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RESEARCH ARTICLE

Developing a taxonomy for sensory-informed architectural design qualities in autism

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ABSTRACT

Sensory-informed architectural design for autistic individuals can significantly enhance health and well-being. This study introduces a taxonomy to classify sensory and spatial design qualities, promoting a unified understanding of current frameworks. Through a literature review of 76 sources, 83 sensory-informed design qualities were identified. The sources were selected based on their relevance to autism-friendly design, ensuring a robust dataset for analysis. Critical gaps in the field were identified, including the reliance on intuition sensory zoning as the main driver for spatial topology without quantifying the sensory drivers, and an emphasis on interior design elements over spatial configuration. Furthermore, the lack of a classification system for the design qualities of autism was noted. Using a thematic analysis, this study proposes four main themes to form an original taxonomy for classifying sensory and design qualities. Unlike prior literature focusing on discrete design qualities, this taxonomy integrates and categorizes spatial- and sensory-based aspects into a comprehensive framework. The taxonomy systematically organizes design qualities into structured categories, offering a practical tool for designers, educators and policymakers. In conclusion, by addressing fragmented and vague design qualities in earlier research, this study bridges theoretical concepts with practical implementations by forming a solid base for future research.

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KEYWORDS
Autism spectrum disorder (ASD); autism-friendly design; inclusive design; sensory-informed design; architectural design qualities; taxonomy

Introduction

Physically disabled individuals often receive priority in the built environment when it comes to design intended for special needs, referred to as barrier-free design (Heylighen et al., 2017). Recent decades have shifted towards more physically accommodating environments, suggesting a greater focus on accessibility (Zallio & Clarkson, 2021). While incorporating disability design relies on regulations, it is imperative to distinguish between inclusive design, which maximizes inclusivity, and accessible design, which meets minimum criteria mandated by building regulations, codes, and policies (Ormerod & Newton, 2005). Inclusive design requires understanding social dynamics, lifestyle patterns, human behaviour, and geographical access (Zallio & Clarkson, 2021). Current inclusive design practices often overlook sensory disabilities. In 2023, the World Health Organisation (WHO) reported that one in every 100 children is autistic (World Health Organisation, 2023), making it a common particular need among school-aged children (Mostafa, 2020). While societies are increasingly recognizing the distinct needs of autistic individuals, their involvement in architectural design remains insufficient (Łukasik et al., 2021). The United Nations mandates equal opportunities for people with disabilities, including access to built environments (United Nations, 1993), but does not offer a comprehensive framework for addressing sensory impairments in spatial configurations.

There is a remarkable correlation between cognitive challenges in autistic individuals and their altered perception of the surroundings (Balasco et al., 2020), making them a critical factor influencing their quality of life (Tola et al., 2021). For autistic individuals, navigating surroundings is complicated (Ghazali et al., 2019b). Their difficulties in processing sensory information lead to unproductive behaviours, which may be minimized with careful design interventions (Gaines et al., 2016). They are susceptible to environmental stimuli, which are caused by sensory processing problems (Łukasik et al., 2021). Interestingly, some autistic individuals have an acute sense of the environment around them, which provides essential information about how readable the architectural structures are (Heylighen

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et al., 2017). While autism-related research focuses on neurodevelopmental issues, there is still a significant gap in understanding the importance of architecture in their daily lives (Gaiani et al., 2022). For instance, sensory design theory highlighted that modifying the sensory environment encourages positive behaviours in autistic individuals (Mostafa, 2014).

Given the sensory sensitivity of autistic individuals, architects must consider their sensory mechanism (Ghazali et al., 2019b). Some have proposed design paradigms considering sensory sensitivities (Building Bulletin, 2014; Dunlop et al., 2009; Gatfield et al., 2018; Humphreys, 2015; Mentel & Bujniewicz, 2021; Mostafa, 2014, 2021; The British Standards Institution, 2022). While design guidelines for autism have been explored, significant gaps remain. The current design guidelines are often too broad, ignoring the various needs of people with varying degrees of severity on the spectrum. There is a lack of evidence-based research on how different individuals at various spectrum levels respond to various design qualities. Additionally, the existing design qualities are qualitative, highlighting the absence of tangible and measurable spatial qualities that can be directly applied to space design. Given the existing research gaps, establishing connections between various spaces and creating spatial layouts based on topological features could prove highly effective in designing autism-friendly environments. Topological features require investigating the connection between various spaces in the layout to determine their impact. Although much research focuses on routine and predictability in sequencing spaces, an extensive framework is required to investigate the most optimal arrangement of spaces for autism. The interior elements of spaces are primarily emphasized in design guidelines, leaving opportunities for additional research on other aspects. Additionally, it is noteworthy that a thorough validation procedure to assess the effectiveness of suggested design qualities is missing, where a comprehensive validation strategy is necessary to ensure the effectiveness of these guidelines. Although recent guidelines have begun addressing these needs (Building Bulletin, 2014; Dunlop et al., 2009; Gatfield et al., 2018; Humphreys, 2015; Mentel & Bujniewicz, 2021; Mostafa, 2014, 2021; The British Standards Institution, 2022), there is a lack of a comprehensive framework or taxonomy for classifying these qualities, resulting in a need for an adequate taxonomy to incorporate these qualities into the design process effectively. This research answers the question of how design qualities for autism can be organized in a comprehensive taxonomy to utilize their effective integration in the design process. It aims to investigate the current literature to form a taxonomy for architectural design qualities for autism.

The term 'Taxonomy' originates from a biological field, where it refers to the identification, characterization and classification of species (Padial et al., 2010). In this study, the term 'taxonomy' refers to a systematic categorization scheme that arranges design qualities in the autism-friendly design field. This taxonomy is built to serve as a practical tool for architects, designers and stakeholders involved in creating sensory-informed environments for autistic individuals. It is designed to structurally classify design qualities based on their sensory and functional needs aiming to provide a clear classification system for those qualities and enhance their application in the design process. By offering a structured framework of design qualities, this taxonomy addresses the challenges of designing sensory-informed environments by providing a unified framework that explains the causes of sensory variations and links them to specific design qualities required to create a positive impact for autistic individuals. It aims to establish a consistent and comprehensive structure to bridge the gap between fragmented design qualities and a more standardized approach to autism-friendly environments. Additionally, this paper is structured as follows: section two discusses the two-phase method used to collect data and form the taxonomy. Section three encompasses a full background regarding designing for autism. Section four discusses the resulting themes. Section five is a discussion section. Finally, section six includes a conclusion and highlights the contribution of the proposed taxonomy.

Methods

This study employs a two-stage method, including: (i) establishing the literature base and (ii) developing a taxonomy for autism-friendly design qualities based on a reflexive thematic analysis (Braun & Clarke, 2006).

Stage one: establishing the literature base

The study seeks to identify the research gaps in this area and provide a thorough analysis of the body of work on designing for autism. The design qualities offered in this study are listed in various international design guidelines (Building Bulletin, 2014; Dunlop et al., 2009; Gatfield et al., 2018; Mostafa, 2014, 2021; Owen, 2016; The British Standards Institution, 2022), journal research papers (Altenmüller-Lewis, 2017; Bettarello et al., 2021; Birkett et al., 2022; Caniato et al., 2022a, 2022b; Gaiani et al., 2022; Gawad & Elafifi, 2023; Ghazali et al., 2019a; Khajehpash et al., 2017; Kinnaer et al., 2015; Love, 2022; Martin, 2016; Marzi et al., 2025;

McAllister & Maguire, 2012a, 2012b; McAllister & Sloan, 2016; Mostafa, 2008, 2010; Scott, 2009; Vartanian et al., 2021; Wohofsky et al., 2023; Yatmo et al., 2017), conference proceedings (Chatzichristou & Kavvalou, 2022; McAllister, 2010; Mentel & Bujniewicz, 2020), and workshop proceedings (Bettarello, 2021; Dordolin, 2021; Giofrè, 2021; Limoncin, 2021; Pogoda & Majczyk, 2022). As presented in Figures 1 and 2, this study uses a two-phased methodology to form a comprehensive taxonomy for autism-friendly settings.

Identifying research questions

A thorough literature review was conducted to understand the state of the art of autism-friendly designs. This seeks to identify critical design qualities, gaps and areas of doubt through a review of the international design guidelines, scholarly journal articles, book chapters, conference papers and proceedings from international workshops. The purpose of this study is to respond to the following three inquiries on autism-friendly design characteristics:

(a) What qualities of autism-friendly design are discussed in the current literature?
(b) What approach can be taken to create a taxonomy to classify design qualities for autism?
(c) What aspects of autism-friendly design remain underexplored in the current literature?

Indexing and search

To identify design qualities that contribute to autism-friendly surroundings, a systematic technique is used in this study to index and search pertinent literature, as follows:

Indexing. The indexing started by identifying key terms and keywords associated with autism-friendly design, including 'autism', 'autism-friendly space', 'sensory-friendly space', 'sensory-sensitive space', 'designing for autism', 'spatial design for autism', 'inclusive design' and 'universal design'. Personal, sensory, and design qualities for autism-friendly spaces were systematically retrieved and arranged into an Excel spreadsheet that contains the identified qualities and their corresponding references. Consequently, a literature matrix was produced, documenting the frequency of each quality.

Search. The relevant literature was retrieved from three primary databases: ScienceDirect, Google Scholar and Scopus. This included scholarly journal articles, book chapters, conference papers and proceedings from international workshops. Guidelines from official governmental and non-governmental organizations' official websites were reviewed. Automated bibliometric analysis was limited due to three main reasons. Firstly, the terms related to autism and design considerations are used in various fields, including psychology, neuroscience, medicine, education, applied behaviour analysis, technology and architecture. Secondly, autism-friendly design qualities can occasionally be observed in guidelines meant for neurodivergent people, going beyond the autism setting itself. This makes it challenging to identify the pertinent research. Finally, guidelines for autism-friendly designs are scattered throughout official institutional websites, making automated data extraction processes more challenging.

The search in the autism-friendly design field has resulted in concepts and principles for creating

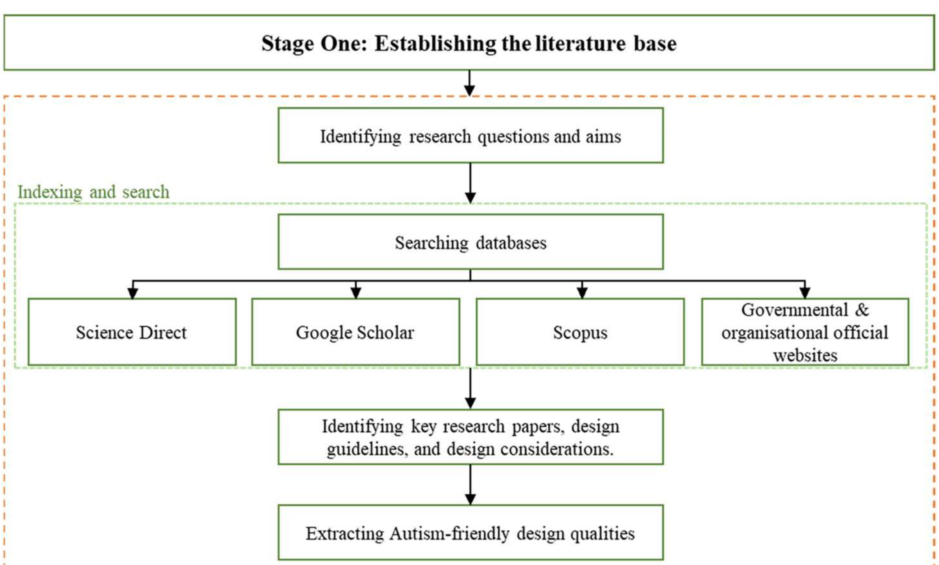

Figure 1. Phase one of the methodology.

sensory-sensitive spaces. A thorough review of existing literature yielded 83 distinct design qualities extracted from 76 sources. These findings contribute to broadening awareness towards designing for autism. Zotero was used as a bibliographic management tool to help systematically track and organize indexed literature. Table 1 presents a representative sample illustrating the methodology for collecting design qualities. The full dataset can be found in Al-Harasis et al. (2024).

Inclusion and exclusion criteria

The inclusion criteria focused on literature clearly addressing sensory-sensitive design qualities or inclusive design practices relevant to autism. The included literature is published in peer-reviewed journals, conferences, international guidelines, or workshop proceedings that are directly related to autism-friendly designs. Studies were excluded if they were not focusing on autism-specific spatial needs, addressed general neurodivergent populations, or were outside the architectural design field. Accordingly, the initial search resulted in 118 papers, of which 76 were included following a thorough investigation of each paper.

Ensuring reliability and validity

Aiming to ensure the reliability of the extraction process, each selected paper was thoroughly investigated and reviewed, in which design qualities are highlighted and summarized. An Excel sheet was prepared for each selected paper, summarizing the key design qualities mentioned on it. Then, a comprehensive Excel sheet was prepared to document each paper's name, citation and the design qualities it includes, ensuring consistency in the data extraction process. Additionally, the data extraction process, from the initial summaries to the final extraction of design qualities, was reviewed multiple times through collaborative discussion among the authors of this paper to ensure the accuracy of the extraction process. To ensure validity, the inclusion criteria focused on selecting relevant and high-quality literature. To ensure the credibility of the analysis, each design quality was explicitly linked to its source in the final data extraction sheet, which aims at forming a robust foundation for the taxonomy. Figure 3 presents the process of the literature screening.

Stage two: developing the taxonomy

Establishing the taxonomy encompasses classifying the collected data from the current literature based on their relevance (Figure 2).

Data classification

Following forming a literature matrix, personal, sensory, and design qualities are identified along with the corresponding references. The extracted qualities were initially categorized using a thematic analysis, resulting in two overarching categories: human-related qualities and space-related qualities. These categories reflect the dual focus in the current literature: qualities focused on autistic individuals and their unique needs, and qualities requiring specific design intervention (Figure 4).

Human-related theme

The human-related qualities encompass the needs of autistic individuals and the impact of achieving autism-friendly settings. Two main themes emerged from this analysis:

(1) Sensory-based variances.
(2) Achieved sensory and personal qualities.

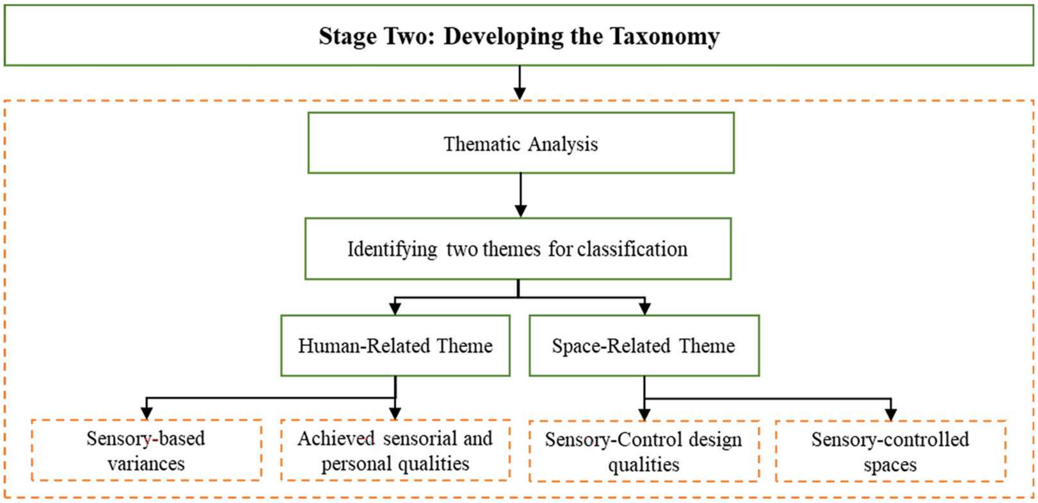

Figure 2. Phase two of the methodology.

Table 1. A representative sample for the method of extracting design qualities from the literature.

Citation \ Design Qualities	Confidence offered by physical spaces	Physical space as a source of certainty	Physical space as a source of Grip	Design for Predictability	Design to promote Independence and self-esteem	Communal Space	Sensory space	Sensory zoning	Escape space	Sensory Accessibility	Space sequencing	Personal space	Safety	Promote Social interaction	Orientation and Navigation	Sensory sensitiveness	Sensory information	Sensory processing	Sensory Profile	Understandable space	Ordered space	Minimize stimulation or reduction in details	Avoid visual stimulation	Avoid glare	Avoid noise	Proxemics	Acoustics	Compartmentalisation	Transition zones	Eliminating harsh corners	Visual connectivity	Quiet space	Sensory recalibration
(Building Bulletin 2014)													X								X	X					X						
(The British Standards Institution 2022)						X							X		X									X	X	X			X		X		
(Gatfield et al. 2018)													X									X					X					X	
(Mostafa 2021)									X																				X			X	
(Mostafa 2014)								X			X		X								X						X	X	X	X			X
(Dunlop et al. 2009)				X																												X	
(Brand et al. 2010)					X							X	X	X	X														X	X	X		X
(Gaines et al. 2016)				X				X			X				X					X	X							X	X		X		
(Mostafa 2008)								X	X		X				X												X	X	X				
(Birkett et al. 2022)															X		X	X	X	X							X	X					
(Baumers and Ann 2010)	X	X	X	X																													
(McAllister 2010)			X	X								X	X								X	X				X	X						
(Altenmüller-Lewis 2017)				X	X		X	X	X		X		X	X	X							X						X	X				
(Ghazali et al. 2019)												X	X		X														X				
(Bettarello et al. 2021)																											X						
(Marzi et al. 2025)																							X				X						
(Wohofsky et al. 2023)													X														X						
(Caniato et al. 2022a)																X								X	X		X						
(Caniato et al. 2022b)																X								X	X		X						

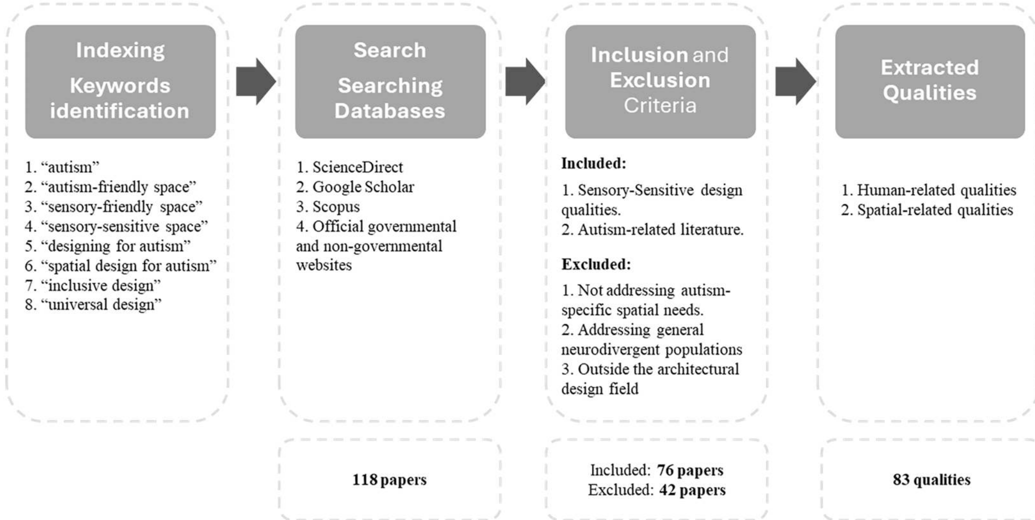

Figure 3. Literature filtering chain.

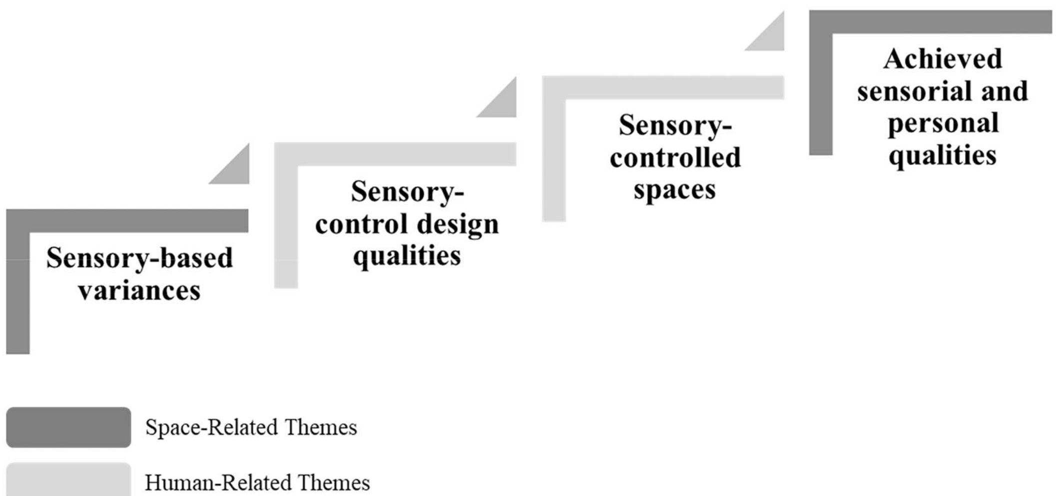

Figure 4. The four identified themes.

Space-related theme

The human-related theme encompasses design-oriented qualities that can be directly applied to the design intervention, ensuring achieving autism-friendly settings. Two main themes emerged from this analysis:

(1) Sensory-control design qualities.
(2) Sensory-controlled spaces.

Taxonomy formation

The thematic analysis presents a structured step for forming the taxonomy. The resulting themes are re-formed logically as follows:

(1) *Causes of sensory variations:* The initial data coding formed the sensory-based variances as a foundational theme, focusing on the causes of sensory variations in autistic individuals, which necessitate special attention when designing their spaces.
(2) *Approaches to design intervention:* This includes: *The sensory-control design qualities* theme includes design qualities that can be applied directly to the space to achieve an autism-friendly one. *The sensory-controlled spaces* theme encompasses the various types of spaces designed specifically for autistic individuals, aiming at recalibrating their sensory stimulation.
(3) *Consequences of design intervention*: Represented by the Sensory and Personal Design Qualities theme, which encompasses the resulting impact of designing autism-friendly designs in individuals.

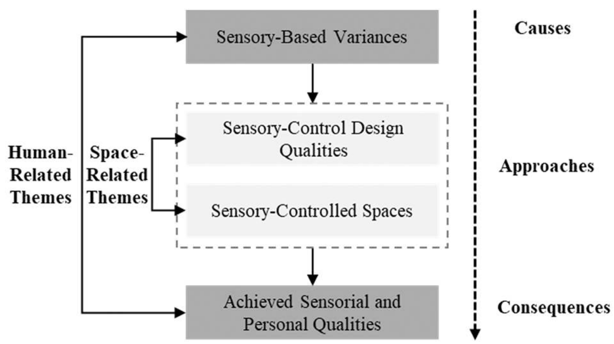

Figure 5. The logic behind the taxonomy formation.

The hierarchical organization of themes serves as the foundation for determining the main themes that form the taxonomy, allowing for a comprehensive categorization. It encompasses the integration of causes, approaches and consequences of creating autism-friendly environments. Figure 5 presents the logic of forming the taxonomy with the four proposed themes.

Background

This section reviews the current literature on sensory-informed design, investigating the design qualities presented by international guidelines and frameworks. This exploration assists in identifying the knowledge gaps and highlights the need for a comprehensive taxonomy encompassing various sensory qualities. The following subsections are organized to identify the different design qualities for autism.

Design qualities for autism

Design guidelines for autism provide extensive insight into the design qualities essential for autistic individuals. This section offers a comprehensive overview of the architectural design aspects that should be considered when designing for autism.

Safety

Safety considerations are paramount when designing environments for autistic individuals, with literature consistently highlighting their significance (Altenmüller-Lewis, 2017; Bettarello, 2021; Brand et al., 2010; Building Bulletin, 2014; Clouse et al., 2020; Dordolin, 2021; Gaiani et al., 2022; Gaines et al., 2016; Gatfield et al., 2018; Gawad & Elafifi, 2023; Ghazali et al., 2019a; Giofrè, 2021; Humphreys, 2015; Kinnaer et al., 2015; McAllister, 2010; McAllister & Maguire, 2012a; McAllister & Sloan, 2016; Mentel & Bujniewicz, 2020; Mentel & Bujniewicz, 2020; Mostafa, 2010, 2014, 2020, 2021; Pogoda & Majczyk, 2022; Premathilake & Hettiarachchi, 2021; Segado & Segado, 2013; The British Standards Institution, 2022; Wohofsky et al., 2023). Given the altered perception of their surroundings and potential lack of awareness of danger (Altenmüller-Lewis, 2017; Ghazali et al., 2019a), safety is considered a crucial design quality for autism-friendly spaces (Dordolin, 2021). Concerns about safety extend beyond physical well-being to include emotional security and privacy issues, particularly in the setting of independent living (McAllister, 2010). This demonstrates the multifaceted nature of safety considerations that must be addressed to enhance the well-being of autistic individuals (Dordolin, 2021). For instance, ensuring safety includes a variety of issues, including the prevention of unnoticed exit from locations or facilities (Altenmüller-Lewis, 2017). Guaranteeing the safe mobility of autistic individuals during emergencies, evacuation situations such as stepwise horizontal evacuation are advocated (Building Bulletin, 2014; Mostafa, 2014). Another crucial factor is material selection. A focus is on selecting materials that reduce dangers while improving physical well-being (Gaines et al., 2016; Mostafa, 2021). For instance, the use of laminated or toughened safety glass for openings helps reduce injuries (Brand et al., 2010).

Another example is the use of curved walls to reduce hard corners, minimizing unexpected confrontations and enhancing safety (Brand et al., 2010; Nguyen et al., 2022), Implementing bevelled corners and incorporating curved corridors can further improve safety (Khajehpash et al., 2017; McAllister & Sloan, 2016; Mentel & Bujniewicz, 2021). The avoidance of sharp edges and angles is significant in educational settings to reduce the risk of damage (McAllister, 2010; Mentel & Bujniewicz, 2021). To ensure safe access to potentially hazardous areas, such as balconies and high windows, protection measures such as guardrails and lattices must be implemented (Mostafa, 2010; Scott, 2009). Additionally, design characteristics that increase visibility and reduce hidden spaces are recommended to improve passive supervision and reduce the dangers associated with inappropriate behaviours (Building Bulletin, 2014).

Minimize stimulations

Minimizing sensory stimulation is a fundamental consideration when designing environments for autistic individuals (Gawad & Elafifi, 2023; Tola et al., 2021). This approach recognizes the sensory abnormalities in autistic individuals and emphasizes the importance of reducing sensory input to create a comfortable and controlled environment (Black et al., 2022). Environments that allow users to manage sensory input can empower autistic individuals and give them a sense of control (Brand et al., 2010). Reducing details helps autistic individuals avoid becoming aggressive by reducing the sensory input in the space (McAllister, 2010; Scott, 2009). Minimize stimulation encompasses providing the least amount of visual information necessary to regulate visual stimulation, the suitable materials that do not agitate autistic individuals, the precise definition of the space zones and the logic behind the zone's sequences (Sheykhmaleki & Yazdanfar, 2023), in which reducing sensory overstimulation requires intelligent design interventions (Black et al., 2022). Two types of stimulation are mainly considered to be reduced:

Visual Stimulation: For instance, placing windows flush with walls to reduce visual clutter and using underfloor heating to hide radiators can minimize the visual stimulation of a space (Nguyen et al., 2022). The integration of visual aids, including colours and patterns in circulation areas, helps determine directions while avoiding excessive visual stimulation (Mostafa, 2014). For example, balancing the need for visual clarity with the risk of overstimulation is critical, as features intended to improve navigation in neurotypical individuals may inadvertently overwhelm the autistic individuals (Mostafa, 2021). Additionally, changes in light and shadow can disrupt focus and cause glare, while certain types of lighting, such as fluorescent lighting, can increase sensory sensitivity (Gawad & Elafifi, 2023). Design strategies highlighted the role of eliminating harsh light sources and using uplighting to create a more comfortable workplace (Building Bulletin, 2014; Gatfield et al., 2018; Mostafa, 2008, 2010). Minimizing the visual stimulation in the background enables carers and educators to adjust the stimulation level based on each individual's needs (Williams, 2011).

Acoustical Stimulation: The noise level significantly impacts sensory experiences, and autistic individuals may have negative emotions and stress when exposed to excessive noise (Ghazali et al., 2019a; McAllister & Sloan, 2016). Excessive loudness can make the autistic individuals tensed (Bettarello, 2021). A correlation between the noise level and the frequency of distressed behaviours was noticed (Kanakri et al., 2017a; Mostafa et al., 2023). Noise causes observable reactions in autistic individuals, such as shielding their ears, sobbing or repeating actions, underscoring the significant influence of environmental cues on well-being (Kanakri et al., 2017a). High-focus or low-stimulation spaces are marked with minimized noise exposure (Mostafa, 2014). Furthermore, thoughtful spatial planning for minimizing noise transmission is necessary for noise management in spaces where quiet areas are advised to be placed apart from the main room (Gatfield et al., 2018). As per Kanakri et al. (2017a), the acoustics in autism-friendly spaces can be managed by improving HVAC systems, attaching egg cartons to walls and carpeting, and using soundproofing materials on floors. Kanakri et al. (2017b) highlight that addressing acoustical concerns in autism-friendly spaces can be aided by avoiding open floor layouts. Interestingly, although home environments provide a variety of stimuli to meet a range of demands and accommodate individuals' variances in sensory sensitivity (Brand et al., 2010), it has been confirmed that there is no correlation between noise level and hominess (Roos et al., 2022). These considerations have significance as studies show that noise levels and behaviours that are suggestive of distress in autistic individuals are related (Mostafa et al., 2023).

Additionally, several types of spaces are proposed by the literature to recalibrate the sensory stimulation level of autistic individuals in case of an overstimulation (Dordolin, 2021; Gatfield et al., 2018; Kinnaer et al., 2015; McAllister & Maguire, 2012b; Mostafa, 2021; Pogoda & Majczyk, 2022). Quiet and escape spaces address the absence or excessive presence of sensory stimuli (Dordolin, 2021; Kinnaer et al., 2015). Quiet spaces offer a serene environment where autistic individuals can withdraw from their surroundings (Gatfield et al., 2018), encompassing visual and auditory sensory inputs (McAllister & Maguire, 2012a). Escape spaces are a safe refuge from overly demanding circumstances, where a sense of safety and control are provided (Dordolin, 2021; Kinnaer et al., 2015). As quiet and escape spaces provide a chance for a quiet time in hectic situations (Mostafa, 2021), they enable autistic individuals to retreat by preventing excessive stress in socially challenging environments (Pogoda & Majczyk, 2022). Partitioned spaces, corners and roof gardens can serve as quiet and escape spots (McAllister & Maguire, 2012b; Mostafa, 2021). Those spaces can be added as an extension to the classroom (McAllister & Maguire, 2012b).

Additionally, sensory spaces are distraction-free, neutral sensory rooms (Altenmüller-Lewis, 2017). They aim at lowering hyperactivity, improving focus, easing depression and encouraging socialization (Giofrè, 2021). Sensory spaces are designed to deliver as minimal stimulation as possible, but also have adjustable controllers that allow them to be adjusted to a quiet or stimulating environment (Altenmüller-Lewis, 2017). This highlights that a quiet room can be transformed into a sensory room (McAllister & Maguire, 2012b).

Wayfinding, orientation, navigation and connectivity

The importance of direction, navigation and connectedness has been considered in numerous research (Altenmüller-Lewis, 2017; Bettarello, 2021; Birkett et al., 2022; Gaines et al., 2016; Ghazali et al., 2019a; Kinnaer et al., 2015; McAllister & Sloan, 2016; Mostafa, 2008, 2010; Owen, 2016; The British Standards Institution, 2022; Yatmo et al., 2017). Autism-friendly spaces, as described by Owen (2016), should allow for sensory connectivity choices, encompassing visually linked but acoustically muted zones (Owen, 2016). As per Dordolin (2021), all aspects of transitions between spaces are grouped under the general phrase 'threshold spaces'. Thresholds explore issues related to consistency, sensory recalibration and allocation of time and space. According to Limoncin (2021), thresholds, or transitions, need to be constructed with technologies that complement its gradualness. Thresholds can be created by altering floor coverings, adding level adjustments, or positioning furniture to designate distinct spaces (Kinnaer et al., 2015). Canopies in outdoor spaces offer an indication of the entry point, facilitating wayfinding (The British Standards Institution, 2022).

Given the difficulties autistic individuals have in creating mental maps, simplifying spatial layouts to ensure ease of navigation becomes imperative (Gaines et al., 2016). Physically and socially navigable environments are crucial for autistic individuals (Brand et al., 2010). This entails setting up access points, entry, exits and circulation networks inside adequately marked buildings (Gaines et al., 2016). Transitions between zones with distinct sensory stimuli are essential for navigation (Mostafa, 2008). The transition has a more significant role in providing a range of conditions with varying stimulus intensities than does the definition of generic spatial solutions (Gaiani et al., 2022). Clear visual signals are helpful (McAllister & Sloan, 2016; Yatmo et al., 2017). It is advantageous to incorporate transition spaces before high-stimulation zones (McAllister & Sloan, 2016; Mostafa, 2008). As per Gaines et al. (2016), delineation and curved walls helps create memorable places that facilitate wayfinding. Mostafa (2021) argued that although curvilinear circulation layouts may offer a gentle flow and a gradual movement, they cannot deliver the sense of orientation the orthogonal systems can. Easy movement is made possible by well-coordinated circulation patterns corresponding with sensory stimulation zones (Mostafa, 2010). Communal or social spaces can be used as a circulation space but need to be designed to be wide and versatile enough to serve purposes beyond simple circulation (Scott, 2009), as they aim at supporting a wide range of functions (Scott, 2009).

Studies by Mostafa (2010) and Gaines et al. (2016) highlighted that clarity and predictability of spaces are crucial for orientation and navigation, allowing autistic individuals to navigate their environment successfully. Although one-way circulation is highly preferred for autistic individuals (Mostafa, 2008, 2014, 2020), implementing a standardized one-way circulation may provide difficulties in larger educational settings that include various age groups (Altenmüller-Lewis, 2017). Assisting in the smooth transition between activities, transition zones like gardens might be useful when one-way circulation is not feasible (Mostafa, 2014). Eliminating lengthy hallways, complex layouts and frequent level changes can improve navigability (Ghazali et al., 2019a). Clear, uncomplicated layouts reduce the need for further signage and facilitate easy navigation in environments (The British Standards Institution, 2022). Overall, sensory-sensitive design qualities, clear spatial organization and intuitive wayfinding aspects can significantly enhance the navigational experiences of autistic individuals in various environments.

Acoustics

As the learning process depends on auditory communication, autistic individuals are vulnerable to the poorly designed acoustical environments (Kanakri et al., 2017b). Acoustics plays a critical role in classroom design (Bettarello, 2021; Kanakri et al., 2017b). Scholarly literature has examined the importance of acoustic factors when creating environments that are autism-friendly (Bettarello, 2021; Bettarello et al., 2021; Birkett et al., 2022; Building Bulletin, 2014; Caniato et al., 2022a, 2022b; Gatfield et al., 2018; Giofrè, 2021; Khajehpash et al., 2017; Martin, 2016; Marzi et al., 2025; McAllister, 2010; McAllister & Sloan, 2016; Mostafa, 2008, 2010, 2014; The British Standards Institution, 2022). The significance of acoustics in influencing autistic behaviour was highlighted by an exploratory study conducted in 2008 with 100 primary carers of autistic individuals (Mostafa, 2008). Including noise reduction measures to improve the acoustic environment have been studied (Mostafa et al., 2023). There appears to be a relationship between the degree of acoustic sensitivity and the severity of autism, with higher sensitivity in more severe autism cases (Caniato, 2021). Thus, a concern towards reducing the external and internal noise was effectively addressed through various methods such as cavity walls, soundproofing materials and spatial configurations to mitigate echoes, alongside the isolation of sound-emitting building systems and the avoidance of disruptive fixtures (Mostafa, 2020). Echoes can be exceptionally bothersome for autistic individuals in large areas, especially if they are equipped with non-sound absorbent finishing materials (Mostafa, 2010). Acoustics matters greatly, especially in multipurpose rooms. As such, sound equipment for shows and maybe sound-field and induction loop installations must be provided (Building Bulletin, 2014). Furthermore, the function of the space and possible interactions between design elements have to be carefully considered since modifications like raising the ceiling height might affect the acoustics, and the room's perceived sense of enclosure (Black et al., 2022).

Proxemics

Proxemics, which refers to the spatial distances preferable between people, has been widely investigated in the context of autism, as mentioned in various sources (Bettarello, 2021; Dordolin, 2021; Giofrè, 2021; Martin, 2016; McAllister, 2010; Scott, 2009; The British Standards Institution, 2022; Vartanian et al., 2021). Proxemics pertains to the interpersonal distances that people develop between each other, with proximity denoting the state of being near or close (Scott, 2009). A lack of personal space causes anxiety or stress in a variety of people. However, specific populations, such as individuals with misophonia, dyspraxia and autism, may experience increased distress in such circumstances (The British Standards Institution, 2022).

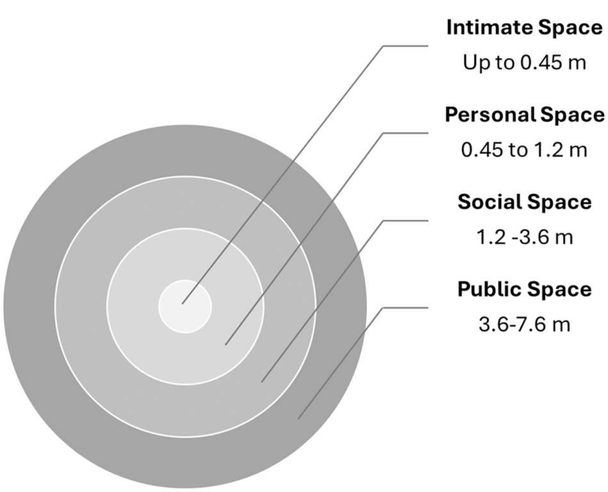

Figure 6. Hall's levels of spaces, after (The British Standards Institution, 2022).

Edward Hall first proposed the notion of proxemics in 1966, in which four distinct levels of spatial zones required for human interaction were identified: intimate space, personal space, social space and public space (Hall, 1966). Hall's framework displaying the four spatial levels is shown below.

As per McAllister (2010), autistic individuals require an increased perimeter of personal space to feel more secure. The notions of escape and safeguarding strongly connect to proxemics, which comprises the personal space where social and physical interactions occur (Dordolin, 2021). However, research conducted by Vartanian et al. (2021) revealed contradictory findings, indicating that autistic individuals have smaller interpersonal distances from others and a tendency for less proximity to objects. This suggests that autistic individuals exhibit a lower sense of personal and physical space (Vartanian et al., 2021).

Personal spaces are introduced as autistic individuals may feel threatened in social settings if they have insufficient space (Brand et al., 2010). Recognizing that autistic students require more personal space than their peers, modifications are implemented to limit their number in each classroom, keeping it below the average for regular classrooms (McAllister, 2010). Although larger spaces are advised to accommodate the sensitivity of autistic individuals, it is advised that the proportion of spaces adhere to domestic proportions (Brand et al., 2010).

Zoning, compartmentalization, spatial sequencing and volumetric expression

Given that autistic individuals prefer routine and predictability, arranging environments logically and incorporating functions that are sensory-compatible is preferable (Altenmüller-Lewis, 2017; Mostafa, 2010). Designing spaces in sequence and compartments is fundamental, and many researchers consider this a key criterion for providing autism-friendly spaces (Altenmüller-Lewis, 2017; Gaiani et al., 2022; Gaines et al., 2016; McAllister & Maguire, 2012b; Mostafa, 2008, 2014, 2014). Compartmentalization entails specifying and restricting the amount of sensory information an individual has to absorb (Gaines et al., 2016; Mostafa, 2014). It is essential to set up distinct and well-defined sensory boundaries in spaces, encompassing categorizing spaces into discrete compartments, each with a specific purpose and level of sensory input (Altenmüller-Lewis, 2017; Mostafa, 2014).

Compartmentalization becomes particularly beneficial when activities are carried out consistently and predictably (Gaines et al., 2016). Sensorial compatible functions and autistic logic should be included in spatial groupings (Mostafa, 2008, 2014). Even while each zone or compartment should be unique from the others, there should not be a sharp separation between them; instead, a more subtle but still noticeable boundary is desired (Altenmüller-Lewis, 2017). Ideally, the optimal spatial sequence facilitates a smooth transition between activities, allowing a well-planned one-way circulation path (McAllister & Maguire, 2012b; Mostafa, 2014).

In spatial arrangements for autism, visual elements, colour schemes, changes in light quality and texture modifications reinforce spatial hierarchy rather than confuse it (Scott, 2009). Notably, a golden cage, a setting in which comfort levels are so high that any difference becomes traumatic, is avoided by creating a sequence of spaces with varying sensory conditions (Gaiani et al., 2022). Additionally, volumetric expression is considered when determining the sequence of spaces. Enhancing openness or raising ceiling levels produces a sense of freedom, encouraging more physical activity and expression while manipulating spatial qualities like increasing enclosure or decreasing ceiling levels can develop a sense of peacefulness (McAllister & Maguire, 2012b).

Spatial sequencing and compartmentalization facilitate sensory-based zoning. It categorizes spaces based on their stimulation level instead of the typical approach of functional zoning (Mostafa, 2014). Sensory zoning, which delineates a distinct dichotomy between a high-stimulus noisy zone and a low-stimulus quiet zone, takes precedence over the functional and spatial design of buildings for autistic individuals (Mentel & Bujniewicz, 2021). Spaces that host low-stimulus activities that require a high level of focus are grouped, while activities that require a high level of alertness are grouped as high-stimulus zones (Anous, 2015). However, although services, including bathrooms, kitchens, staff rooms and administration, are considered high-stimulus spaces, they should be designed into a separate compartment (Altenmüller-Lewis, 2017; Anous, 2015).

Themes

Design qualities for autism-friendly spaces are introduced through various design guidelines, each highlighting autistic individuals' sensory, cognitive and social needs. By design qualities, we refer to a specific feature or characteristic that can influence the experience of autistic individuals. Many of the proposed qualities highlight the need for an organized framework or taxonomy to classify them. Although each guideline provides insightful information, the need for a comprehensive taxonomy arises to avoid any fragmentation and inconsistency in the design process. Without a classification for autism-friendly design qualities, designers navigate an excessive number of qualities, potentially excluding critical design qualities and influencing the space's adaptability for autistic individuals.

Taxonomy structure

A well-structured taxonomy fulfils several critical purposes. It provides an organizational approach to ensure the integration of all design qualities. It also acts as a fundamental instrument for further studies, allowing continuous development. This paper develops a taxonomy encompassing most of these qualities. This taxonomy integrates design qualities and brings clarity to the design process. The taxonomy is structured to include the causes that raise the need for having unique design qualities for autism and the various design qualities and ends up with the achieved qualities resulting from applying the design qualities for autism. Accordingly, four main categories are included to form a comprehensive taxonomy that can be integrated into the design process. Figure 6 illustrates the concept of the proposed taxonomy.

Categories and subcategories

As presented in Figure 7, the proposed taxonomy includes for main categories, covering most of the qualities found in the current literature for autism-friendly settings. Figure 8 presents the full taxonomy including categories and subcategories.

Sensory-based variances: This category explores sensory processing variances and the factors contributing to sensory differences in autistic individuals. It explains the sensorial qualities underlying these variations and highlights the need for specific design considerations for autism-friendly environments.

This category forms the basis for understanding the necessity of the second and third categories. As presented in Figure 9, it includes subcategories mainly related to the sensory variances, including the locally oriented perception of autistic individuals, their unique stimulation of mental processing as episodic future thinking, the deficiency in their perception of depth, the different regulation of sensory input and sensory processing, and their sensitivity to details.

Sensory-control design qualities: This category investigates the pivotal design qualities employed to enhance and modify the physical environment of autistic individuals. It comprehensively analyses the design qualities for autism-friendly designs outlined in the current

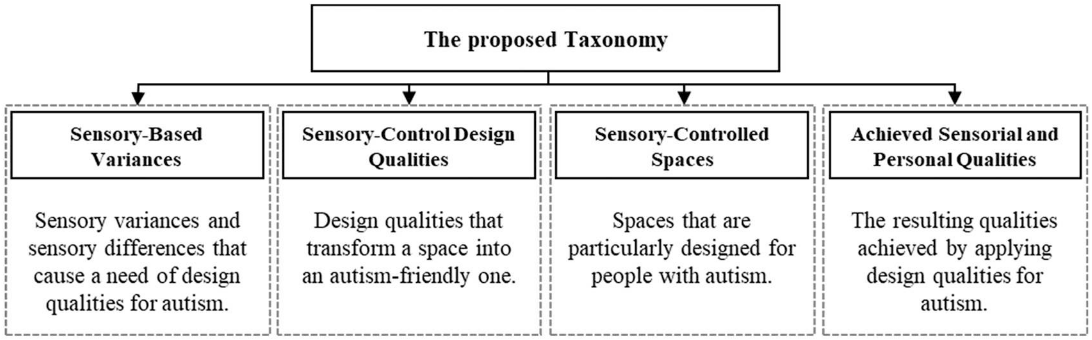

Figure 7. The proposed taxonomy.

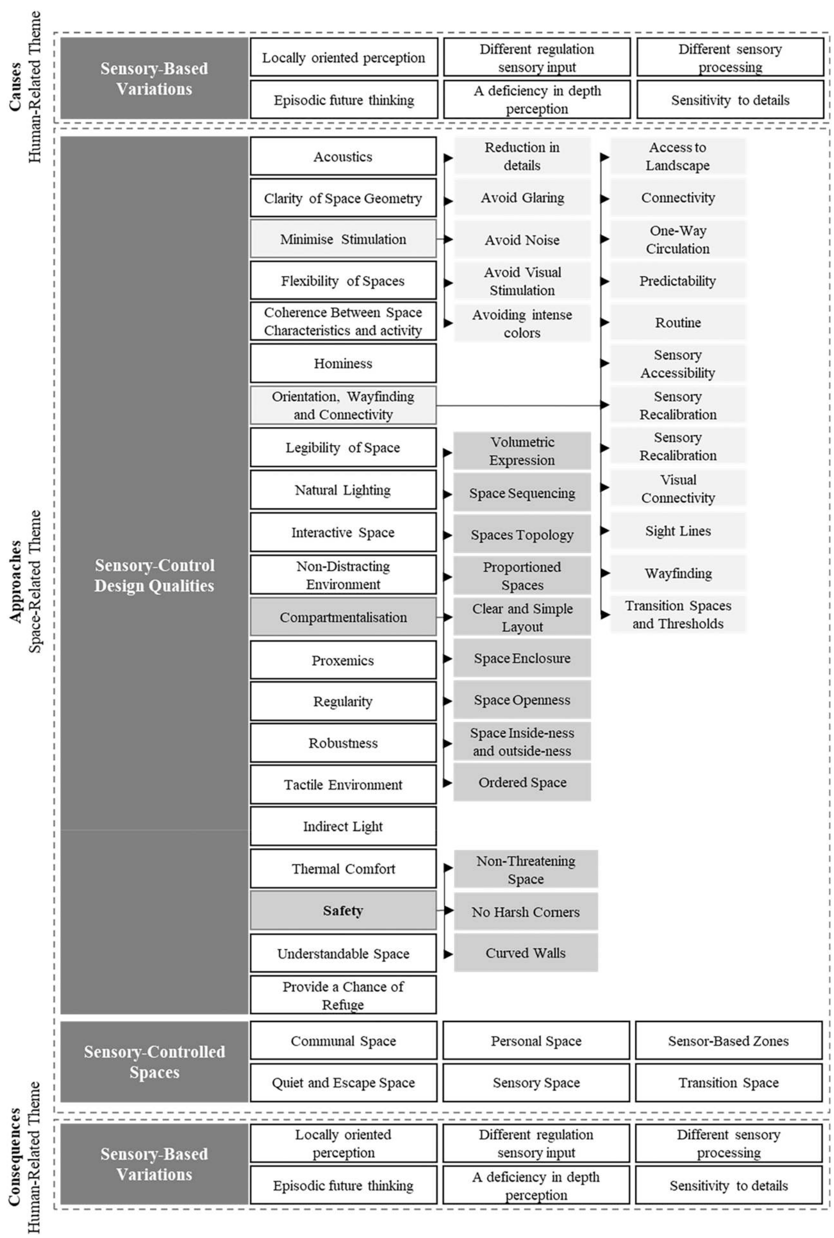

Figure 8. The proposed taxonomy including themes, categories, and subcategories.

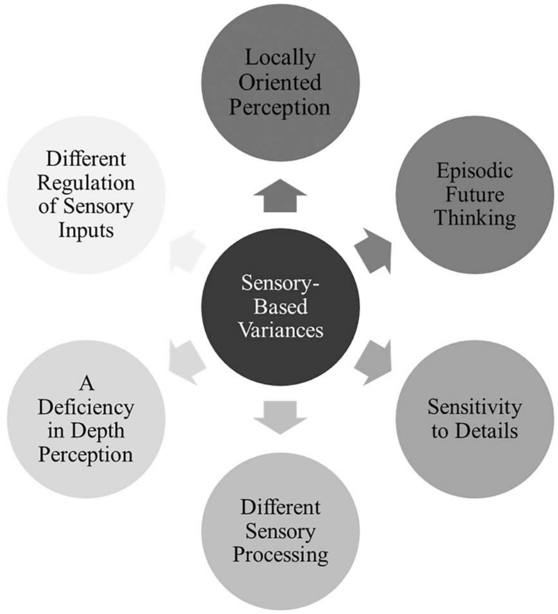

Figure 9. An illustration of the sensory-based variances category.

literature. It describes the factors that must be considered to transform a particular setting into an autism-friendly one.

This category is considered the biggest within the taxonomy. It includes 21 design qualities that can be applied directly to a space to make it more suitable for an autistic person. Four of these qualities include more subcategories, as presented in Figure 10.

Sensory-controlled spaces: This category emphasizes the significance of including particular spaces in autism-friendly designs, stressing the critical role these spaces play in controlling sensory experiences for autistics. These spaces introduce a controlled stimulation level, which helps to soothe the chaotic environments autistics may experience. These spaces are intended explicitly for autism centres. They effectively address unexpected sensory issues faced by autistics. For instance, quiet spaces are specially made for autistics, offering a refuge from the unexpected overstimulation that a person with autism may encounter in a particular environment. This category is labelled as 'sensory-controlled' because it provides a pre-controlled stimulation level. As presented in Figure 11, this category encompasses the six types of spaces designed for autistic individuals, including (i) communal spaces, (ii) escape spaces, (iii) personal spaces, (iv) quiet spaces, (v) sensory spaces and (vi) transitions spaces.

Achieved sensorial and personal qualities: The final category includes sensorial and personal qualities achieved by providing autism-friendly environments. It illustrates how the use of design qualities for autism and the incorporation of sensory-controlled spaces can affect a person's personality and senses. This category explores the personal and sensorial characteristics or qualities attained by meticulous design considerations that cater to autistic individuals' sensory processing complexities. It deals with immaterial qualities beyond simple spatial depiction and emphasizes the transforming influence on the person.

As presented in Figure 12, this category highlights the increase in the sense of (i) hominess, (ii) predictability, (ii) control, (iv) motivation, (v) regularity and (vi) confidence resulting from considering autism-friendly design qualities and spaces.

Discussion

The proposed taxonomy presents a structured framework for classifying various design qualities for autism. It provides a comprehensive approach for utilizing the design qualities in the design process. This taxonomy starts by highlighting the *causes* of the sensory variations in autistic individuals. It highlights the need for understanding the perception of autistic individuals towards their spaces as a first step in designing sensory-informed designs. Autism is frequently associated with a locally oriented perception, in which individuals show increased sensitivity to details (Giovannini et al., 2009). Autistic individuals face various sensorial and perceptual variances, substantially impacting their environmental interaction. They experience perceptual issues in establishing preferences of different environments, affecting their ability to stimulate mental processes, referred to as episodic future thinking (Vartanian et al., 2021). Autistic individuals experience a challenge in depth perception, impacting their use of steps or staircases (Kinnaer et al., 2015). As the comprehension of autism has improved, there has been a noticeable increase in interest in sensory processing (SP) (Hadad & Yashar, 2022; Lane et al., 2010), which is the sophisticated brain mechanisms that govern the receiving and interpretation of sensory stimuli (Johnson-Ecker & Parham, 2000). Autistic individuals commonly exhibit sensory sensitivity (Caniato et al., 2022a, 2022b; Lane et al., 2010), under-responsivity or seeking behaviours (Lane et al., 2010), and up to 95% have sensory processing abnormalities (Baker et al., 2008). Their sensory profiles and the evaluation of sensory processing play a vital role in examining various aspects of sensory processing across the spectrum (Johnson-Ecker & Parham, 2000). These discrepancies in sensory processing in autism can make it challenging to regulate sensory information, impairing social relationships and involvement in daily activities

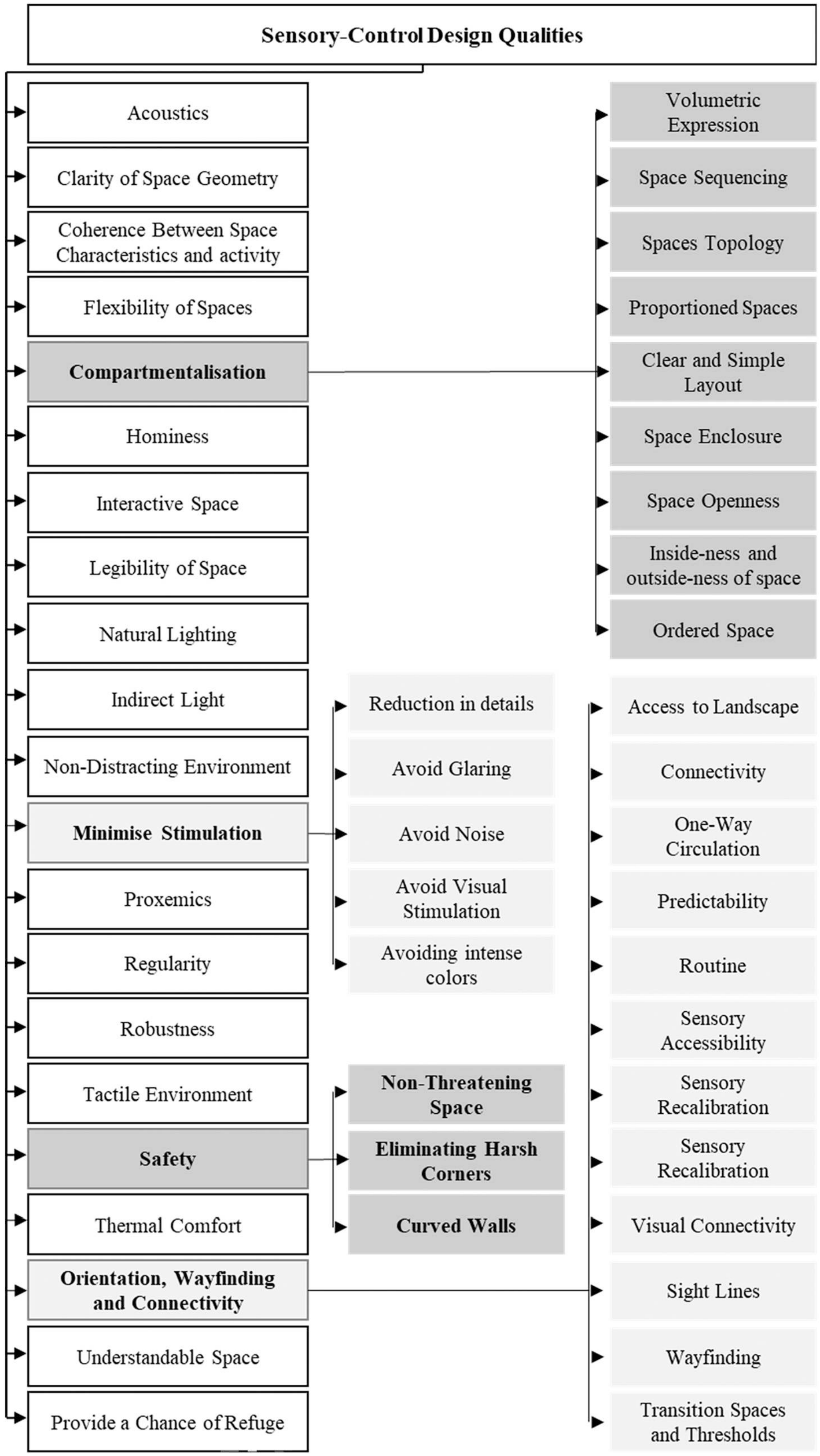

Figure 10. An illustration of the sensory-control design qualities category.

Figure 11. An illustration for the sensory-controlled spaces.

Figure 12. An illustration for the achieved sensorial and personal qualities category.

(Donnellan et al., 2013). Furthermore, autistic individuals frequently demonstrate various sensory processing problems, such as difficulty in regulating sensory input, seeking input from many sensory systems, and sensitivity to tactile stimuli (Tomchek & Dunn, 2007). Interpreting cues across several modalities, such as sight, sound, smell and touch, might be difficult for individuals with autism (Mentel & Bujniewicz, 2021). Accordingly, an emphasis on the diverse character of sensory experiences in autism and the need to consider sensory demands when designing for this population is required. The proposed taxonomy addressed how sensory variations are linked to design solutions, ensuring better clarity and usability for designers.

The built environment's effect mostly impacts individuals with impairments affecting their vestibular and proprioceptive systems on their ability to move around and navigate (The British Standards Institution, 2022). It is considered critical for their well-being, in which supporting their healthy lives entails the creative integration of design criteria that cope with their sensory processing mechanism. The taxonomy dives through design qualities that can control the sensory input, which can be directly applied in the design process. Those *sensory-control design qualities* are mainly responsible for providing the *sensory-controlled environments* autistic individuals need. In a learning setting, there is a strong emphasis on considering the relational and sensory aspects of the environment in addition to the unique learning requirements of each student, which serve as the backdrop for learning experiences, particularly for autistic individuals (Birkett et al., 2022). Overall, sensory-sensitive design qualities, clear spatial organization, and intuitive wayfinding aspects can significantly enhance the navigational experiences of autistic individuals in various environments.

The taxonomy then includes a category for spaces designed specifically as sensory-controlled environments. Those spaces are responsible for recalibrating the sensory stimulation level in case of overstimulation. Sensory, escape, personal, quiet, communal and transition spaces are distraction-free, neutral sensory environments that can enhance the well-being of autistic individuals. Interestingly, each autistic person has a unique interpretation of his relief space, where the required sensory input can be achieved (Kinnaer et al., 2015). All of those spaces are aiming at giving a break from the excessive stimulus present in the surroundings (Mostafa, 2021). The inclusion of these spaces highlights the taxonomy's broader benefit as a guide for creating sensory-informed environments, not only a classification tool.

Finally, the taxonomy highlights the impact of considering the sensory variations in autism, applying the sensory-control design qualities, and providing sensory-controlled spaces to enhance autistic *sensory and personal qualities*. The physically observable properties of space appear to engender greater confidence in autistic individuals (Baumers & Ann, 2010). As per The British Standards Institution (2022), designing spaces that promote visual legibility, clarity and simplicity enhances an autistic individual's sense of calmness and reassurance. In their study of autistic individuals' autobiographies, Kinnaer et al. (2015) underlined that the material surroundings appear to provide autistic individuals with constancy and, hence, comfort in an often confused and chaotic reality. Accordingly, spaces are perceived clearly when they exhibit a coherence between the characteristics of the space and the activity carried out within it (Dordolin, 2021). In accordance with Vartanian et al. (2021), designing environments in a way that accommodates an autistic person's limited sense of personal and physical spaces increases their sense of hominess, which makes their physical surroundings more cohesive. Accordingly, this taxonomy highlights the significance of applying sensory-informed design qualities in improving the mental well-being and independence for autistic individuals.

Regularity and predictability of a physical environment lead to qualifying the spatial behaviour of individuals with autism (Baumers & Ann, 2010). Additionally, autistic individual's feeling of control over their own space is positively impacted by the setting's degree of familiarity and predictability (Brand et al., 2010; Kinnaer et al., 2015). Space's physical elements may offer some grip and qualify space use, making this sense of control possible (Baumers & Ann, 2010). Furthermore, the principles of mental and sensory accessibility can be utilized to improve the mental well-being of individuals with autism (Kinnaer et al., 2015). For instance, offering a sense of choice in the physical environment can foster the independence of an autistic individual (McAllister, 2010). Additionally, it is possible to improve the motivation, confidence and self-esteem of autistic individuals by creating environments that support skill development and encourage environmental exploration (Brand et al., 2010; Wohofsky et al., 2023). Moreover, autistic individuals' ability to give meaning to their experiences in the world is also notably influenced by their material environment (Kinnaer et al., 2015). For instance, for an environment to give a sense of non-distraction, the chance of sensory overload has to be decreased (McAllister, 2010).

The second category, encompassing sensory-control design qualities, is considered the most extensive in the taxonomy. This highlights that the literature is oriented towards providing qualities for controlling sensory stimulation. However, studies on the main causes of sensory variations in space perception for autistic individuals and the sensory and personal impact of applying these design qualities are still not fully addressed. This gap may result from the complexity of assessing the autistic individuals' perception, given the significant variations within the spectrum. Although the autism spectrum has a wide cognitive and sensory range, there is a need for building evidence-based studies focusing on autistic individuals' perception of their environments, relying mainly on the individuals themselves, not their caregivers.

The findings highlight the deficiencies in the current literature regarding the topological aspect of spatial design in terms of the connections between spaces. Design guidelines primarily address sensory zoning as the main driver for spatial topology. Furthermore, most studies emphasize interior design elements more than the spatial configuration of the floor plan layout.

Nevertheless, converting design guidelines and principles into concrete design strategies requires quantifying design qualities and translating the qualitative-based attributes into quantitative, measurable data. This can enhance the chance of applying these design qualities to the computational frameworks for spatial layout planning. Another aspect to consider is creating a validation strategy, considering the various sensory processing profiles displayed by autistic people, which will be addressed in future works/lies beyond the scope of the current work.

This research primarily explores the necessary design qualities for creating autism-friendly settings, focusing on spatial design qualities. The contribution of this study encompasses establishing a taxonomy that systematically categorizes design qualities associated with autism and presenting the achieved personal and sensorial qualities by following autism-friendly design aspects. This study demonstrates a framework that categorizes autism-related qualities based on a thorough examination of the current literature, offering a collective taxonomy for design qualities for autism.

A key novel aspect of this taxonomy is distinguishing between spatial, personal and sensory qualities, often overlapping in the current guidelines and considerations for autism. It addresses the physical, sensory, social and personal needs of autistic individuals. This work fills the gap in previous research by establishing a classification system for dealing with the fragmented and vague design qualities in earlier design guidelines. Accordingly, it serves as a platform for future research and practice in autism-friendly designs, as it acts as a tool for evaluating current settings and influencing the creation of new spaces for autism.

Limitations and future directions

Although the proposed taxonomy aims to provide a comprehensive framework for classifying design qualities associated with autism-friendly environments, certain limitations should be acknowledged. First, as autism spectrum disorder exhibits a wide range of sensory, cognitive and behavioural variations, in which creating a universal taxonomy that accounts for all individuals equally presents significant challenges. Accordingly, future research could explore strategies for dealing with the heterogeneity across the spectrum, rearranging the taxonomy to specific sensory profiles. Second, the applicability of the taxonomy may vary according to cultural or contextual differences. This opens a door for future research to investigate the impact of cultural or contextual differences on the sensory and spatial needs of autistic individuals. Third, as the proposed taxonomy offers a qualitative framework, its application in real projects may be challenging. Future research could focus on the quantification of the design qualities to form measurable indicators for evaluating the success of implementing sensory-informed qualities. Additionally, although the taxonomy is grounded in cutting-edge literature, its effectiveness has not been validated, opening the door for future research to evaluate and test the taxonomy in real-world projects. Finally, although the taxonomy addresses the sensory and spatial needs of autistic individuals, the long-term behavioural and psychological impact of autism-friendly designs is not considered. Future studies may apply a post-occupancy evaluation to assess the influence of particular design qualities on the development of an autistic individual.

Conclusion

As efforts to develop inclusive designs gain momentum, designing for neurodivergent individuals, particularly autistic people, have become crucial. Addressing the spatial needs of autistic individuals is recognized as a vital factor for promoting universal design principles. This study makes a significant contribution by addressing a critical gap in the literature: while existing research identifies key design qualities for autism, it lacks a structured framework for categorizing them. To address this gap, this study introduces a novel taxonomy that provides a clear and systematic approach to classifying these qualities. This taxonomy not only bridges theoretical insights and real-world implementation but also enhances the effectiveness and precision of autism-friendly design strategies. A comprehensive understanding of how these qualities are integrated within the design process further supports their practical application. The significance of this research extends to several stakeholders, including designers, educators and policymakers, who are engaged in creating autism-friendly spaces. It lies in establishing a systematic foundation for creating autism-friendly spaces by facilitating the understanding and implementation of sensory-informed design qualities. The proposed taxonomy emphasizes the importance of identifying the causes of the sensory issue before addressing how to meet the sensory requirements. By systematically classifying qualities and considering causes-and-effects relationships of sensory and functional needs, the taxonomy fills a critical gap in the current literature, which lacks structured guidance. Furthermore, it highlights the potential consequences of applying design qualities without thoroughly understanding the sensory variations, which could lead to inappropriate or ineffective interventions. The taxonomy primarily focuses on ensuring that design solutions are grounded in a comprehensive understanding of individual sensory needs, thereby avoiding misaligned outcomes. Additionally, the inclusion of clear categories and subcategories in the taxonomy provides architects with a practical tool, such as a checklist, to identify and integrate the required qualities into their designs. The taxonomy is specifically intended to simplify the design process while enhancing its efficiency by enabling designers to align their designs with the sensory requirements of autistic individuals. Additionally, this taxonomy can serve as a foundation for developing design tools that enable practitioners to effectively integrate sensory-informed design qualities into diverse projects, ranging from schools to healthcare facilities.

To further facilitate the taxonomy's practical application, a beneficial step encompasses conducting case studies or building prototypes to validate the taxonomy's efficiency. The validation process could also be done through collaborative work with autistic individuals, caregivers and clinical professionals, with the aim of refining the taxonomy. Additionally, the scalability of the taxonomy is worth attention. This taxonomy is built on the published literature, which mainly considers spaces ranging from schools to universities. A detailed assessment of the taxonomy's scalability could be achieved by applying it to best practices in designing for autism to check its practical application on a wide range of buildings and public spaces. This taxonomy emphasizes that the varying degrees of autism severity must be considered while creating design guidelines and considerations for autism-friendly design. The sensory processing variations between individuals with hypersensitivity and those with hyposensitivity demand detailed and specific design approaches tailored to these variations. By addressing these complexities, this paper fills a critical gap in the literature, introducing a comprehensive and practical categorization system that paves the way for further research and innovation in designing for autism. A collaborative interdisciplinary work between clinical professionals, educators and designers could enhance the applicability of this taxonomy. Finally, this taxonomy has the potential to serve as the foundational tool for scholars and designers, enabling the incorporation of sensory-informed design principles into practical applications. This enhances the effective use of design qualities in creating autism-friendly environments and advances the field toward more inclusive and responsive design solutions. The findings presented here are likely to appeal more to people who are involved, directly or indirectly, in designing inclusive environments for autistic individuals.

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