

# Spatial Cues as Mediators of Social Behavioral Guidance in Autism-Supportive Interiors

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**Abstract** – Autism Spectrum Disorder (ASD) is characterized by differences in sensory processing, spatial cognition, and social communication, all of which significantly influence behavioural responses within built environments. Although educational and therapeutic research recognizes environmental sensitivity in autistic populations, architectural discourse often under-theorizes how spatial cues actively mediate behaviour. This study investigates how interior spatial cues—materiality, enclosure gradients, lighting modulation, acoustic buffering, zoning clarity, and transition sequencing—function as mediators of social behavioural guidance in autism-supportive interiors. Using a mixed-method approach incorporating educator and parent questionnaires, percentage-based quantitative mapping, and qualitative interpretation, the study examines correlations between spatial typologies and behavioural outcomes. The research integrates Sensory Processing Theory (Dunn, 1997), the Autism ASPECTSS™ Design Index (Mostafa, 2014), and egocentric–allocentric navigation frameworks (Meneghetti et al., 2020) to construct a behavioural-spatial interpretative model. Findings indicate that sensory-regulated environments significantly reduce withdrawal behaviours, while semi-enclosed spatial configurations promote structured peer interaction without overwhelming exposure. Spatial predictability emerges as a critical behavioural stabilizer, and transition zones are identified as behavioural vulnerability points requiring design intervention. The study concludes that architecture operates as a behavioural scaffold, shaping autonomy, regulating sensory thresholds, and mediating social engagement. It proposes a layered spatial strategy framework for inclusive interior environments that positions design as an active therapeutic and behavioural agent.

**Keywords:** Autism Spectrum Disorder, spatial cues, behavioural mediation, interior architecture, sensory processing, inclusive design

## 1. INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by differences in communication, social interaction, sensory processing, and spatial cognition. While the spectrum is heterogeneous, sensory modulation differences and environmental sensitivity remain consistent markers across many individuals diagnosed with ASD. These differences significantly influence how children interpret, navigate, and behave within interior environments.

In educational and therapeutic contexts, spatial environments are not neutral containers; they actively influence behavioural regulation, engagement, withdrawal, and social participation. Despite this, architectural discourse often addresses autism-supportive design through generalized guidelines—calm colours, acoustic treatment, or escape rooms—without systematically examining how spatial cues function as behavioural mediators.

This research reframes architecture not as background infrastructure but as behavioural guidance system. It asks:

### How do interior spatial cues mediate social behavioural guidance in autism-supportive environments?

The study investigates the following sub-questions:

1. Which spatial typologies support positive peer interaction?
2. Which environmental conditions trigger withdrawal behaviours?
3. How does spatial predictability influence behavioural stability?

4. Are transition zones associated with behavioural challenges?
5. Which design elements reduce sensory overstimulation most effectively?
6. Do enclosed and open spaces generate different social behaviours?
7. How important is architectural design in supporting inclusive learning?

By integrating empirical questionnaire data with established theoretical frameworks, this research constructs a spatial-behavioural mediation model applicable to autism-supportive interiors.

## 2. THEORETICAL FRAMEWORK, LITERATURE REVIEW AND METHODOLOGY

### 2.1 Theoretical Framework

#### 2.1.1 Sensory Processing Theory (Dunn, 1997)

- Winnie Dunn's Sensory Processing Framework posits that individuals differ in neurological thresholds and self-regulation strategies. For individuals with ASD, hypersensitivity to auditory, visual, tactile, or proprioceptive stimuli often results in behavioural adaptations such as avoidance, withdrawal, or agitation.
- Dunn categorizes sensory processing into four patterns:
  - Sensory seeking
  - Sensory avoiding
  - Sensory sensitivity
  - Low registration
- When environmental stimuli exceed an individual's tolerance threshold, behavioural dysregulation occurs. In architectural terms, excessive echo, glare, crowding, or visual clutter may trigger avoidance behaviours.
- Thus, spatial design must account for sensory thresholds as behavioural determinants.

#### 2.1.2 Autism ASPECTSS™ Design Index (Mostafa, 2014)

- Magda Mostafa's ASPECTSS™ Index provides an architectural framework specifically tailored to autism-supportive design. The seven principles include:
  - Acoustics
  - Spatial sequencing
  - Escape spaces
  - Compartmentalization
  - Transition spaces
  - Sensory zoning
  - Safety

- Mostafa emphasizes predictability and compartmentalization as mechanisms to reduce anxiety and behavioural escalation. Spatial sequencing—clear progression from one zone to another—supports cognitive mapping and autonomy.
- This research operationalizes ASPECTSS principles within questionnaire-based behavioural mapping.

### 2.2 Literature Review

#### A. Environmental Psychology and Behaviour

Environmental psychology demonstrates that spatial density, noise levels, and visual complexity directly influence stress and behavioural response. Overcrowding increases cortisol levels and social withdrawal.

For children with ASD, such effects are amplified due to sensory modulation differences.

#### B. Materiality as Behavioural Cue

Material textures, acoustic absorption, and visual softness influence emotional regulation. Soft finishes and muted palettes reduce perceptual overload. Material gradients can signal behavioural expectations—quiet zones, interactive areas, or transitional spaces.

#### C. Thresholds and Transition Spaces

Research identifies corridors and entry points as behavioural compression zones. Abrupt spatial shifts generate anxiety. Gradual thresholds—semi-open vestibules or buffered corridors—mitigate overstimulation.

#### D. Gaps in Existing Research

While guidelines exist, limited empirical research maps specific spatial typologies to observable behavioural outcomes in educational settings. This study addresses that gap through structured educator and parent feedback.

### 2.3 Methodology

#### 1.3.1 Research Design

- Mixed-method approach combining:
  - Structured questionnaires (teachers and parents)
  - Multiple-response categorical data
  - Percentage-based analysis
  - Qualitative interpretation
  - Theoretical triangulation

### 2.3.2 Participants

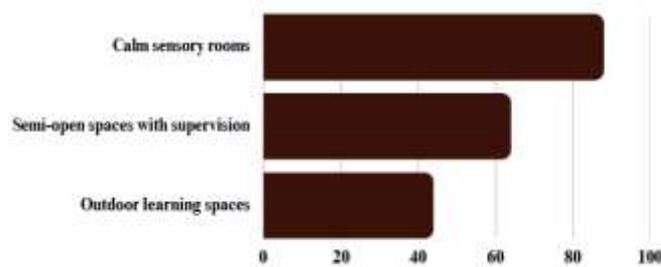
- 25 educators working in ASD-focused educational or therapy centres.
- Parents of children diagnosed with ASD.
- Context: classroom and therapy interiors.

### 2.3.3 Data Categories

The questionnaire explored seven key domains:

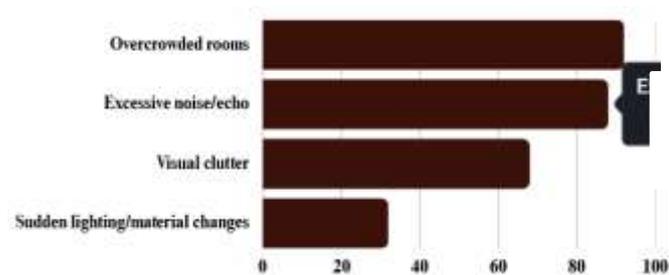
1. Spaces supporting peer interaction.
2. Spatial triggers of withdrawal.
3. Impact of predictability.
4. Behaviour in transition zones.
5. Effective sensory-reduction elements.
6. Behavioural difference in enclosure types.
7. Perceived importance of architecture.

### 2.4 Results



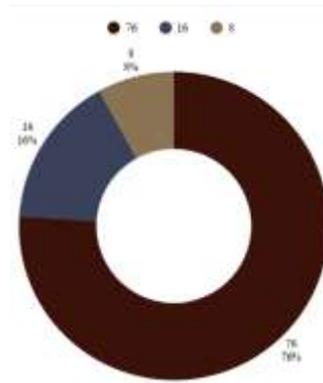
**Fig -1:** Spatial typologies supporting positive peer interaction in autism-supportive environments.

*Interpretation:* Semi-enclosed environments balance sensory protection with social visibility, supporting guided interaction.



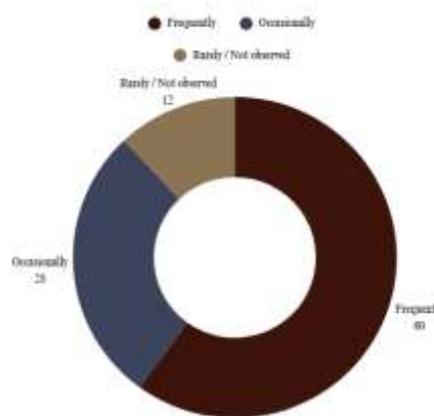
**Fig -2:** Environmental conditions associated with withdrawal behaviours.

*Inference:* High sensory density correlates strongly with avoidance behaviour.



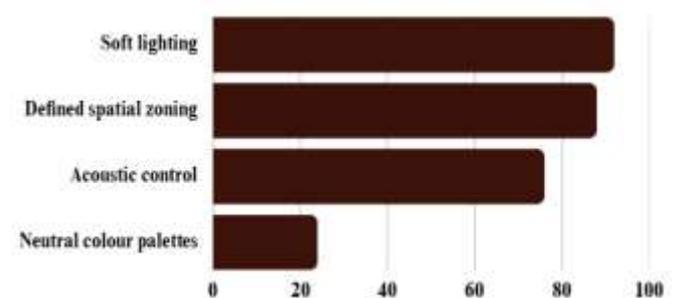
**Fig -3:** Perceived behavioural impact of spatial predictability.

*Interpretation:* Predictability functions as behavioural stabilizer by reducing uncertainty.



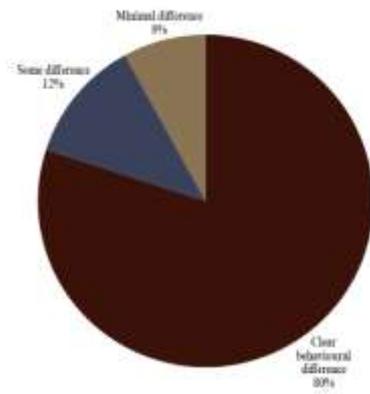
**Fig -4:** Perceived behavioural impact of spatial predictability.

*Interpretation:* Corridors and entry points act as behavioural pressure nodes.



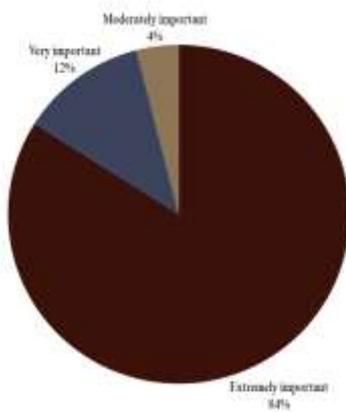
**Fig- 5:** Design elements most effective in reducing sensory overstimulation.

*Interpretation:* Lighting and zoning are primary behavioural mediators.



**Fig -6:** Observed behavioural differences between enclosed and open spatial typologies.

*Interpretation:* Graduated enclosure supports autonomy.



**Fig -7:** Perceived importance of architectural design in supporting inclusive environments.

**Table -1.** Perceived importance of architectural design in supporting inclusive environments.

Finding	Behavioural Inference	Design Implication
Calm sensory rooms (88%) & semi-open spaces (64%) support interaction	Controlled, semi-enclosed environments encourage guided peer engagement	Provide semi-enclosed, supervised interaction zones
Overcrowding (92%) & noise	High sensory density leads	Reduce crowding; integrate

(84%) trigger withdrawal	to avoidance behaviour	acoustic treatment
76% report predictability improves behaviour	Spatial clarity reduces anxiety	Use clear zoning and consistent layout sequencing
60% report challenges in transition zones	Thresholds act as behavioural stress points	Design buffered, gradual transitions
Soft lighting (92%) & zoning (88%) reduce overstimulation	Sensory modulation stabilizes behaviour	Use indirect lighting and defined spatial compartments
80% observe difference in enclosure types	Enclosure supports calm; openness increases stimulation	Create hierarchy: enclosed → semi-open → open
84% rate architecture extremely important	Design significantly influences behaviour	Treat architecture as behavioural infrastructure

### 1.5 Discussion

- Findings align strongly with Sensory Processing Theory. Overstimulation correlates with withdrawal; modulation correlates with engagement.

- Spatial cues function in three behavioural layers:

#### 1.5.1 Sensory Regulation Layer

- Lighting, acoustics, and material softness reduce neurological overload.

#### 1.5.2 Cognitive Mapping Layer

- Predictable zoning supports spatial orientation and reduces anxiety.

#### 1.5.3 Social Threshold Layer

- Semi-enclosed environments scaffold interaction gradually.

- Transition zones require special architectural modulation to prevent behavioural escalation.
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### 1.6 Design Implications

Based on findings, autism-supportive interiors should integrate:

- Graduated enclosure hierarchy (open → semi-open → enclosed).
- Acoustic absorption as baseline design standard.
- Predictable spatial sequencing.
- Material coding for behavioural expectations.
- Soft indirect lighting systems.
- Buffered transition thresholds.

Architecture becomes therapeutic scaffold.

## 3. CONCLUSION

This research establishes that spatial cues in autism-supportive interiors function as mediators of social behavioural guidance rather than passive environmental conditions. Through empirical mapping and theoretical triangulation, the study confirms that sensory-regulated, predictable, and hierarchically zoned interiors significantly enhance behavioural stability and social engagement.

Three major conclusions emerge:

1. Sensory modulation is foundational to behavioural regulation.
2. Predictability reduces anxiety and increases autonomy.
3. Graduated enclosure mediates social thresholds effectively.

Architecture thus assumes ethical responsibility in neurodivergent contexts. It becomes a silent instructor—structuring movement, moderating exposure, and guiding interaction.

Future research should incorporate behavioural observation mapping, biometric stress indicators, and spatial analytics for deeper quantification.

Ultimately, inclusive design must move beyond accessibility compliance toward behavioural intelligence.

A conclusion might elaborate on the importance of the work or suggest applications and extensions. Authors are strongly encouraged not to call out multiple figures or

tables in the conclusion—these should be referenced in the body of the paper.

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