



Urban form for autism: the role of architectural design in the social life of autistic individuals

Supported by funding from Leif Blomkvists Forskningsstiftelse (LBF)

2024

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Abstract

Autism is a neurodivergent condition characterized by differences in social communication, interaction skills, and sensory processing. The quality of life for autistic individuals is influenced not only by societal attitudes and support systems but also by the architectural attributes and spatial consideration of their surrounding environments. Access to inclusive and autism-friendly urban spaces is essential for enhancing the social experiences and the participation of autistic individuals and their families. Through spatial interventions, architects, planners, and designers can significantly impact the sensory input within the built environment, creating spaces that facilitate social participation and increase the overall well-being of individuals. While existing research has largely focused on specific architectural interventions at a micro scale—such as homes, schools, and public spaces—this study aims to broaden the discourse by examining the spatial characteristics of autism-friendly urban forms. The main purpose of this study is to explore the impact of the built environment on the quality of life of autistic individuals. The study seeks to contribute to the development of guidelines and policies for creating autism-friendly urban environments that promote social inclusion and well-being for the neurodiverse community. Ultimately, this research offers insights for academics, practitioners, and policymakers invested in designing equitable cities.

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Introduction

Autism Spectrum Condition (ASC) is a neurodevelopmental condition that primarily relates to individual's social communication and interaction skills, as well as their cognitive and sensory processing. Autistic individuals often encounter challenges in engaging in social interactions and participating in public spaces.

The quality of life of autistic individuals is closely tied not only to societal attitudes and the support levels offered by local and national authorities, but also to the architectural and spatial features of their surroundings. Access to inclusive and autism-friendly urban spaces is crucial in shaping the quality and variety of social experiences available to autistic individuals and their families.

Through intentional conscious design processes, architects, planners and designers can exert notable levels of control over the built environment sensory input to which individuals on spectrum are exposed. That is, architecture and planning have the potential to create autism-friendly environments to facilitate social participation and enhance the life quality of individuals on spectrum.

While recent studies have explored architectural and design aspects of the built environment in relation to autism, they have predominantly focused on specific architectural interventions at a micro scale, such as home environment, learning environments, preschools, schools, health care, shopping malls, parks, and so forth. However, by extending the discourse on autism-friendly architecture beyond these isolated interventions, the questions that arise are:

What are the architectural characteristics of an autism-friendly urban form? What levels of spatial flexibility and architectural adaptability should be embedded in urban structures to accommodate the diverse sensory preferences of autistic individuals? How can urban form address autism beyond sensory aspects? What spatial settings have the potential to empower autistic individuals based on their skills and abilities, rather than focusing solely on 'deficits'?

In the long term, exploring these questions will contribute to gaining a deeper understanding of the relationship between architecture and the social life of autistic individuals. These questions will have implications for the development of guidelines and policies for designing *autism-friendly* urban environments, capable of promoting social participation and the wellbeing of neurodivergent individuals. Therefore, they are deemed useful not only for academics in autism studies but also for practitioners, authorities and decision-makers involved in advancing the concept of cities for all.

The overall aim of this study is to provide new insights into the potential role of architecture and urban design in enhancing the quality of life for autistic individuals and promoting equal opportunities for socio-spatial participation.

Method

The project primarily relies on a scoping literature review, supplemented by a limited number of interviews with experts in participatory processes and social sustainability in urban planning and design.

Arksey and O'Malley [1, 2] methodological framework for conducting scoping reviews is particularly relevant to this study due to its aim of *identifying research gaps*, which necessitates a multidisciplinary approach. The review explores a variety of disciplines with diverse research designs and frameworks, however, with an emphasis on the relation between autism and the built environment.

The interviews aim to validate the findings from the literature review as well as provide additional practical insights, despite their limited scope.

Results

Autism, or Autism Spectrum Disorder (ASD), is a neurodevelopmental condition characterized by differences in social communication and interaction, alongside restricted and repetitive patterns of behavior, interests, or activities. There are varying estimates regarding the prevalence of autism, but according to the World Health Organization (WHO), about 1% of the global population is diagnosed with autism. The increase in autism prevalence is primarily attributed to changes in diagnostic processes and methods.

According to the Diagnostic and Statistical Manual of Mental Disorders, (DSM-5), [3] Autism Spectrum Disorder (ASD) is defined by persistent deficits in social communication and social interaction across multiple contexts, along with restricted, repetitive patterns of behavior, interests, or activities. The DSM-5 outlines two main specific criteria for diagnosing ASD, which include:

- 1- Persistent deficits in social communication and social interaction;
- 2- Restricted, repetitive patterns of behavior, interests, or activities.

Despite the prevalence of references to the DSM and medical definitions in autism studies, there is an emerging paradigm questioning the medical approach to autism, [5] which will be further discussed in the following paragraphs. By adopting a holistic approach, this paradigm seeks to recognize autism beyond its purely medical frameworks, instead encompassing a wide range of social, cultural, and neurodiversity perspectives in understanding and supporting autistic individuals and their families. [6]

Disability: medical model or social model

Autism studies are deeply rooted in a medical approach that often uses terms like "disorder" or "deficit" to describe autism. However, grounded in the social model of disability, which views disability as arising from social, environmental, attitudinal, and organizational barriers that hinder

individuals with impairments from fully participating in society, the neurodiversity paradigm offers a new framework for understanding and studying autism. [7] Within this paradigm, autism is primarily seen as a *difference* and a form of *diversity* rather than a deficit. [8]

Building upon this perspective, the relevance of the built environment to autism studies becomes increasingly relevant. [9] That is, fields dealing with spatial and physical aspects such as architecture, urban design, and spatial planning must identify and address the barriers within the built environment to facilitate the full engagement of autistic individuals in their daily activities.

Neurodiversity

Since its early beginnings in the 1910s, autism research has continuously developed across various academic disciplines. The recent rise of the neurodiversity paradigm has prompted critical autism studies to explore new frameworks beyond traditional medical definitions. [5] The emerging paradigm of neurodiversity, conceptualized through the social model of disability, [7] and viewing autism as a natural variation of humanity, [10] seeks to recognize the differences and diversity within the neurodivergent community. [11] Drawing from theories in fields such as critical disability studies, feminist studies, sociology, critical race studies, and urban politics, [8, 12] neurodiversity seeks to establish cultural and political identities [13]. Broadly, neurodiversity advocates for justice by emphasizing the recognition of difference and diversity. [7] Influenced by the disability rights movement, Jim Sinclair's essay "Don't Mourn for Us" calls for understanding autism as a *way of being* rather than a disorder to be cured or a deficit to be mitigated [14]. The neurodiversity paradigm views autism as a natural variation of humanity and a culture. [11] Within this framework, autistic individuals seek recognition as a distinct community with group-differentiated rights. [11]

While various approaches exist to define and implement neurodiversity in theory, policy, and practice, [5, 15] it broadly advocates for a re-evaluation of social and cultural constructs of 'normality'. [6] This perspective opens up opportunities for critically exploring the concept of 'difference' in social interactions. Despite some discussions within the neurodiversity movement rejecting the notion of autism as a disability and emphasizing it as a cultural identity, [11] there is a general consensus that autism encompasses both cultural identity and disability. This understanding of disability is based on the social model, which views disability as the result of societal discrimination and environmental barriers, rather than an inherent bodily impairment or deficit. [16]

Participatory planning and the autistic community

In urban planning, one key approach to achieving spatial justice is through collaborative planning, which is grounded in the principles of communicative rationality and deliberative democracy. [17] This method emerged as a reaction against scientific rationalism, drawing from Habermas's idea of inter-subjective reasoning. [18] Essentially, it emphasizes the importance of involving diverse groups in decision-making processes to collectively make sense of their shared spaces while respecting their differences. [19]

Since the early 1980s, the collaborative planning model has become a central part of planning theory and has significantly influenced practical planning approaches. Various methods, techniques, and tools have been developed to engage diverse communities in planning processes across different contexts and at various scopes. The underlying goal has been to accommodate the needs of diverse groups and stakeholders within socio-spatial planning processes. However, a review of the existing literature on participatory planning indicates a lack of examples for engaging the neurodivergent community in planning processes.

Autism and the built environment

The question of an autism-friendly built environment has been explored within architectural studies to identify the main characteristics for the spatial arrangement of buildings and urban spaces. This has often resulted in guidelines, recommendations, and indexes aimed at addressing the needs of the neurodivergent community. For example, the Autism ASPECTSS Design Index [20, 21] identifies seven criteria as follows:

1. Acoustics: to control the background noise.
2. Spatial Sequencing: to address the spatial need for predictability in the spatial logic.
3. Escape Space: a neutral sensory environment to withdraw and recover from over stimulation.
4. Compartmentalization: designated spaces for defined functions and activities.
5. Transitions: in between spaces to facilitate the transition from one space with particular function to another.
6. Sensory Zoning: the relevance of sensory quality in spatial arrangements.
7. Safety: with an emphasis on the needs of children regarding the safety of the built environment.

The aforementioned seven criteria are mainly discussed at the level of interior design and architecture. Accordingly, there are applicable in design or renovations plans of buildings with specific functions such as residential, schools, health care, workplace or even indoor public space. It can be argued that the two main factors behind these criteria include sensory control through the built environment and spatial arrangements to facilitate the predictability of space and its function.

There have been a number of studies on the relationship between spatial arrangements and autism, focusing on the specific functions of a building. For example, McAllister and Sloan [22] study autism-friendly environments in school settings with the aim of facilitating the inclusion of autistic children in mainstream schools. In their study, they categorize their findings based on several important spatial components and considerations, including playgrounds, security, noise and comfort, circulation spaces such as corridors, legibility of spatial arrangements, ASC resource base spaces or rooms, and the overall spatial arrangement of the school. Similarly, in order to discuss an autism-friendly school environment, Altenmüller-Lewis [23] elaborates on several considerations including safety, context and community, zoning and

compartmentalization, spatial sequencing, thresholds, way-finding, navigation & circulation, escape spaces & sensory rooms, control of sensory stimuli, acoustics, lighting, and color.

Nagib and Williams [24] study an autism-friendly home environment, trying to develop design strategies for five potential challenges at home environment. Their suggested strategies include:

1. the challenge of social and communication: with design strategies of organizing space into zones with different gradations and providing generous spaces to allow for larger personal zones
2. The sensory challenge: Implementing design strategies such as ensuring quality acoustics to manage noise levels, maximizing natural lighting, avoiding traditional fluorescent lighting, and incorporating a sensory-friendly room in the house.
3. The challenge of imagination and perception: with design strategy of encouraging space simplicity and sense of spatial and physical order.
4. The challenge of safety: with design strategy of providing locks for windows and external doors.
5. The challenge of behaviour: with design strategy of utilizing clean and durable materials; providing wider spaces and higher ceiling;

In his study, Kenna [25] offers one of the few perspectives on autism from an urban studies standpoint, focusing on neurodiversity and its significance in the geography of urban encounters and public spaces. Emphasizing autism beyond sensory aspects, this study remains at the level of theoretical contributions though. Similarly, although Vanolo [26] addresses the question of autism in the context of cities and urban spaces, his research remains largely conceptual and theoretical in nature. Nevertheless, he attempts to challenge some of the neurotypically established values of the capital city, demonstrating that the concept of the autistic city has more to offer. For instance, he puts: *“the autistic city offers potential for subverting this narrative, suggesting that there may be something positive about monotony, slowness, predictability, rest, and quiet—and not only for people with a diagnosis. Even boredom or loneliness can hold something worthy, useful, and creative”*.

In their review of the existing literature on the built environment and autism, Black et al. [27] identify six different aspects of the built environment that are frequently discussed. They include:

1. Design and construction: including layout, walls, building material, ceilings, entrances and orientation.
2. Lighting: including light intensity, light quality, light fixtures.
3. Sound: including sound intensity, sound quality
4. Aesthetics: including pattern, windows, colour, texture and clutter.
5. Indoor air quality.
6. Temperature.

In their study, Black et al. [27] also emphasize the importance of understanding autistic experiences in relation to the built environment from the perspective of autistic individuals themselves as the most crucial aspect in developing design guidelines for an inclusive urban environment.

As the result of a qualitative synthesis literature review, Tola et al. [28] identify three autism-specific *spatial* criteria in addition to three criteria of general interest. The main three spatial criteria are related to the specific features of clinical descriptions of autism, which include: a) *sensory quality*, b) *intelligibility*, and c) *orientation*.

Their three autism-specific *spatial* criteria include:

- a) Sensory quality: which is described mainly in relation to i) low arousal environment, ii) transition spaces and, iii) quiet spaces
- b) Intelligibility: which is discussed in relation to i) clear and simple spatial layout, ii) visual relation, iii) predictability and routine, iv) circulation and possibility of choosing, and v) Proportion and proxemics.
- c) Orientation and navigation: which can be enhanced through i) visual supports, ii) wayfinding

In addition, the three criteria of general interest consist of:

- 1. Identification of a quiet and accessible location
- 2. Safety and security
- 3. Flexibility and customizing

Despite the relevance of the spatial criteria for an autism-friendly environment, a question that arises here is: to what extent the needs and expectations of the neurodivergent community from the built environment differs from neurotypicality? Aligned with the ideal of Universal Design and its core value of advocating design strategies that promote an attractive and functional built environment “for all people, disabled or not”, [29, 30] there is a need for future studies to investigate the extent to which the spatial criteria for an autism-friendly environment might differ from the norms of an inclusive design for all.

Also, as mentioned earlier, the majority of design strategies and criteria are developed at the scale of interior architecture or building layouts. Despite several attempts to extend such criteria to the larger scales of neighborhoods and cities, there still remains a gap in research on autism and urban scale. Among the very few works on cities for the neurodivergent community, one could refer to the work of Fiscella et al., [31] which assesses the relationship between the neighborhood environment and the physical activity of autistic children. In another study advocating for neurodivergent neighborhoods as a means to enhance the overall livability of urban regions, Chan [32] elaborates on design strategies for creating spaces where different groups, particularly those with varied abilities, can coexist. In his work, Chan tries to bridge two concepts of *accessibility* and *spatial experience*, arguing that architects tend to consider them as unrelated. Following that, the study refers to the Kevyn Lynch main elements of the city image as *paths*, *edges*, *nodes*, *landmarks and districts*, trying to develop discussions on how those elements are of relevance to an autism-friendly urban space and experience. At the scale of neighborhood, the study also proposes three zones with varied residential types in accordance with the level of independence and living arrangements of autistic individuals. This is, however, important to note that there is a need for future evidence-based research to explore and assess the proposed design strategies in this study.

- detached bungalow (Zone 1) for independent autistic individuals who prefer to live alone.
- duplex units (Zone 2) for independent autistic individuals who are comfortable to live with other people.
- cluster homes (Zone 3) catered for autistic individuals who need support and supervision.

Sensory processing

The control over sensory input experienced by autistic individuals has been a central topic in the majority of literature exploring the relationship between the built environment and autism. This emphasis may be connected to the DSM-5 criterion of "*Hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of the environment,*" which underscores the relevance of the built environment in autism. In other words, addressing the impact of the built environment on sensory stimuli levels is crucial to understanding autism.

However, it is important to note that there is a wide spectrum of diversity among neurodivergent individuals in their responses to sensory input. Therefore, spatial considerations regarding sensory input control must account for this diversity of reactions and refrain from generalizations.

Interviews

Although this report mainly relies on peer-reviewed publications concerning the relationship between autism and the built environment, several interviews with experts were conducted to validate the data.

The interviewees were selected using *purposive sampling*, which was initiated by seeking recommendations from an urban planner at RISE, who has extensive professional experience in the public sector and urban planning offices in Sweden. Initially, eight individuals were approached for interviews. In the end, four interviews were conducted with five experts specializing in spatial planning, citizen participation, accessibility, and universal design. The interviews were semi-structured and conducted in both digital and in-person formats. All participants had professional backgrounds in urban planning, community planning, or related fields, and were employed in the public sector in Sweden at the time of the interviews. To maintain the confidentiality of the interviewees, the report will refer to them by assigning each a unique number whenever a quote is included.

- Interviewee 1: urban planner (stadsbyggnadsstrateg), working in a municipal planning office in Sweden.
- Interviewee 2: urban planner (översiktsplanerare), working in a municipal planning office in Sweden.
- Interviewee 3: community planner (strateg för boendepanering), working in an Elderly Services Department (äldreförvaltningen) in a municipality.
- Interviewee 4: strategist, Welfare Department at a city management office in Sweden.
- Interviewee 5: an expert working with disability issues to support decision-making processes at a city management office (Stadsledningskontoret).

Prior to the interviews, the participants were informed about the purpose of the research study as to gain new perspectives on challenges, requirements, and suggestions for the inclusion of the autistic community in planning processes. Due to the challenge of finding specific examples of planning for the neurodivergent community, the interviews inevitably broadened to the topic of participatory planning and disability.

Despite the limited number of interviews, which restricts the possibility of identifying themes or patterns in the collected qualitative data, a few common themes emerged. The interview results provide valuable insights into the following *four* topics.

1. knowledge about autism and its pertinence to urban planning

The need for understanding autism and the neurodivergent community was one of the most emphasized topics during the interviews. Despite their experience with various social communities, experts involved in planning and decision-making processes are not fully familiar with the spatial barriers preventing the neurodivergent community from participating in urban social life and pursuing an independent daily life.

For instance, one of the interviewees compares the knowledge related to planning for children, the elderly as well as the gender aspects of planning, emphasizing the need for similar knowledge development to address the needs of the autistic community in urban planning:ⁱ

“a lot of years or decades or more knowledge about the difference between the genders, for example, and what different genders need or don't need or how they perceive their environment, and as the results, we have dialogues with children and women or the elderly because we have the knowledge to understand these groups [and how they] use and perceive environments. So, I would say that knowledge about persons on the spectrum or the needs that they have, like different needs or certain needs, ... could also help us to understand what we have to focus on our dialogue process with them as well”

Key Takeaway: urban planning professional working with different spatial and social interventions need to be provided with more information and knowledge about the autism condition, the needs of the community particularly in relation to the built environment.

2. A framework, guideline and toolkit to involve the neurodivergent community in planning

Despite a relatively long history of engaging different communities in urban planning decision-making processes, there has been no framework or guidelines on how to involve the neurodivergent community in planning processes. Accordingly, the need for a framework and a set of guidelines or a method to assist planning practitioners in involving the neurodivergent community in decision-making processes has been emphasized.

For example, in a discussion highlighting that most participatory methods are designed to engage neurotypical individuals, it was noted that there is a risk of excluding neurodivergent individuals due to inadequate participatory mechanisms. The

interviewee, in this regard, emphasized that *“no, we don't really have any tools or mechanism for that, I would say, and that is that is a problem.”*

Key Takeaway: Current participatory methods in urban planning heavily rely on techniques and approaches that are suitable for neurotypical individuals. There is a need for more inclusive techniques to effectively incorporate the perspectives of neurodivergent individuals.

3. Diverse groups, different needs

One of the challenges in engaging citizens in spatial planning decision-making processes is related to the diversity of needs. Within the framework of nondiscriminatory approaches, the general umbrella of disability often encompasses various communities that may have distinctly different, and occasionally conflicting, needs. This raises the question of how to effectively involve specific communities, such as the neurodivergent community, given their highly specific needs. Spatial adjustability and adaptability have been mentioned as potential solutions for addressing a diverse range of spatial requirements. However, as one of the interviewees also mentions, despite employing various methods to consider the needs of different groups, some of the spatial interventions may not fully meet everyone's needs. One of the interviewees refers to the practical challenges such as time and cost, in order to hold fully inclusive processes in which the needs and perspectives of everyone is explored.

“some people think it is very important with dialogue and consultation and some people don't find it that necessary as others, but I would say that the biggest problem is that it cost money and that the process gets even longer if we're having, like an extensive dialogue process or inclusive process it; it would cost time and money. And maybe that's like the biggest problem”

Key Takeaway: Participatory planning processes need to encompass a wide range of views, needs, and demands, which are occasionally conflicting in nature. Due to limited resources, there is a risk that the interests and needs of some groups may be overlooked. Given the differences in social communication within the neurodivergent community, there is also a risk that they may be excluded from participatory processes that heavily rely on methods such as citizen dialogue.

4. From dialogue to real impact

There is a range of methods and tools to involve different social groups, such as children, the elderly, and youth, in planning and decision-making processes. However, this involvement is often described as a form of dialogue primarily aimed at informing the community about the already planned interventions. Accordingly, there is a level of skepticism regarding the extent to which such dialogues enable meaningful community involvement and participation in planning processes, with the potential to influence spatial interventions effectively. One of the interviewees discusses the stages at which

public consultation can occur, arguing that if dialogue does not take place during the early phases of the planning process, it is likely to become more of an information dissemination exercise rather than a meaningful opportunity for public input to influence outcomes. In this scenario, the dialogue becomes what the interviewee refers to as '*dialogue for the sake of dialogue*,' where public engagement occurs without any genuine potential for implementing changes based on feedback.

Key Takeaway: It is crucial to incorporate the perspectives of the neurodivergent community in the early stages of the (spatial) planning process to reduce the need for retrofitting and post-occupancy interventions.

Interviews summary

The questions of an autism-friendly built environment and the participation of the neurodiversity community in spatial planning processes are relatively new for practitioners in spatial planning. Despite a history of work on considerations for the built environment for autistic individuals at the scale of buildings and interior designs, such questions have not been addressed in urban planning and design fields. The relevance of the built environment, particularly its impact on sensory inputs, has attracted attention from academics and professionals working with inclusive cities. However, the dynamics of social interactions in in-between urban spaces and their impact on individuals on the autism spectrum have been understudied.[9]

Architecture and urban design can serve as tools to manage sensory stimuli and provide customizable and adaptable spaces to meet the needs of autistic individuals. However, as a first step, there is a need for a framework to facilitate the participation of the autistic community in decision-making processes for spatial interventions.

Discussions and recommendations

Based on the review of peer-reviewed publications on the relationship between the built environment and autism, as well as the supporting interview data validating identified themes, the report summarizes its findings in the following recommendations. Each recommendation is presented in the form of a numbered bullet point, followed by a description that further elaborates on and clarifies the point.

- 1- Approaching autism in urban planning as a form of *diversity* and *difference*, rather than a 'deficit'

Description: an examination of recent literature on the relationship between autism and the built environment indicates that many of the identified studies continue to rely on medical definitions of autism, occasionally exhibiting implicit ableism. For example, autism is often framed as a 'deficit' or 'disorder' in much of the reviewed research. However, there are recent alternative approaches to autism that emphasize the unique abilities and differences associated with it.

For instance, Ahlquist [33] employs the concept of a *differently-abled* body and mind in his exploration of the relationship between autism and architectural space. Similarly, Wright et al. [34] advocate for a shift in focus from *deficit* to a recognition of the diverse skills and interests exhibited by autistic individuals.

- 2- Incorporating the perspectives of the autistic community in the early stages of spatial planning, rather than relying on post-design adjustments and retrofitting

Description: while recent research on urban planning in relation to autism—and some other neurological conditions such as ADHD—has expanded, these studies primarily focus on microscale spatial interventions. This involves enhancing the spatial flexibility and nodal adjustability of specific locations to better accommodate the needs of autistic individuals, often in the form of interior modifications and adjustments. However, there is still a lack of a well-defined participatory approach that fully integrates the needs of autistic individuals into urban planning processes from the early stages.

This study proposes that early participation in the design and planning processes will reduce the need for subsequent reinvestment and retrofitting within the built environment.

- 3- Viewing spatial structure and planned interventions as a means to achieve spatial justice for the neurodivergent community

Description: the emerging paradigm of neurodiversity in autism studies seeks justice for the neurodivergent community. This approach emphasizes the spatial aspects of justice and the right of the neurodivergent community to the city, advocating for an urban politics that recognizes and embraces diversity as its core value. [26] Building on Hillier [35] explanations of spatial structure, urban form is not merely a backdrop to various social processes and behaviors; rather, it is itself a social behaviour imbued with the social processes and patterns through which it is initially constructed. This understanding of spatial structure can potentially establish a conceptual framework for neurodiversity's pursuit of such urban politics, emphasizing the diverse socio-spatial interactions embedded in the built environment. This also contributes to the spatial understanding of neurodiversity, a domain that, according to Kenna [25] has been highly undertheorized in urban geography and planning.

- 4- Considering the interplay between built environmental factors at different scales, ranging from interior architecture to urban structure.

Description: as shown in the literature review, the majority of work on the relationship between autism and the built environment has been developed at the architectural scale, focusing on interior spaces and building designs, often in the form of design guidelines and strategies. Despite several efforts to extend these guidelines to the larger scales of urban spaces and spatial structures, there has been a lack of empirical studies systematically investigating the relationship between urban form and autism. Accordingly, there is a need for future studies to

focus on autism-friendly spaces at the scale of urban structure. This also suggests that design recommendations applicable at one scale cannot be assumed to be pertinent to other scales.

- 5- Adopting a holistic approach to autism by acknowledging the interplay among various influencing factors.

Description: there has been increasing advocacy for a holistic approach to the study of autism, encompassing the various factors that impact the well-being and overall quality of life of individuals with autism. [36] The built environment, as one influential aspect, has attracted the attention of autism studies. However, the question of the built environment needs to be associated with the quality of life of autistic individuals to encompass a holistic perspective. The built environment should be understood as a means to enhance various aspects such as community participation, employment, access to healthcare and education, and mobility. Accordingly, this study suggests that the question of autism and urban structure can be pursued through its impact on the general quality of life and independence of autistic individuals.

- 6- Considering the primary role of the built environment as a regulator of sensory input.

Description: the majority of existing research on the intersection of autism and the built environment emphasizes sensory aspects and how the built environment can influence the control of sensory input. While considerations of the built environment in relation to the sensory processing of autistic individuals are perhaps the most important contributing factors within the fields dealing with man-made environments, recent calls have emerged to go beyond sensory aspects. Emphasizing diversity and difference, the emerging trends seek strategies that empower the neurodivergent community by focusing on the range of *abilities* and *skills* related to autism rather than solely on challenges. The spatial setting for this approach needs to transcend sensory controls and instead create an environment that facilitates the emergence of autistic skills.

- 7- Enhancing the spatial predictability

Description: one of the main spatial considerations discussed in various studies—albeit using different terms—relates to the predictability of spatial arrangement within a given space. Predictability can pertain to: 1) function, 2) sensory input, and 3) formal and spatial characteristics. While addressing spatial arrangement at the level of individual buildings and their interior layouts is more feasible, the question of spatial arrangement at the scale of urban form and spatial structure in relation to the needs of autistic individuals has been understudied. Accordingly, there is a need for research endeavors to study the complexity of urban encounters and their relevance to a wide range of socio-spatial processes in regard to autism.

- 8- Understanding autism as an intersectional concept.

Description: The majority of existing studies portray autistic individuals as a *homogeneous* group, using terms such as "autistic individuals" or "persons with autism" without further differentiation based on personal characteristics. Age and gender are however exceptions, as studies often distinguish between children and adults, with occasional references to gender as well.

However, to comprehensively address the complexities of discrimination against cultural identities and structural inequalities, it is crucial to adopt an intersectional framework in autism research. [37, 38] The necessity for an intersectional framework becomes apparent considering the extensive research history on the use of urban spaces by diverse social groups and the associated challenges and opportunities.

Thus, to understand the role of the built environment in relation to autism, there is a need to adopt an intersectional approach in studying the needs and challenges of the autistic community, moving away from viewing the neurodivergent community as a homogeneous entity.

Closing words:

The question of the relevance of the built environment to autism has gained significant interdisciplinary attention. However, current research predominantly concentrates on small-scale architectural and interior design interventions. These studies typically aim to formulate design guidelines that primarily address two objectives: a) regulating sensory stimuli and, b) enhancing spatial predictability. While these strategies are crucial for improving the quality of interior spaces to meet the diverse needs of autistic individuals, there remains a notable scarcity of research examining spatial requirements at the scale of urban spatial structure.

Existing studies at the urban scale often narrow their focus to specific demographic groups, frequently children, or particular urban components such as outdoor spaces, parks, and playgrounds. Consequently, there exists a research gap concerning autism within the context of urban planning and design. Addressing this gap necessitates adopting a holistic approach that integrates spatial considerations for autism into broader urban planning frameworks.

Moreover, for such an approach to be truly inclusive, it is imperative to directly involve the neurodivergent community in the planning and design processes. This involvement should recognize autism not merely as a *disorder*, but as a dimension of human diversity. By acknowledging autism as a form of diversity and difference, planners and designers can develop environments that are more inclusive and supportive of the needs and preferences of autistic individuals.

In summary, while current research has made significant progresses in understanding the implications of the built environment on autism at the scale of interior designs, there is an urgent need for more comprehensive studies that explore these dynamics within the context of urban planning and design.

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ⁱ a limited level of proofreading has been applied in all the interview quotations.