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Architecture of Empathy: Examining Environmental Barriers and Spatial Needs of Adults with Down Syndrome

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Abstract

Neurodivergent adults often encounter barriers when navigating and inhabiting the built environment, largely due to spatial configurations that fail to consider cognitive, sensory, and behavioral differences. While architectural discourse has increasingly addressed accessibility in relation to mobility impairments, comparatively limited attention has been directed toward sensory and cognitive accessibility for adults with neurodevelopmental conditions. This study examines the relationship between spatial environments and the daily independence of adults with Down syndrome, with particular focus on the role of sensory accessibility in shaping spatial experience.

The research aims to identify environmental factors that influence autonomy among neurodivergent adults within everyday built environments. Using a qualitative research framework, the study draws upon academic literature, interviews with neurodivergent adults and their caregivers, and observational insights. The research investigates sensory processing differences, spatial predictability, environmental stimuli, and behavioral responses in relation to architectural space.

Findings suggest that spatial disorientation, sensory overstimulation, and abrupt environmental transitions can significantly affect the comfort and independence of adults with Down syndrome. These challenges are often intensified by architectural environments characterized by visual complexity, unclear wayfinding, inconsistent spatial organization, and inadequate sensory buffering. Conversely, environments that emphasize spatial clarity, predictable layouts, moderated sensory stimuli, and gradual transitions tend to support greater autonomy and emotional stability.

The study proposes the concept of sensory accessibility as an important dimension of inclusive architecture. Rather than focusing solely on mobility standards, sensory accessibility emphasizes architectural environments that respond to cognitive perception, sensory tolerance, and behavioral adaptability. By examining spatial conditions affecting neurodivergent users, the research contributes to ongoing discussions on inclusive architecture and highlights the importance of environmental responsiveness in supporting adult independence and well-being.

Keywords; Sensory Accessibility, Neurodivergence, Down Syndrome, Inclusive Architecture, Environmental Psychology, Spatial Cognition

INTRODUCTION

Accessibility within the built environment has traditionally been associated with physical mobility impairments, primarily addressing barriers faced by individuals using wheelchairs or other mobility aids. However, accessibility extends beyond physical movement and includes cognitive, sensory, and perceptual interactions with space. Individuals with neurodevelopmental conditions, such as Down syndrome, may experience challenges related to sensory processing, spatial orientation, and environmental predictability, which influence their ability to navigate and inhabit built environments independently (Mostafa, 2015)

Neurodivergence refers to variations in neurological functioning that affect cognition, perception, and behavioral responses to environmental stimuli. Adults with Down syndrome often demonstrate differences in sensory sensitivity, spatial perception, and information-processing speed, shaping how architectural environments are experienced and interpreted (Fidler, 2005). Despite increasing awareness of inclusive design, architectural frameworks addressing neurodivergent users remain limited and frequently focus on childhood

environments such as schools or therapeutic facilities (Kinnaer, Baumers & Heylighen, 2016)

Urban and residential environments often contain complex spatial layouts, intense sensory stimuli, and unclear wayfinding systems. Such conditions can contribute to stress, confusion, and reduced autonomy for individuals with cognitive differences. Environmental psychology research suggests that individuals with cognitive differences rely heavily on spatial predictability, recognizable cues, and sensory stability when interacting with built environments

Psychology Meets the Way of Living

Environmental psychology provides an important framework for understanding how individuals perceive and respond to architectural space. Interaction with the built environment is shaped by sensory perception, cognitive interpretation, and behavioral response. For neurodivergent individuals, these processes may differ from neurotypical patterns, resulting in distinct spatial experiences and environmental needs (Evans & McCoy, 1998)

Down syndrome is associated with cognitive and sensory characteristics that influence spatial perception. Individuals with Down syndrome often demonstrate slower information-processing speeds, reduced short-term memory capacity, and heightened sensitivity to environmental stimuli (Fidler, 2005) These factors may affect the interpretation of spatial cues, navigation within complex environments, and responses to sudden environmental changes.

Research in sensory processing theory indicates that individuals with neurodevelopmental conditions may experience variations in sensory responsiveness, including hypersensitivity or hyposensitivity to sound,light,texture, and spatial density (Dunn, 2007) Environments with excessive sensory input, crowded spaces, harsh lighting, or abrupt spatial transitions can contribute to sensory overload and emotional distress.

Architectural environments can mediate these experiences through spatial clarity, gradual transitions, consistent environmental cues, and moderated sensory conditions. Such spatial characteristics support orientation and reduce anxiety by allowing individuals to anticipate spatial changes (Kinnaer, Baumers & Heylighen, 2016)

The concept of sensory accessibility emerges from these perspectives. Sensory accessibility refers to the ability of architectural environments to support cognitive clarity, sensory regulation, and spatial comprehension. Unlike conventional accessibility standards that focus primarily on physical movement, sensory accessibility emphasizes perceptual and experiential aspects of space.

(Evans & McCoy, 1998) The absence of these spatial qualities can therefore affect comfort, confidence, and independence.

Recent discourse within inclusive architecture has introduced sensory-sensitive design approaches that emphasize regulating environmental stimuli such as sound, lighting, spatial transitions, and visual complexity (Mostafa, 2014) These considerations highlight the need for architectural environments that respond not only to physical accessibility but also to perceptual and cognitive experience

Positioning neurodivergent spatial experiences within the framework of environmental psychology allows architecture to be examined as an active contributor to either enabling or limiting independence among adults with Down syndrome.

While studying the concept of Universal Design through the work of Ronald Mace, I understood how spaces can be designed to be usable and accessible for people with diverse physical, sensory, and cognitive abilities without the need for special adaptation. His principles highlighted the importance of creating environments that promote independence, comfort, safety, and equal participation for all users. Keeping these ideas in mind helped shape my understanding of inclusive spatial design and influenced the way I approached sensory accessibility and user-centered planning within my research.

METHODOLOGY

This study adopts a qualitative research methodology to examine the relationship between architectural environments and the spatial experiences of adults with Down syndrome. Qualitative approaches are particularly suited to exploring perception, behaviour, and lived experience within built environments (Creswell, 2014)

The research integrates literature review, experiential insights, and case-based interviews conducted with neurodivergent adults and their caregivers. Academic literature provided theoretical foundations concerning sensory perception, cognitive processing, and environmental psychology, while interviews enabled the research to capture lived spatial experiences within everyday environments.

Each interview was treated as a case example, allowing individual experiences to be examined in detail while contributing to broader thematic patterns. To maintain confidentiality and protect participant privacy, interviewees are not identified by name. Instead, neutral identifiers such

as Case Example-1, Case Example-2, and Case Example-3 are used throughout the research documentation.

Participant selection considered several criteria to ensure a diversity of experiences and perspectives. These included age group, gender, type of neurodivergence, sensory triggers, lifestyle patterns, and environmental contexts. This approach enabled the research to capture how different living environments and daily routines influence spatial perception and comfort.

Interviews followed a semi-structured format that allowed participants and caregivers to describe experiences related to spatial navigation, environmental triggers, and behavioural responses to build environments. Caregivers were also able to share long-term observations regarding environmental conditions that either supported or hindered independence. The study is exploratory in nature and limited by a relatively small qualitative sample. Hence findings are more indicative spatial insights rather than universal conclusions.

Observational insights complemented the interview data by identifying patterns in movement, spatial interaction, and responses to environmental stimuli across different environments, including residential and public spaces.

Data collected through literature review, interviews, and observations were analysed using thematic analysis. Recurring themes related to sensory triggers, spatial predictability, environmental clarity, and behavioural comfort were identified and categorized, enabling individual case examples to collectively reveal spatial characteristics influencing independence.

The motivation for this research is also informed by a personal dimension. The researcher has a maternal uncle with Down syndrome whose experiences contributed to an early awareness of the environmental and social challenges faced by neurodivergent individuals. While the research maintains academic objectivity, this connection reinforces the importance of addressing inclusive architectural environments with sensitivity and responsibility

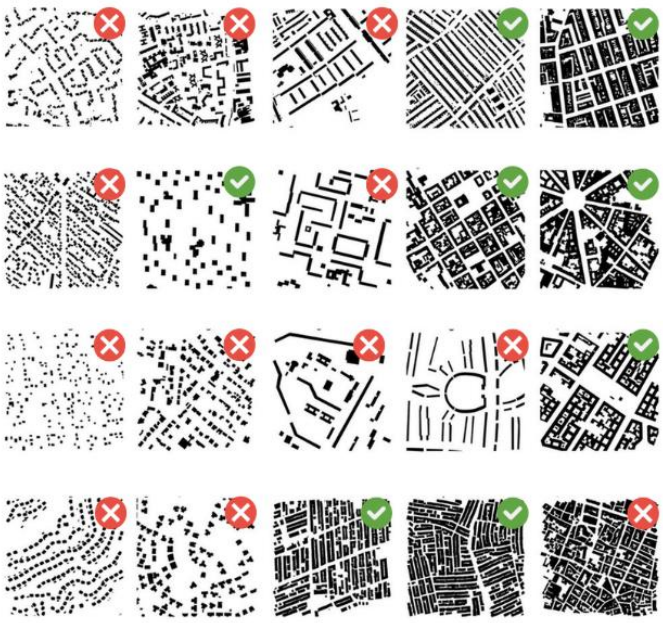


Fig. 1: Comparative Understanding of Grid and Organic Spatial Patterns

Source: Edited by Author

The Familiarity also fosters emotional comfort. Returning to the same bus stop or navigating a known street corner reinforces routine and builds resilience. When environments support predictable memory-building, neurodivergent individuals can navigate with dignity rather than relying on constant external assistance. These everyday cues transform an overwhelming urban fabric into a series of familiar reference points, enabling smoother navigation and reducing cognitive load.

Grids: Straightforward, repetitive street layouts can simplify orientation but may become monotonous or confusing without distinct landmarks.

Organic Patterns: More fluid and irregular layouts may provide rich sensory and visual cues but can overwhelm those who depend on predictability.

Table 1: Challenges and Triggers

Source: Author

Case example	Criteria & Archetype	Fears and Challenges	Triggers	Description
1	Age – 43, Male DownSyndrome. The Aging Adult, Represents the need for ergonomic support.	Being alone in unfamiliar environments, Darkness and dimly lit areas, Presence of animals (especially stray dogs)	Overcrowded spaces with pushing or loud movement, Raised voices or harsh tones from close individuals, Meeting new people.	Case example 1's fears darkness, unfamiliar environments, and animals highlight the importance of visual and emotional safety in spatial design.
2	Age – 23, Female DownSyndrome. The Young Aspirant: Represents the desire for social inclusion	Failure in performance settings, Loud background chatter, Falling down while walking	Overcrowded or visually chaotic spaces, Harsh criticism during teamwork, Dim or unlit spaces during travel	Case example 2's fears of failure, noise, and isolation reflect a deep need for community validation and sensory stability.
3	Age – 25, Female DownSyndrome. The Non-Verbal Observer: Highlights the need for intuitive, non-textual wayfinding.	Losing structure or time schedule, Traveling without prior planning, Unexpected social interaction	Traveling alone Loud, chaotic markets, Getting lost in new areas	Case example 3's traveling alone, chaos, and unfamiliar smells reveal how environmental perception shapes emotional security.
4	Age – 33, Male DownSyndrome. The Routine Keeper: Shows the importance of predictability and spatial layouts.	Sloped or uneven terrain (fear of falling), Darkness in streets or staircases, Strangers in isolated areas	Rapid movement of vehicles or people nearby, Continuous honking or traffic sounds, Being asked to navigate alone suddenly	Case example 4's fears of isolation, unstructured settings, and public exposure reflect the emotional side of belonging and participation in built environments.
5	Age – 25, Male Autism The Daily Commuter: Represents navigation challenges	Failure in performance settings, Loud background chatter, Falling down while walking	Overcrowded or visually chaotic spaces, Harsh criticism during teamwork, Dim or unlit spaces during travel	Case example 5's fears and triggers revolve around sensory overload loud sounds, and clutter all revealing a core sensitivity to environmental order and sensory balance
6	Age – 19, Female Autism The Young Aspirant: Represents the gap between social eagerness, environmental safety.	Being isolated from familiar classmates or mentors, Unstructured environments (no clear routine), Getting lost	Overly bright or harshly lit spaces, Large unfamiliar social groups, Sudden schedule or spatial changes	Case example 6's fears of isolation, unstructured settings, and public exposure reflect the emotional side of belonging and participation in built environments.
7	Age – 28, Male DownSyndrome. The Digital Native: Represents need for "retreat nooks"	Fear of rejection or judgment during performances, Being alone in unknown settings, Getting lost while traveling	Excessive noise of people shouting gossiping,during dance events he likes to focus. Sudden lighting or sound shifts, Technology failure	Case example 7's fears of rejection, being alone, and losing control during travel mirror an emotional need for acceptance and environmental stability.

8	Age – 31, Female DownSyndrome. The Invisible Struggle (Female): Represents the "Double Burden" of gendered hygiene	Closed elevators or tight enclosed spaces, Darkness and poorly lit interiors, Fear of getting lost (past experience at Dadar Market)	Being left alone in a crowded or chaotic space, Sudden loud noises arguments nearby, When people judge her of talking alone.	Case example 8's fears enclosed spaces, darkness, and crowds reveal a deep sensitivity to spatial confinement and loss of control.
9	Age – 22, Male Autism The Routine Keeper: Shows the importance of predictability.	Confined indoor spaces, Being watched or judged while playing, Losing direction in large environments	Overly structured routines or rules Loud, overlapping conversations, Lack of visible signage, Unfamiliar odors or smoke	Case example 9's fears confined spaces, being watched, and losing direction stem from environmental unpredictability and overexposure.
10	Age – 23, Male Autism The Active Child: Represents the need contained exploration zones.	Losing structure or time schedule, Traveling without prior planning, Unexpected social interaction	Sudden disruptions in work environment, Continuous noise in transit zones, Visual confusion in signage or paths	Case example 10's fears loss of structure, unpredictable travel, and forced interaction expose how cognitive order and control are central to neurodivergent comfort.

DISCUSSION

Analysis of the collected data indicates that environmental complexity and sensory intensity significantly influence the spatial experiences of adults with Down syndrome. Environments characterized by excessive visual stimuli, unclear spatial organization, and abrupt transitions can create difficulties in navigation and orientation.

Insights derived from case example interviews revealed several recurring spatial parameters influencing comfort and independence. One commonly identified challenge involved navigating spaces in low-light or dark environments, which often resulted in anxiety and spatial disorientation. Participants and caregivers also emphasized the importance of frequent resting spaces along longer circulation routes, as extended walking distances without pause could lead to fatigue and emotional stress.

Another spatial need identified through interviews was the presence of calming or retreat spaces where individuals could temporarily withdraw during moments of sensory overload. Such environments support emotional regulation and enable individuals to re-engage with surrounding spaces once sensory stress has been reduced.

Caregivers also expressed a recurring long-term concern regarding the future independence of neurodivergent individuals. Many described a common question that arises within families supporting neurodivergent adults: "What will happen after us?" This concern reflects the need for environments that support autonomy while providing a stable and supportive spatial framework.

These insights highlight the potential role of architecture as a supportive environmental system. Carefully designed environments can function as an additional layer of support alongside family care and professional assistance. In this sense, architecture can contribute to emotional security, independence, and social participation for neurodivergent adults.

ARCHITECTURAL PARAMETERS DERIVED THROUGH RESEARCH

The research began by understanding the everyday experiences of neurodivergent adults and the relationship between behavior, perception, and the built environment. While the study initially explored these conditions through social and psychological perspectives, the findings revealed the need to translate these observations into tangible architectural parameters that can directly inform spatial design decisions.

This design checklist therefore acts as a bridge between research and architectural application. It converts observed sensory, cognitive, emotional, and physical challenges into measurable spatial responses and design strategies. Each parameter identifies a specific difficulty experienced within the built environment and examines how architectural planning, circulation, materiality, zoning, sensory control, and spatial organization can respond more effectively.

The checklist is intended not as a universal formula, but as a framework for designing environments that are more predictable, legible, safe, and emotionally supportive.

Through diagrams, spatial analysis, and architectural interventions, the study attempts to demonstrate that inclusive design extends beyond physical accessibility and must also address sensory comfort, cognitive clarity, and emotional well-being.

By translating research into architectural language, the checklist establishes a set of spatial principles that can guide the creation of environments that encourage independence, reduce anxiety, and promote dignity for neurodivergent individuals within everyday public and private spaces.

Understanding Spatial Needs Through Empathetic Design

Balance, Muscle Tone & Mobility Issues

Adults with Down syndrome often experience physical challenges such as hypotonia (low muscle tone), reduced balance, poor coordination, and early joint fatigue. These conditions directly affect the way individuals move through and interact with architectural spaces. Long walking distances, abrupt level changes, steep staircases, and inaccessible circulation systems can create physical exhaustion and reduce independent mobility.

The design approach therefore prioritizes barrier-free movement and physical comfort. Ramps and elevators are preferred over excessive stair usage, while gradual level transitions help reduce strain during movement. Frequent resting points integrated within circulation corridors provide opportunities for pause and recovery, particularly for individuals with reduced stamina. The intention is to create environments that support movement with dignity, ease, and confidence rather than spaces that demand physical adaptation from the user.

Physical and Cognitive Characteristics in Spatial Interaction

The built environment plays a critical role in shaping the daily experiences of neurodivergent adults. Physically, adults with Down syndrome may present shorter stature, lower muscle tone, and reduced fine motor coordination, all of which influence spatial accessibility and comfort. Elements such as high risers, narrow staircases, or inadequate seating can increase discomfort and fatigue over time.

Cognitively, many individuals demonstrate strong visual memory and routine-based learning abilities. Familiar colors, repetitive visual cues, and recognizable landmarks often become essential tools for navigation and orientation. Architectural responses such as color-coded zones, textured pathways, repetitive iconography, and visually legible circulation systems help reduce cognitive stress while encouraging independent navigation. Through these interventions, architecture becomes not only functional but also psychologically supportive.

Visual Scanning Difficulties

Visual scanning difficulties affect the ability to quickly identify obstacles, judge spatial depth, or process environmental information while moving. Many neurodivergent adults rely on downward visual focus while walking, making sudden level changes, uneven flooring, or poorly defined edges potentially hazardous.

To address these concerns, the design emphasizes visual clarity and uninterrupted spatial continuity. Contrasting floor edges improve visibility and orientation, while continuous flooring materials help maintain spatial consistency. Sudden drops and unexpected level variations are minimized to reduce confusion and improve movement safety. The objective is to create environments that communicate spatial information clearly and intuitively through architectural elements rather than excessive instruction.

Memory, Familiarity & Spatial Orientation

Memory and familiarity strongly influence how neurodivergent adults experience and navigate environments. Rather than relying solely on abstract spatial understanding, many individuals depend on recognizable landmarks and repeated spatial experiences to build confidence and orientation. Familiar elements such as a distinct tree, a colored wall, or a recognizable seating area often become emotional and navigational anchors within the environment.

Architecture can strengthen this relationship by creating spaces that encourage memory-building through repetition and identity. Predictable circulation patterns, repeated visual markers, and emotionally recognizable spatial cues reduce cognitive load and foster a sense of comfort. When environments become familiar over time, users are able to navigate more independently and with greater emotional security.

Need for Frequent Rest

Reduced stamina and quick fatigue are common among adults with Down syndrome, particularly during long periods of movement or physical activity. In many public environments, the absence of seating or pause areas creates unnecessary physical stress and limits independent mobility.

The architectural response focuses on integrating rest as a

natural part of circulation rather than as a secondary element. Seating is provided at regular intervals, shaded pause points are incorporated within outdoor pathways, and leaning rails are introduced in transitional spaces and corridors. These interventions acknowledge that movement should accommodate varying physical capacities and that accessibility extends beyond basic mobility standards toward long-term comfort and usability.

Cognitive Processing Speed & Routine Dependence

Neurodivergent adults may require additional time to process information, make decisions, or interpret complex signage systems. Overstimulating environments with multiple choices, excessive text, or unclear circulation can lead to confusion and anxiety.

To support cognitive clarity, the design encourages simplified wayfinding systems that rely on symbols, repetition, and visual consistency. Junctions are designed with fewer directional choices, and circulation patterns remain straightforward and predictable. Routine dependence is addressed through consistent spatial sequencing and fixed activity zones, allowing users to build familiarity over time. Such architectural predictability enhances confidence and reduces dependence on external guidance.

Safety Awareness & Need for Breakout Spaces

Many neurodivergent adults may have reduced awareness of environmental dangers or experience sudden episodes of anxiety and sensory overwhelm. Architecture therefore must respond not only through accessibility but also through emotional and psychological safety.

Safety-oriented interventions include rounded edges, slip-resistant flooring, protective railings, and visually clear boundaries. Simultaneously, breakout spaces and quiet retreat zones are integrated near activity areas to provide immediate emotional relief when overstimulation occurs. These calming spaces allow users to regulate emotions privately and comfortably without withdrawing entirely from the social environment. The design approach recognizes emotional regulation as an essential aspect of spatial well-being.

Spatial Predictability & Anxiety Reduction

Complex, maze-like layouts can increase anxiety and disorientation for neurodivergent individuals, particularly in unfamiliar environments. Spatial unpredictability often creates cognitive stress, reducing confidence and limiting independent engagement with the environment.

To minimize these challenges, the planning strategy emphasizes straight circulation paths, clearly defined zoning, and visual connectivity between spaces. Predictable layouts allow users to mentally map their surroundings more easily and reduce the fear associated with uncertainty. Architecture, in this context, becomes a tool for reassurance, offering stability, order, and clarity through spatial organization.

Challenges Faced by Neurodivergent Adults: Architectural Opportunities

The relationship between neurodivergence and architecture highlights how many challenges emerge not solely from neurological conditions, but from environments that fail to respond to sensory and cognitive diversity. Difficulties such as fatigue, sensory hypersensitivity, slower processing speed, or social anxiety become more pronounced when spaces lack clarity, comfort, and predictability.

This study reframes these challenges as opportunities for architectural intervention. Through accessible circulation, sensory-sensitive materials, predictable layouts, and emotionally supportive spaces, architecture can foster inclusion and independence. Rather than designing for limitation, the goal is to design for participation, dignity, and equal spatial experience.

Environmental Barriers and Sensory Inclusivity

Sensory overload caused by excessive lighting, noise, cluttered visuals, or overwhelming textures can significantly affect the emotional comfort of neurodivergent adults. At the same time, some individuals may seek tactile engagement or stronger sensory stimulation to feel connected to their surroundings. These varying sensory responses highlight the importance of flexibility and balance within architectural environments.

The study concludes that architecture must move beyond standardized accessibility and begin addressing sensory and cognitive inclusivity as essential design parameters. Calm zones, acoustic control, adjustable lighting, tactile surfaces, and visually coherent environments contribute toward creating spaces that support emotional regulation and independent participation. Ultimately, limitations often arise not from the individual, but from environments that overlook neurological diversity. Through empathetic and responsive design, architecture can become an enabler of confidence, comfort, and belonging.

CONCLUSION

This study explores how architectural spaces influence the

everyday experiences of adults with Down syndrome, with particular attention to the role of sensory accessibility in inclusive design. The research suggests that factors such as overwhelming sensory stimulation, complicated spatial layouts, and unpredictable environments can affect confidence, comfort, and independent navigation for neurodivergent individuals.

By examining literature studies, interview-based case examples, and observational findings, the research identifies several spatial elements that contribute to a more supportive environment. These include clear wayfinding systems, predictable spatial organization, opportunities for rest, calming sensory conditions, and the use of environmental cues that assist orientation and movement.

The study further highlights that accessibility should not be understood only in terms of physical mobility. Sensory perception, emotional comfort, and cognitive understanding also play a significant role in how individuals experience space. Considering these aspects allows architecture to become more responsive to the diverse needs of neurodivergent users and encourages a more human-centered approach to inclusive design.

Future investigations can expand this research by studying other neurodevelopmental conditions and exploring how collaboration between architects, psychologists, therapists, and healthcare professionals can contribute toward creating more inclusive and empathetic built environments.

BOOK REFERENCE

[1]. Creswell, J. W. (2014). Research Design: Qualitative, Quantitative and Mixed Methods Approaches (4th ed.). Thousand Oaks, California: Sage Publications.

[2]. Dunn, W. (2007). Using Sensory Processing Knowledge to Support Children in Everyday Participation. Baltimore: Brookes Publishing.

[3]. Fidler, D. J. (2005). Understanding the Emerging Behavioural Characteristics of Down Syndrome During Early Childhood. Baltimore: Paul H. Brookes Publishing.

[4]. Evans, G. W., & McCoy, J. M. (1998). "When Buildings Don't Work: Examining the Influence of Architecture on Human Health." Journal of Environmental Psychology, 18(1), 85–94. Available at: https://doi.org/10.1006/jevp.1998.0089

[5]. Kinnaer, M., Baumers, S., & Heylighen, A. (2016). "Autism-Friendly Architecture: Connecting Research Findings with Design Practice." Archnet-IJAR: International Journal of Architectural Research, 10(2), 5–19. Available at: https://doi.org/10.26687/archnet-ijar.v10i2.936

[6]. Mostafa, M. (2014). "Architecture for Autism: Applying the ASPECTSS Principles in Educational Spaces." International Journal of Architectural Research, 8(1), 143–158. Available at: https://doi.org/10.26687/archnet-ijar.v8i1.314

[7]. Mostafa, M. (2015). "Design Interventions in Architecture for Individuals with Autism." International Journal of Architectural Research, 9(1), 24–36. Available at: https://doi.org/10.26687/archnet-ijar.v9i1.603

[8]. Mace, R., Hardie, G., & Place, J. (1991). Accessible environments: Toward universal design. In W. Preiser, J. Vischer, & E. White (Eds.), Design intervention: Toward a more humane architecture (pp. 155–175). Van Nostrand Reinhold.

[9]. Bubbles Down Syndrome Support Network (n.d.) Bubbles Down Syndrome Support Network Gujarat. Available at: https://www.facebook.com/Bubbles-105962844330793/

[10]. Down Syndrome Federation of India (2024) About Down Syndrome Federation of India. Available at: https://www.downsyndrome.in

[11]. Smiling Dandelion Foundation (2024) Down Syndrome Support Group India. Available at: https://smilingdandelionfoundation.org

a. Case Example 1 to 10 (2025) Interview with neurodivergent adults with Down syndrome and Autism with their caregivers. Conducted by author, October 2025