydrotherapy. Cleveland Clinic. Retrieved from Cleveland Clinic: https://health.clevelandclinic.org/what-is-hydrotherapy/
Gaiani, A., Fantoni, D., & Katamadze, S. (April 2022). Autism and Architecture: The Importance of a Gradual Spatial Transition. Athens Journal of Architecture, 18 (2), 175- 194.
Autism Specialty Group. (2022, December 15). Gardening with Autism: How Keeping a Garden Benefits Children with ASD. Retrieved from Autism Specialty Group:

https://www.autismspecialtygroup.com/blog/gardening-with-autism
Noble, O. (2023, September 13). Does Cycling Help Children with Autism? Retrieved from Autism Parenting Magazine: https://www.autismparentingmagazine.com/cycling- with-autism/
EBH. (2023, November 2). 5 Common Types of Therapy: What Is Best for Autism? Retrieved from Empower Behavioral Health: https://www.empowerbh.com/blog/common-types- of-therapy-for-autism/
WHO. (2023, November 15). Autism. Retrieved from World Health Organization: https://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders?gad_source=1&gclid=CjwKCAiAl4a6BhBqEiwAqvrquqWBGwfWYJUHAi0j0Jqu9pjlglSfKBw-ZLEPofyyFHLtbAv6UuRO8BoCB80QAvD_BwE
Reid, S. (2024, February 5). Autism Treatments, Interventions, and Therapy Options. Retrieved from HelpGuide.org: https://www.helpguide.org/mental-health/autism/autism- treatments-therapies-interventions
Raafat, I., & Almaz, A. F. (March 2024). The role of architectural and interior design in creating an autism-friendly environment to promote sensory-mitigated design as one of the autistic needs. International Design Journal, Vol. 14 No.2, 239-255.
NeuroLaunch editorial team. (2024, August 11). Hyperactivity in Autistic Children: Causes, Signs, and Management Strategies. Retrieved from NeuroLaunch: https://neurolaunch.com/why-is-my-autistic-child-so-hyper/?utm_source=chatgpt.com#google_vignette
Rudy, L. J. (2024, October). Understanding the Three Levels of Autism. Retrieved from VeryWellHealth: https://www.verywellhealth.com/what-are-the-three-levels-of-autism-260233
Topper, A. (2024, November 1). How does Autism Affect Social Interaction? Retrieved from Behavioral Intervention for Autism: https://behavioralinterventionforautism.com/blog/how-does-autism-affect-social-interaction/
Healis Autism Centre. (2024, December 12). Benefits of Hydrotherapy for Children with ASD. Retrieved from Healis Autism Centre: https://www.healisautism.com/post/benefits-hydrotherapy-children-asd