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Young autistic adults' active travel (walking) behaviours mirror those of older adults: a pilot study

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ABSTRACT

Walking fosters health and sustainability, yet autistic adults' urban walkability remains underexplored. This pilot study compared walking behaviours among UK-based young neurotypical adults ($n = 30$; 18–39 years), young autistic adults ($n = 30$; 18–39 years), and older neurotypical adults ($n = 24$; 65+ years). Participants reported whether they walked to eight destination types during daylight and after dark. Logistic regression assessed group, gender, and time-of-day effects; McNemar tests compared walking to essential (e.g. work, shopping) versus discretionary (e.g. leisure, social) destinations within young groups. Autistic and older adults had similarly reduced odds of walking to local destinations compared to young neurotypicals (OR ≈ 0.53, $p < 0.001$). Nighttime walking was markedly lower across all groups (OR ≈ 0.35, $p < 0.001$). Young autistic and neurotypical adults did not differ for essential trips ($p = 0.064$) but autistic adults walked less for discretionary trips ($\chi^2 = 10.21$, $p = 0.001$). Young autistic adults exhibit walking patterns similar to over65s, avoiding nonessential outings likely due to sensory sensitivities and social and environmental unpredictability. Incorporating sensory-friendly urban features, such as clear wayfinding, quiet zones, consistent lighting, may enhance both essential and leisure walking among autistic populations, promoting inclusive active travel and public health.

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Autism; urban planning; urban design; older adults; autistic adults; active travel

Introduction

Building on the principles of the emerging neurodiversity paradigm, this article investigates the Active Travel (Walking) Behaviour (ATWB) of autistic adults compared to other groups in urban neighbourhoods. While some interdisciplinary research has explored the relationship between the built environment and autism, the extent to which environmental barriers and challenges affect the ATWB of autistic individuals, in contrast to other populations, remains underexplored. This gap in understanding limits our knowledge of how these challenges uniquely shape the daily lives of this group. Understanding how the ATWB of autistic individuals differs from that of other groups can provide a strong foundation for future research on the various factors that affect walking as a means of travel in this group, ultimately contributing to more inclusive urban design and planning initiatives. This study is part of a broader research initiative examining how to design more inclusive streets for both autistic individuals and older people, particularly after dark.

Walking serves as both a health-promoting activity and a sustainable mode of transport, but individuals with Autism Spectrum Condition (ASC) (Bottema-Beutel *et al.* 2021) may face unique challenges related to sensory processing and environmental perception, which can make Active Travel (Walking) Behaviour (ATWB) more difficult for them.

Individuals with autism spectrum condition (ASC) generally exhibit lower levels of physical activity compared to their neurotypical peers, a trend that has been consistently documented particularly in children (Carmona 2019, Case *et al.* 2020). Several factors contribute to this reduced activity level, including sensory processing challenges, motor coordination difficulties, and social communication impairments, which are core characteristics of ASC (Kojovic *et al.* 2019, Bhat 2021). Sensory sensitivities, such as heightened reactivity to environmental stimuli, may lead to discomfort or avoidance of certain physical activities, particularly those that involve loud noises, bright lights, or crowded spaces (Parmar *et al.* 2021, Nair *et al.* 2022). Additionally, motor impairments,

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including difficulties with balance, coordination, and fine motor skills, can limit participation in structured physical activities and sports, further reducing overall activity levels (Ketcheson *et al.* 2017, Bodnar *et al.* 2020). Social and communication challenges inherent to ASC also play a significant role in the reduced physical activity observed in this population.

The interaction between autistic individuals and urban environments has been an increasingly important area of research, particularly as cities strive to become more inclusive and accommodating for neurodivergent populations (Mostafa 2020, Kenna 2022, Black *et al.* 2022). Autistic adults often experience heightened sensory sensitivities, which can make navigating urban spaces overwhelming and uncomfortable. Research by Kenna (2022) argues that while much of the focus on autism in urban environments has been centred around sensory issues, other factors such as executive functioning and social interactions are equally critical. This is particularly relevant in public spaces like streets, where unpredictability and sensory overload can make walking difficult, as noted by Davidson and Henderson (2016). They emphasise that urban designs which prioritise clarity, predictability, and sensory regulation can significantly reduce the anxiety associated with urban navigation for autistic adults.

Furthermore, urban green spaces and quieter areas have been shown to offer substantial benefits in improving the quality of life for autistic individuals. Gaudion and McGinley (2012) suggest that well-designed gardens with clear, structured pathways provide both restorative experiences and opportunities for social interaction, reducing the sensory burdens often encountered in bustling city streets. The integration of sensory-friendly design elements in urban spaces, such as quieter zones, green spaces, and sensory stations, has been highlighted as crucial for creating environments that are both welcoming and functional for neurodivergent individuals. The 'Streets for Diversity' project (2023) (Gaudion *et al.* 2023) found that neurodivergent individuals, including those with autism, often face discomfort due to sensory overload, lack of pedestrian space, and safety concerns. By introducing design interventions that address sensory needs, such as increasing separation between transport modes and offering calming spaces, urban environments can become more navigable and supportive of neurodiverse individuals' needs. Thus, the design of urban spaces that consider sensory diversity is essential not only for improving the mobility of autistic adults but also for fostering a more inclusive and equitable urban experience for all.

Walking, widely recognised as a fundamental and accessible form of physical activity, offers numerous health benefits, including improved cardiovascular health, muscular strength, and overall fitness (e.g. Lee and Buchner 2008, Kelly *et al.* 2018). Research highlights the strong correlation between walkable neighbourhoods and increased walking activity, emphasising the environment's impact on physical activity levels (e.g. Saelens *et al.* 2003, Frank *et al.* 2010, Zapata-Diomedi *et al.* 2019, McGreevy *et al.* 2023).

Beyond its direct health benefits, walking serves as a sustainable mode of active transportation, aligning with global efforts to reduce carbon emissions and promote urban sustainability (e.g. Salvo *et al.* 2021, Götschi *et al.* 2022). By fostering pedestrian-friendly environments and infrastructure, cities can encourage greater uptake of walking as a viable alternative to motorised transport, thereby addressing both public health concerns and environmental impacts (e.g. Schabus 2020, Massingue and Oviedo 2021). The integration of walking into daily routines not only enhances physical activity levels but also contributes to community cohesion and urban livability, underscoring its role as a cornerstone of comprehensive public health and urban planning strategies (e.g. Allen *et al.* 2018, Carmona 2019).

Given the lower levels of physical activity often observed in individuals with autism spectrum condition (ASC) and the well-documented benefits of active travel, particularly walking, it is essential to investigate how ASC impacts ATWB within the context of modern urban environments. This study seeks to address this issue by examining the ATWB in neighbourhoods for autistic individuals compared to their neurotypical peers and older adults, focusing on patterns and preferences during both daytime and nighttime.

Method

To investigate the relationship between urban environments and Active Travel (Walking) Behaviour (ATWB), this study adopted the Activity-Based Approach (Axhausen and Gärling 1992) (ABA) to travel behaviour. The ABA examines patterns of activities and associated travel to various destinations over the course of a day or longer. It emphasises that these patterns are shaped by a combination of social, environmental, and individual factors. As such, the ABA provides a nuanced framework for understanding the motivations behind travel behaviour and offers greater predictive accuracy, thereby informing more inclusive urban planning and transport policies. In line with this approach, a questionnaire was developed to capture local activity and destination patterns, as detailed in Table 2.

Following the identification of activities, participants progressed through the travel decision-making process, beginning with an assessment of the Hierarchy of Travel Needs (Singleton 2013) (Figure 1). This hierarchy organizes and ranks personal, social, and environmental influences that shape transportation decisions. It defines key characteristics of travel needs, motivations, and the perceived attributes of different transport options that are evaluated during decision-making.

At the feasibility level, all participants shared the most basic need – the ability to walk. All participants were required to be able to walk independently for at least 20 min. Once feasibility was established, the next need addressed was accessibility to key destinations. Participants were required to live within walking distance of essential local amenities (e.g. work, shops, services), which we operationalised as a walking distance of 20 min or less. This definition aligns with active travel and urban planning norms, where a walking distance of 20 min or less is frequently used as a benchmark (Giles-Corti *et al.* 2005, Ayala *et al.* 2022).

Three participant groups, selected based on the feasibility and accessibility criteria described above, were included in the study:

- **Young neurotypical adults**: This group consists of typically developing young adults (late teens to middle-aged) without neurodevelopmental conditions. They generally have high mobility and are familiar with modern urban settings, making them a baseline for active travel behaviour in an age group with greater physical capacity for walking.
- **Older neurotypical adults**: This group includes older adults (e.g. seniors or retirees) without neurodevelopmental conditions. It was expected that this group would have a lower ATWB rate compared to younger adults. A large UK panel study (Pistoll and Cummins 2019) on commuting found that advancing age is significantly associated with a reduced uptake of walking for travel. Specifically, middle-aged and older adults were less likely to initiate active commuting (walking or cycling to work) compared to younger individuals, even after controlling for other influencing variables.
- **Young autistic adults**: This group includes individuals on the autism spectrum in young adulthood. Participants in the autistic group were required to have a formal diagnosis of Autism Spectrum Condition (ASC), as verified through Prolific's pre-screening filters. All participants were living independently and met inclusion criteria of being able to walk unaided for at least 20 min. We did not collect IQ scores or support level data due to ethical and platform constraints. This limitation is acknowledged in the discussion.

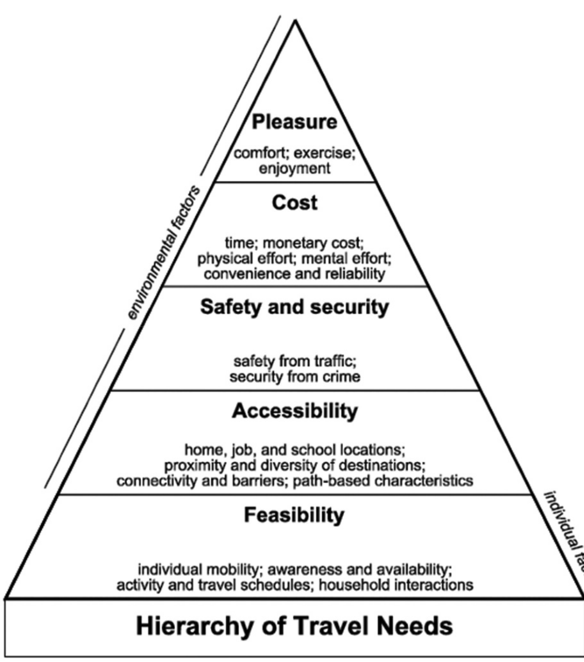

Figure 1. Hierarchy of travel needs (Singleton 2013).

It was hypothesised that the young neurotypical group would exhibit the highest level of walking-based active travel, while the older group would be the least active. Based on existing research, individuals with Autism Spectrum Condition (ASC) typically exhibit lower levels of physical activity compared to their neurotypical peers (Carmona 2019, Case *et al.* 2020). Therefore, the working hypothesis suggests that young autistic adults would exhibit lower levels of ATWB than their neurotypical peers, but higher levels compared to older adults.

Participants

Participants were recruited online via Prolific, a web-based research recruitment platform known for providing diverse, high-quality samples (Davis *et al.* 2023). Prolific allows researchers to target specific participant groups, ensuring that eligibility criteria are met prior to enrolment. For this study, participants were recruited for three distinct groups: neurotypical individuals aged 18–39 ($n = 30$), neurotypical individuals aged 65 and above ($n = 24$), and individuals aged 18–39 with ASC ($n = 30$).

Using Prolific's built-in pre-screening filters, eligibility was first determined by age (e.g. 18–39 years for the young adult group and ≥ 65 years for the older adult group) and neurodevelopmental status. Specifically, neurotypical participants had to report no diagnosis of autism or other neurodevelopmental conditions, while individuals in the autistic group were required to self-identify as having a formal autism spectrum disorder (ASD) diagnosis. To further ensure participant relevance to the study, additional custom screening criteria were applied via Prolific's survey tool. Participants were required to live within walking distance of local amenities (e.g. work, shops, services), as this would provide more accurate and relevant data regarding their walking behaviour.

Further screening ensured participants met the following additional criteria:

- Healthy eyes with normal or corrected vision: This requirement was critical because vision plays an integral role in both mobility and neurological functioning. Good vision, either naturally or with corrective lenses, is necessary for safe navigation in urban environments. Visual impairments can interfere with an individual's ability to perceive obstacles, recognize landmarks, or navigate safely, which are essential for walking-based active travel. Furthermore, visual ability is closely linked to neurological processing, affecting spatial awareness, coordination, and balance – all crucial elements for walking and interacting with the environment.
- No mobility or neurological problems: Participants had to report no significant mobility issues or neurological conditions (such as motor coordination or balance problems). Mobility issues could affect the ability to walk independently, and neurological conditions may influence the way an individual experiences or reacts to travel environments. Ensuring participants were free from these issues allowed for a more accurate representation of typical active travel behaviour, free from confounding factors.
- UK residency: Participants were required to reside in the UK to ensure a consistent context for the study. This criterion was important because it helped ensuring that local activity patterns and accessibility to urban amenities were comparable for all groups.

Once eligibility was confirmed through Prolific's screening process, participants were presented with an informed consent form and an information sheet. Consent was obtained electronically, in accordance with ethical guidelines and Prolific's procedures. Participants were given the option to withdraw from the study at any time without penalty. Compensation for participation was provided at a rate in line with Prolific's fair pay policies, which ensures participants are paid appropriately for their time and effort. Participants were provided with a unique Prolific ID for anonymity purposes and no personal identifying information was collected, as per the ethical requirements of the study.

The recruitment process was designed to ensure that the study sample accurately represented the target population while maintaining ethical standards regarding informed consent, participant anonymity, and compensation. Table 1 shows the demographic distribution of the participants.

Procedure

Ethical approval for this study was obtained from the University College London Research Ethics Committee (ID: ICN-VW-09-11-2023A). Participants in three groups (young neurotypical adults, older neurotypical

Table 1. Demographic distribution of the study participants.

Variable	Groups		Female	Male	Overall
Age	Autistic	n	15	15	30
		Mean (SD)	29.47 (5.28)	30.87 (3.46)	30.17 (4.76)
		Min, Max	22, 37	22, 36	22, 37
		Median	33	33	32.5
	Young	n	20	10	30
		Mean (SD)	31 (6.37)	30.4 (5.52)	30.8 (5.94)
		Min, Max	19, 39	21, 39	19, 39
		Median	32	29.5	31.5
	Older	n	17	7	24
		Mean (SD)	69.65 (3.71)	74 (6.58)	70.92 (4.99)
		Min, Max	65, 78	66, 83	65, 83
		Median	69	71	70

adults, and young autistic adults) were recruited through the online platform Prolific. After providing informed consent on the Prolific platform, participants were immediately redirected to an online survey hosted on Gorilla (a web-based experiment platform) to complete the study. All participants completed the same survey in a single session. Participants took an average of 10–15 min to complete the survey.

The survey collected information about participants' walking habits to local destinations under different conditions (daytime vs. after dark) (see Appendix 1). Participants were instructed within the survey to consider 'after dark' as they typically experience it during winter months, when sunset occurs around or before 4:00 p.m. This framing was designed to evoke scenarios where reduced daylight may influence walking behaviour. Participants indicated whether they typically walk to various destinations during daylight hours and whether they also do so after dark. This was assessed across eight common categories of local destinations listed in Table 2.

Additionally, the survey asked participants about any changes in their mode of travel after dark. Specifically, if a participant indicated that they do not walk to a particular destination after dark, the survey prompted them to report any alternative mode of transport used for that journey. Options for alternative transportation included driving a car, taking a bus, hiring a taxi, riding a train, or cycling.

The survey was designed to be clear and accessible to all participants, including those with an Autism Spectrum Condition (ASC). The language and formatting were kept straightforward to ensure that autistic participants could easily understand and respond to the questions. All instructions were concise, and the survey interface was kept simple to minimise potential confusion.

Table 2. Destination categories.

Category	Description
Food shopping	Grocery stores, supermarkets, or local shops
Work/Job	Workplaces, schools, or universities
Exercise	Walking your dog, jogging, or running in your neighbourhood
Dining out	Cafes, restaurants, or pubs
Nature walks	Local parks or green spaces
Transportation	Public transportation stops, such as bus stops or train stations
Socialising	Visiting friends and family
Healthcare	Visits to GP surgeries, hospitals, or pharmacies
Other	Any other location not listed above

Results

Daytime and nightime walking to local destinations by group and gender

Figure 2 illustrates the percentage of participants in each group (young neurotypical, older neurotypical, young autistic) who reported walking to local destinations, both during the daytime and after dark.

- **Daytime Walking**: As shown in Figure 2, young neurotypical adults exhibited the highest levels of walking to local destinations during the daytime, with both men and women reporting similarly high walking rates. Older neurotypical adults walked significantly less during the day, with the percentage of men and women both lower compared to their younger counterparts. Young autistic adults showed intermediate walking rates, similar to older neurotypical adults. In all groups, women generally reported slightly higher walking rates than men, though these differences were minimal.

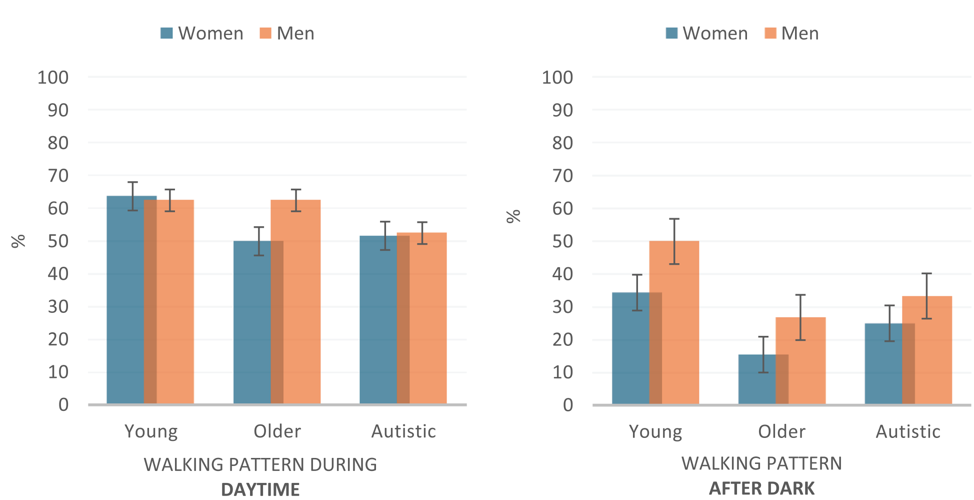

Figure 2. Walking pattern of different groups during Day and night.

- **After Dark Walking**: After dark, walking rates significantly declined across all groups. Young neurotypical adults continued to have the highest percentage of walkers after dark, although the numbers were notably lower compared to daytime walking. Older adults exhibited even lower rates of walking after dark, with both men and women reporting particularly low percentages. Young autistic adults showed the lowest walking rates after dark, even lower than older neurotypical adults. Notably, there was less gender difference in after-dark walking, with both men and women showing similar percentages within each group.

The error bars in Figure 2 represent the 95% confidence intervals for each group and gender combination, indicating some variability in walking behaviour. However, the error bars for daytime walking were generally tighter, suggesting less variability, while the nighttime error bars were wider, indicating more variability in the likelihood of walking after dark across individuals.

Logistic regression analysis of walking behaviour

To formally test group, gender, and time-of-day effects on walking behaviour, we conducted a binary logistic regression analysis (forward stepwise likelihood ratio method) with walking to a local destination (yes/no) as the outcome. Please note that responses of 'Sometimes' were categorised as 'yes' in the analysis. This decision was made to reflect any degree of engagement with walking, however occasional, as an indication of behavioural intent or feasibility. Given the exploratory nature of this pilot study and the emphasis on inclusivity, we aimed to capture a broader spectrum of walking activity rather than restrict the analysis to habitual or frequent walkers only.

The predictors entered were Group (young neurotypical as reference, with older neurotypical and young autistic as comparison categories), Gender, and Time of Day (daytime vs nighttime). The final model was statistically significant and demonstrated a good fit. It explained a substantial proportion of the variance in walking behaviour (Nagelkerke R^2 ≈0.35) and achieved a high classification accuracy (approximately 80% of cases correctly classified), indicating a robust model.

In the final model (Table 3), Group and Time of Day emerged as significant predictors of walking, while Gender showed a weaker effect. Specifically, older adults were far less likely to report walking to local destinations compared to young adults: their odds of engaging in local walking were reduced to roughly one-half or less that of the young group (e.g. OR ~ 0.4, p <0.001). Young autistic adults also had significantly lower odds of walking compared to young neurotypical adults (OR on the order of 0.5-0.6, p <0.01), indicating that autism status was associated with a reduced likelihood of local walking even within the young adult age range. It also suggests that older adults and autistic adults have very similar odds ratios (OR) for walking behaviour.

In the table (Table 3), the odds ratio for older adults is 0.526 (with a 95% confidence interval of 0.397-0.698), and the odds ratio for autistic adults is 0.531 (with a 95% confidence interval of 0.404-0.697). Both are less than 1, indicating that both older adults and autistic adults are less likely to engage in walking behaviour compared to young neurotypical adults. The odds ratios are almost identical, and the confidence intervals overlap, which suggests that the walking behaviours of older adults and autistic adults are very similar in this study. This similarity in odds ratios indicates that both groups exhibit lower levels of walking compared to young neurotypical adults, and the likelihood of walking behaviour is similarly reduced for both groups.

Table 3. Logistic regression analysis results.

Variable	B (Coefficient)	SE (Standard Error)	Wald χ^2	p-value	Odds Ratio (OR)	95% CI for OR
Group						
- Young (Reference)						
- Autistic	−0.632	0.125	25.49	<.001	0.531	0.404, 0.697
- Older	−0.643	0.129	24.98	<.001	0.526	0.397, 0.698
Time of Day						
- Day (Reference)						
- Night	1.050	0.124	71.838	<.001	2.856	2.272, 3.588
Gender						
- Women (Reference)						
- Men	0.488	0.130	14.062	<.001	1.630	1.257, 2.114

In contrast, Gender was not a strong independent predictor in this model. Although women showed slightly higher raw rates of daytime walking (Figure 2), after controlling for group and time-of-day the gender effect was small; men had only marginally higher odds of walking than women, and this difference did not reach statistical significance in the final stepwise model ($p > 0.05$).

Finally, Time of Day was a significant predictor: walking trips were much more likely to occur in the daytime than at night. The odds of reporting a walking trip during nighttime were dramatically lower than in daytime (OR considerably below 1, $p < 0.001$), confirming that participants across all groups were significantly less inclined to walk to local destinations after dark.

Mean comparison between discretionary and essential

The amenities that participants were asked about, in terms of whether they walked to them or not, were categorised into two groups: 'Discretionary' and 'Essential'. The 'Essential' category includes essential destinations such as workplaces, schools, grocery stores, and health-related locations like GP surgeries and pharmacies. The 'Discretionary' category encompasses non-essential activities, including visits to restaurants, pubs, coffee shops, social visits to friends and family, and recreational walks in parks. The older group was not included in this analysis due to their different social life patterns. Unlike the younger participants, older adults may not regularly engage in activities such as attending school, university, or work, which are key components of the 'Essential' category.

Essential vs. discretionary destination walking (young vs. autistic groups)

We next compared walking levels for essential vs. discretionary local destinations, focusing on the young neurotypical and young autistic groups (the older group was excluded from this comparison due to different life-stage travel patterns). Descriptive statistics from Table 4 show that in both the young neurotypical and young autistic groups, participants were more likely to walk to essential destinations (e.g. work, school, grocery shopping) than to discretionary destinations (e.g. social visits, leisure activities). However, the key finding of this analysis is the significant difference in walking to discretionary destinations between the two groups.

Table 4. Mean and standard deviation for discretionary and essential walking among young and autistic adults. Walking was coded as (1), while not walking was coded as (0).

Group	Categories	Mean	Std. Deviation
Young	Discretionary	0.74	0.439
	Essential	0.77	0.421
Autistic	Discretionary	0.62	0.487
	Essential	0.69	0.464

- **Discretionary Destinations**: The young neurotypical adults were significantly more likely to walk to discretionary destinations than the young autistic adults. This difference was statistically significant (McNemar test, $\chi^2 = 10.205$, $p = 0.001$), suggesting that autistic adults are less likely to engage in walking for non-essential, recreational, or social activities compared to neurotypical adults.
- **Essential Destinations**: In contrast, when it comes to walking to essential destinations, the difference between the two groups was not significant. The Related-Samples McNemar Change Test comparing walking to essential activities showed no significant difference between the young neurotypical and young autistic groups ($\chi^2 = 3.439$, $p = 0.064$), suggesting that both groups had similar walking patterns for necessary activities like work, school, or health-related visits.

Overall, these findings indicate that walking is prioritised for essential activities across both groups, but young autistic adults walk significantly less for discretionary activities than their neurotypical peers. This suggests that autistic adults may engage less in non-essential walking and may prioritize walking for activities they perceive as necessary, which could be linked to patterns of engagement with social and leisure activities.

Discussion

This pilot study provides novel insights into how Active Travel (Walking) Behaviour (ATWB) differs among young neurotypical adults, young autistic adults, and older neurotypical adults in urban neighbourhoods. Our key finding – that young autistic adults and older adults exhibit similarly reduced odds of walking compared to young neurotypical peers – underscores that the barriers facing autistic walkers extend beyond age-related factors and may reflect persistent sensory, motor, and environmental challenges.

Consistent with prior research documenting lower physical activity levels in ASC populations (e.g. Lang *et al.* 2010, Bodnar *et al.* 2020), our logistic regression showed that autistic participants were approximately half as likely as young neurotypicals to walk to local destinations (OR ≈ 0.53, $p < 0.001$). This reduction mirrors that seen in adults over 65 (OR ≈ 0.53, $p < 0.001$), suggesting that, despite their youth, autistic adults face walking barriers similar in magnitude to those encountered by much older individuals. Importantly, these findings cannot be attributed to age-related mobility declines, but instead point toward autismspecific factors, such as heightened sensory sensitivity and social communication challenges, which make navigating urban environments less appealing or feasible (Gaudion *et al.* 2023).

When examining destination type, both groups walked equally often for essential trips (e.g. work, shopping), but autistic adults walked significantly less for discretionary trips (e.g. leisure, social visits). This divergence implies that autistic adults prioritise walking for necessity, avoiding nonessential outings that may involve unpredictable sensory inputs or complex social dynamics. Urban design elements, such as poor lighting, excessive noise, and crowded sidewalks, likely exacerbate these challenges, reducing willingness to walk for pleasure or social purposes. These insights align with qualitative work highlighting the importance of sensory-friendly public spaces and clear wayfinding in supporting autistic mobility (Davidson and Henderson 2016, Tola *et al.* 2021, Gaudion *et al.* 2023).

The study adds to the growing field of inclusive urban design by highlighting how environments optimised for neurotypical pedestrians can exclude autistic adults. However, these insights are not only relevant for autistic populations. With the UK's ageing population and rising prevalence of dementia, design features that support autistic walkers – such as clear signage, quiet routes, and consistent lighting – can also improve mobility, autonomy, and quality of life for older adults and others with cognitive or sensory challenges.

Despite the valuable insights offered by this pilot study, several limitations must be acknowledged. The modest, selfselected sample may limit generalisability, and our reliance on selfreported walking behaviour could introduce recall bias. We did not collect information on cognitive functioning, IQ, or level of daily support. Moreover, we did not capture detailed environmental metrics (e.g. noise levels, street topology), which would help clarify which specific urban features most strongly influence autistic walkers.

Future research should build on these results by:

(1) **Linking environmental audits to walking outcomes**. Objective measures of street characteristics (e.g. lighting quality, traffic volume) would illuminate the precise barriers autistic adults encounter.
(2) **Exploring intervention efficacy**. Pilot trials of sensory-adapted walking routes or technologyassisted wayfinding (e.g. mobile apps offering quietroute navigation) could test whether targeted design changes increase both essential and discretionary walking.
(3) **Longitudinal monitoring**. Following autistic adults over time would reveal whether walking behaviours change with increased urban familiarity or as age-related factors emerge.

In sum, our study highlights that young autistic adults face walking limitations similar to those of much older peers, particularly for discretionary journeys. Addressing these limitations through inclusive design and community support holds promise for enhancing mobility, promoting health, and fostering equitable access to urban life for autistic individuals.

This study aligns with broader debates in Disability and the Built Environment. Urban infrastructure often reflects normative assumptions about bodies, cognition, and behaviour, inadvertently excluding individuals whose sensory or cognitive needs differ from the majority. By framing neurodivergent walking behaviours as a design and policy issue, our work calls for a shift towards neuroinclusive public space that recognises and accommodates sensory diversity.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Antonia Hamilton is the leader of the Social Neuroscience group at the Institute of Cognitive Neuroscience (UCL). She completed a PhD on the impact of neuronal noise for the optimal control of human arm movements (UCL, 2002) and has since worked on imitation and brain systems for social interaction. She was awarded the Experimental Psychology Society prize lectureship for 2013. Her current research interests include how and why people imitate each other, how social skills differ in autism, and the neural mechanisms of social interaction.

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Appendix

Appendix 1. This paper discusses responses to the following items from the questionnaire

We would like to know about your experiences walking near your home during the daytime.

Do you walk <u>alone</u> to any of the following local destinations during the daytime?

	No	Sometimes	Yes
Grocery stores, supermarkets or shops	○	○	○
Work, Schools or universities	○	○	○
To walk your dog or walk/run in your neighbourhood	○	○	○
Cafes, restaurants, or pubs	○	○	○
Local parks or green spaces	○	○	○
Public transportation stops (bus stops, train stations)	○	○	○
To visit friends and family	○	○	○
GP surgeries, hospitals, or pharmacies	○	○	○
Others	○	○	○

Next

We would like to know about your experiences walking near your home during <u>night time.</u>

Do you walk <u>alone</u> to any of the following local destinations after dark? Think of "after dark" as 4pm during winter.

	No	Sometimes	Yes
Grocery stores, supermarkets or shops	○	○	○
Work, Schools or universities	○	○	○
To walk your dog or walk/run in your neighbourhood	○	○	○
Cafes, restaurants, or pubs	○	○	○
Local parks or green spaces	○	○	○
Public transportation stops (bus stops, train stations)	○	○	○
To visit friends and family	○	○	○
GP surgeries, hospitals, or pharmacies	○	○	○
Others	○	○	○

Next

Do you use the same route to these local destinations after dark as you do during the daytime? Think of "after dark" as 4 pm during winter.

	I don't walk after dark	Same route	Different route	It depends
Grocery stores, supermarkets or shops	○	○	○	○
Work, schools or universities	○	○	○	○
To walk your dog or walk/run in your neighbourhood	○	○	○	○
Cafes, restaurants, or pubs	○	○	○	○
Local parks or green spaces	○	○	○	○
Public transportation stops (bus stops, train stations)	○	○	○	○
To visit friends and family	○	○	○	○
GP surgeries, hospitals, or pharmacies	○	○	○	
Others	○	○	○	○

If It depends, depends on what?

Next

Here, we would like to ask you about the reasons behind your preference for walking after dark.

If you do not go to one of these destinations in the dark, please explain why you prefer not to walk to those destinations after dark.

If you choose a different route after dark, please explain why. Think of "after dark" as 4 pm during winter.

What changes could occur in your neighborhood to make you feel comfortable walking to your local destinations after dark? Think of "after dark" as 4 pm during winter.

Next

This question is about your other means of transportation.

If you avoid walking to certain destinations after dark, do you use alternative transportation methods instead?

- (●) Yes
- ( ) No
- ( ) I walk to all destinations after dark

If you use other means of transportation after dark, what do you use. Please select as many options as possible.

- [ ] Driving (cars, motorcycles, etc)
- [ ] Public transport (buses, trains, etc)
- [ ] Cycling
- [ ] Taxi (Black cabs, Uber, etc
- [ ] Other - please specify:

Next