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EDITORIAL

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Reimagining Urban Spaces for Children: Insights and Future Directions

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Abstract

Despite decades of international efforts, children remain overlooked in urban planning, which predominantly caters to adults. This editorial introduces a thematic issue of *Urban Planning* that compiles 13 articles exploring how cities can be redesigned to better serve children's needs and rights. The collection covers a range of critical themes, including children's mobility and the constraints imposed by car-centric environments, the lack of accessible and inclusive play spaces, and the disconnection between children and nature exacerbated by the Covid-19 pandemic. The articles highlight barriers to children's independent mobility, the importance of unstructured green and grey spaces, and the need for multigenerational public spaces. Additionally, they emphasize the role of children in environmental stewardship and urban wellbeing. We argue for a holistic, child-centred approach to urban planning, calling for greater integration of children's voices in decision-making and the creation of urban environments that promote children's well-being, mobility, and inclusion. The thematic issue provides a comprehensive framework for addressing the urgent need to reshape urban spaces for children, fostering more liveable, sustainable cities for all.

Keywords

child-friendly cities; children's well-being; environmental stewardship; inclusive public spaces; independent mobility; multigenerational spaces; urban design

1. Introduction

Colin Ward's seminal work *The Child in the City* (1978) placed the focus on children as integral users of urban environments. Yet, more than 40 years later, children remain overlooked in urban design and planning

practices. While international frameworks like the United Nations Convention on the Rights of the Child and initiatives such as Child-Friendly Cities have advanced children's rights, urban planning continues to inadequately address children's needs and their interaction with the city. As a result, this misrecognition has a detrimental effect on both children and cities. How children experience their urban environment shapes not only their well-being but also the future of the cities themselves.

2. Building Child-Friendly Cities: Lessons from Research and Practice

This thematic issue of *Urban Planning* brings together a collection of 13 articles that advance the discussion on child-centred urban environments. These studies challenge the adult-centric narratives of urban planning, introducing evidence-based insights on how children experience cities and how urban policies can promote safer, more inclusive spaces. The articles examine various aspects of children's urban experiences, exploring themes from mobility and play to safety and nature connection, shedding light on both theoretical perspectives and practical interventions.

2.1. Rethinking Mobility and Accessibility for Children

One dominant theme in this thematic issue is children's mobility and its constraints due to car-centred urbanism. In the article "Beyond Car-Centred Adultism? Exploring Parental Influences on Children's Mobility," Cadima et al. examine how parental decision-making in Portugal restricts children's independent and active mobility due to fears rooted in traffic-heavy environments. Despite the recognized benefits of active mobility, parents' reliance on cars persists, influenced by a broader cultural acceptance of motorized travel as the safest option. This culture not only limits children's engagement with their surroundings but also perpetuates sedentary lifestyles that negatively impact children's health and well-being.

Complementing this work, Michail and Ozbil Torun in their article "Walking to School: What Streets Do Children Prefer?" offer valuable insights into children's navigation choices and the environmental attributes that influence their walking routes. By focusing on children's actual walking patterns, rather than relying on geographic information system (GIS)-calculated routes, this study identifies specific street-level features, such as footpath width and street connectivity, that either promote or discourage active school travel. Such findings are crucial for designing child-friendly streets that facilitate safe and independent mobility.

Another study by Abdollahi et al., "Understanding the Factors Affecting Traffic Danger for Children: Insights From Focus Group Discussions," explores the risks posed by motorized traffic, identifying key factors such as traffic volume, speed, and road design that exacerbate danger for children on urban streets. By involving children, parents, and experts in focus group discussions, this research highlights the critical need to rethink traffic infrastructure to mitigate dangers and enhance safety for young pedestrians and cyclists.

2.2. Play and Gathering Spaces in Urban Settings

Urban environments often fail to provide adequate play spaces for children, who increasingly find themselves confined indoors, disconnected from nature and the social dynamics of public spaces. In this context, the research by Tavakoli et al., "Where Do Children Go?": Exploring Children's Daily Destinations With Children, Parents, and Experts," reveals the wide range of informal and non-school destinations that

contribute to children's well-being. The study emphasizes the importance of spaces that offer freedom from structured activities, which children associate with cognitive and social benefits. These findings suggest that urban planners should prioritize unstructured green and grey spaces in cities to promote holistic well-being for children.

Kaplan's article, "From Decline to Renewal? Understanding Children's Relationship With Nature in the Wake of Covid-19," investigates the evolving relationship between children and nature during the pandemic. Despite the general recognition of nature's positive impact on mental and physical health, the pandemic widened the gap between those with regular access to natural spaces and those without. Kaplan's research underscores the necessity for local governments to ensure accessible, high-quality green spaces, especially in urban areas, to foster children's connection with nature and promote long-term well-being.

2.3. Children's Safety, Independence, and Agency

The tension between children's independence and parental concerns about safety is another critical issue explored in several articles. Katsavounidou et al.'s research, "Active but not Independent: Children's School Travel Patterns in a Compact-City Environment in Greece," highlights how dense urban environments with mixed land uses still fail to support children's independent mobility. Despite the short distances between home and school, parents often accompany their children on foot due to concerns about road safety and poor pedestrian infrastructure. This raises questions about how cities can better support not only active, but also independent mobility for children, particularly in compact urban areas.

Cadima and Pinho's systematic review, "Walkability and Parental Safety Perceptions as Determinants of Children's School Commutes: A Systematic Review," further examines the barriers to children's active commuting, identifying a range of environmental and social factors, including parental fears about traffic safety. Their work underscores the need for comprehensive urban strategies that address both physical infrastructure and social norms to encourage walking as a viable and safe option for children.

In "New House, New Furniture, New Room: Children's Pandemic Landscapes of Care in Chile" by Cortés-Morales et al., there is a shift of focus from public space into the space of the home, a space which was transformed in unprecedented ways during the Covid-19 pandemic and the lockdown imposed. During that time of confinement, adults and children worked, studied, and cared for each other in close proximity. The authors, through their ethnographic research, demonstrate that children, who are often perceived as subjects of care, are capable of assuming roles of caregiving and assuming greater responsibilities than what is typically expected of them.

2.4. Multigenerational and Inclusive Urban Spaces

While designing child-friendly spaces is critical, Daniel Kaplan's other article, "Challenging Child-Friendly Urban Design: Towards Inclusive Multigenerational Spaces," introduces a thought-provoking critique of the child-friendly city concept. Drawing from data collected in Czechia, Kaplan argues that exclusive child-centric spaces may unintentionally segregate children from other age groups, undermining the goal of inclusivity. Instead, Kaplan advocates for multigenerational urban spaces where children and adults can share and shape the environment together, fostering a sense of community and cooperation.

Similarly, Natalia Bazaiou's research, "Exploring Elementary School Children's Interaction at the School Threshold: Evidence From Athens, Greece," examines how the school entrance, as a space of transition between public and private realms, can serve as a critical node for interaction between children, families, and the broader urban fabric. By focusing on the design of these "in-between" spaces, Bazaiou's work emphasizes the need to rethink the boundaries between children's spaces and the public realm to create more integrated, child-friendly cities.

2.5. Children's Role in Environmental Stewardship

In a more environmentally focused study, "Young Latinas/os' Environmental Commitments: The Case of Waste" by Miriam Solis et al. explores how young people in Pharr, Texas, perceive environmental issues, particularly waste management. This participatory study showcases the engagement of young Latinas/os in improving their neighbourhoods through environmental action, highlighting their commitment to sustainable practices. The study underscores the importance of incorporating youth voices in shaping local environmental policies, particularly in underserved communities.

2.6. Well-Being and Children's Perceptions of Place

Angela Million et al. provide a crucial perspective on children's well-being in their interdisciplinary study "Understanding Well-Being Through Children's Eyes: Lessons for Shaping the Built Environment." Using child-centred methodologies, this study emphasizes the importance of micro-spaces and translocal identities in shaping children's well-being in urban environments. The findings provide valuable insights into how urban planning and design can prioritize children's well-being, creating spaces that cater to their unique needs.

Ozbil Torun et al., in their article "Children's Perspectives of Neighbourhood Spaces: Gender-Based Insights From Participatory Mapping and GIS Analysis," examined children's perceptions of their everyday environments and correlated them with different neighbourhood types, through participatory map-based focus groups. The study identifies gender-based differences in preferences, with boys indicating a preference for more physical activities in open spaces, while girls more frequently emphasised the need for accessible playgrounds and natural settings. Children residing in urban neighbourhoods were observed using streets, parks, and local shops with greater frequency, whereas those in suburban and sprawling areas demonstrated a preference for amenities situated in closer proximity to their residences. The findings indicate that local governments should prioritise the development of context-specific policies that are sensitive to the specific needs and experiences of children when designing child-friendly neighbourhoods.

3. Future Research Agenda for Child-Friendly Cities

A future research agenda should address multiple dimensions of child-friendly cities, including mobility, play, inclusivity, nature connection, well-being, and global contexts.

Understanding barriers to children's mobility is crucial for promoting their independence. Future studies should explore how cultural norms and parental concerns constrain mobility, and investigate how interventions like traffic-calming and pedestrian-friendly design affect parental decision-making. Research

into digital navigation tools may also empower children's independence while addressing privacy and equity issues.

Urban spaces must prioritize unstructured play opportunities for children. Research should examine how public spaces can support free play beyond formal structures. Comparative studies across geographies could highlight effective design solutions. Addressing social inequalities in access to play spaces is vital, particularly in marginalized areas, underscoring the importance of participatory planning that engages diverse children.

Engaging children in urban planning is essential for fostering inclusivity. Research should focus on innovative child-centered engagement methods, such as participatory mapping and game-based approaches. Institutionalizing children's voices in decision-making will be key, exploring successful models where children have influenced urban changes.

Research on children's relationship with nature is increasingly important, particularly as opportunities for outdoor engagement decline. Longitudinal studies could examine the mental and emotional benefits of nature exposure. The pandemic's impact on access to nature also needs exploration to inform future urban design.

Creating multigenerational urban spaces is a pressing need. Research should examine successful case studies and explore social dynamics in shared spaces to foster inclusivity across age groups.

Developing metrics that prioritize children's well-being in urban planning is crucial. Future research should refine existing metrics and create new indicators measuring child-friendly infrastructure, safety, and mobility. Cross-cultural studies of children's urban experiences will deepen our understanding of global disparities, while research in rapidly urbanizing areas can reveal unique challenges in the Global South.

The role of technology in shaping children's urban experiences requires further exploration. Studies should assess digital play spaces and how smart city technologies enhance child-friendly urban design and promote safety.

The implications of climate change for children should be a research priority. Rising temperatures could render outdoor spaces unusable. Children's involvement in climate-resilient planning may illuminate their potential role in adapting public spaces, while research should examine how climate change disproportionately affects vulnerable children.

Evaluating child-friendly city initiatives is essential for identifying best practices and improving outcomes. Research should assess the long-term effectiveness of these initiatives and explore how child-friendly design principles align with broader sustainability goals.

4. Conclusion: Towards a Holistic Approach

The articles in this thematic issue collectively argue for a holistic, multi-scale approach to urban planning that considers children as central actors in the design of cities. From improving mobility options to ensuring access to nature and play, the research presented here highlights the urgent need to address the urban environment's

impact on children's well-being. Yet, the solutions are not one-size-fits-all; local contexts, cultural norms, and socio-economic factors all play crucial roles in shaping children's urban experiences.

As planners, architects, and policymakers, we must adopt child-centered methodologies that engage children directly in the planning process, ensuring that their voices are heard. Moreover, creating inclusive urban environments that cater not only to children but to all generations requires a shift in urban design paradigms. Only by addressing the needs of children can we create cities that are truly liveable for everyone.

The contributions in this thematic issue serve as a vital reminder that the quest for a "childhood city" is an ongoing challenge, but one that holds transformative potential for the future of urban living. Children's well-being is not a peripheral issue; it is fundamental to the health, vitality, and sustainability of our cities. Urban planners must recognize that the spaces we design today will shape the citizens of tomorrow.

Conflict of Interests

The authors declare no conflict of interests.

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ARTICLE

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Beyond Car-Centred Adultism? Exploring Parental Influences on Children's Mobility

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Abstract

Motorised traffic and car-centric environments restrict children's commuting patterns and outdoor activities. This has adverse health consequences as it induces physical inactivity and reduces children's well-being. Understanding parents' daily routines and reasons to facilitate or restrict their children's active and independent mobility is essential to improving children's well-being and encouraging environmentally sustainable mobilities. This article explores parental decision-making processes regarding how children should travel to and from school and how these constitute barriers or enablers for children's independent and active mobility in a Portuguese context. We used a mixed-methods sequential approach: We first collected data through an online survey and then via focus groups with parents and interviews with school directors. Overall, parental concerns about traffic stem from an automobility-centred culture that has converted urban streets into an optimised system of mobility flows focused on (single and employed) adults. This culture responds to the anxieties it creates by perpetuating a cycle that exacerbates existing concerns and reinforces the need to rely even more heavily on mobility technologies, especially the private car. This adult-centred mobility culture jeopardises children's ability to navigate the city independently while offering children a highly problematic and self-reproducing social construction. In this construction, the risks and drawbacks of physically confined virtual environments and experiences are considered acceptable, while engaging with the physicality and sociality of the urban environment is considered unacceptably dangerous and promiscuous.

Keywords

active commuting to school; independent travel; parental safety perceptions; travel behaviour; urban mobility; walkability for children

1. Introduction

Achieving a shift towards decarbonising urban mobility by encouraging public transport, shared micro-mobility, and active modes of transport, mainly walking, is a crucial challenge for many cities. They increasingly face problems related to traffic congestion, road safety, energy dependency, social injustices, and air pollution. Moreover, walking is the simplest, most universal, affordable, healthiest, easiest, and oldest way to get around. Improving walking improves the streetscape, helps to increase security, provides "eyes on the street," and creates safer and less noisy environments (Cervero, 2014, p. 178), while a shift to walking can also reduce car use and traffic congestion. Furthermore, in car-dependent cities, people tend to have fewer opportunities to access services, parks, recreation, and other institutions when they cannot drive a car.

Recent studies verify that children's active and independent mobility has drastically decreased over the last decades in many countries, including Portugal (Arez & Neto, 1999; Lopes et al., 2014). Children are increasingly transported to school in the back seat of a car, to the extent that the term "backseat generation" has emerged (van den Berg et al., 2020). Several reasons have been identified, such as growing social fears (crash rates and crime rates), increased distance between home and school, the planning of the built environment in dedication to car mobility, among others (Carver et al., 2019). Previous evidence has shown that parental perceptions of road safety and general built environment-based safety were also associated with the choice of transport mode (Mitra, 2013).

This article explores how parents' daily routines, safety perceptions, and views of the school district's infrastructure shape their attitudes toward children's active and independent mobility. We study this in the Portuguese context and show parents' diverse reasons for overwhelmingly choosing car-based mobility for the path between home and school. The reasons seem to converge on the (single- and employed) adult-centred land-use and mobility planning of the past decades. We reveal the extent to which children are spending time on indoor play and screen-based entertainment, further exacerbating the lack of outdoor and spatial awareness and low levels of physical exercise. We also show how valuable specific knowledge of the local context and social norms is for understanding how active and independent travel for children might be facilitated while highlighting the importance of parental backgrounds. This study offers insights to aid transport planners and policymakers, both in Portugal and globally, in creating safe, parent-and-child-friendly environments that promote active and independent mobility.

This article is structured as follows. After this introduction, Section 2 presents a literature review exploring how children travel to and from school and parental perceptions of children's active travel. Section 3 describes the methodology employed. Section 4 discusses the main findings and the implications for planning practice. The last section summarises the main conclusions and suggests future research directions.

2. Children's Active Travel and Parental Perceptions

In recent years, more attention has been paid to children's travel behaviour and independent mobility (Huertas-Delgado et al., 2019). Independent mobility is understood as children being allowed and able to move freely to reach different activities. Since children are not usually able to use motorised modes independently, there is a strong relationship between children's independent mobility and active mobility, most commonly walking (sometimes also cycling; Silonsaari et al., 2024).

Usually, attending school is a crucial daily activity for children. Several studies defend active travel to school as a daily source of physical activity and energy expenditure for children, with the potential to reduce overweight and obesity and improve cardiovascular health among school-aged children (Hino et al., 2021). Children's active commuting to school has additional benefits, such as developing social skills and autonomy levels (Aranda-Balboa et al., 2020). This improves children's mental, psychological, cognitive, and social well-being (Mei et al., 2024; Siiba, 2021). Additionally, walking is environmentally sustainable, and when substituting a car-based trip, it reduces exhaust gases from cars (Chillón et al., 2011) and peak hour congestion (Zhu & Lee, 2009), among other benefits. Yet, despite these well-known benefits, the dominance of motorised traffic and car-oriented urban environments continues to expand (Larouche et al., 2018).

Different personal, social, and environmental factors determine children's travel behaviour. The literature confirms, however, that parents are the primary decision-makers in children's travel behaviour in general (Aranda-Balboa et al., 2021) and school travel behaviour in particular (Kerr et al., 2006). Aranda-Balboa et al. (2020) identify the following key barriers to independent and active mobility reported by parents: (a) distance from home to school; (b) traffic-related risks; (c) crime-related risks; (d) characteristics of the built environment, namely density, mixed-use, street connectivity, aesthetics, and pedestrian and cycling infrastructures; and (e) social support, namely the presence of children or adults on the streets.

Distance is presented by other studies as one of the most used indicators in children's school travel mode choice (Macdonald et al., 2019), with those living longer distances from school being less likely to actively travel to school (Mitra & Buliung, 2015; Terrón-Pérez et al., 2018). However, studies have no consistency regarding the "optimal" distance (Panter et al., 2010). In a recent study from Seattle, USA, safety concerns were reported as stronger than distance as barriers to active travel to school (Lee et al., 2020).

Traffic-related safety concerns consider danger to children being involved in accidents due to factors such as traffic speed, road size, availability of legible signs for children, and safe lighting systems at junctions to ensure visibility at crossings (Danenberg et al., 2018; Rothman et al., 2015). Lopes et al. (2014) evaluated children's independent mobility in Portugal and found that traffic is the most frequent cause of parental concern for outdoor safety. However, parental fear of traffic varies with context (Aranda-Balboa et al., 2021; Rodríguez-Rodríguez et al., 2021). Parents point to barriers such as school opening hours, lack of sidewalks or long distances between crosswalks, highways that must be crossed or provide dangerous or polluting environments, hazardous walking conditions, and fences. Conversely, safe walking-only paths are considered key enablers (Bejleri et al., 2011).

Crime-related issues include fear of assault, harassment, and bullying. Situations of this nature, as documented on television, greatly impact parental decisions (Huertas-Delgado et al., 2019; Lopes et al., 2014). However, parents' perceptions are context-specific and vary with social norms and cultures, geography, socio-demographic characteristics, and policy (Aranda-Balboa et al., 2020; Huertas-Delgado et al., 2019).

A growing body of literature has been exploring for some years which aspects of the built environment influence children's travel behaviour, such as residential density, land-use mix, street connectivity, and commercial density. The idea is that these should guarantee a walkable distance between a child's home and relevant services for them (e.g., schools, local shops, libraries, health services, among others; Gorrini et al., 2023; E. Ikeda et al., 2020). A few studies also considered important micro-scale characteristics of the built

environment, usually in terms of comfort. This refers to standard quality criteria, such as presence of tree shade (density), type of pavement, continuity and width of sidewalks, walking paths, but also to a set of highly recommended elements for the specific comfort of children while walking (e.g., playgrounds, shelters, toilets; Huertas-Delgado et al., 2019).

In terms of "social support" and other social factors, for example, in one study a child's age, lower parental education, and socioeconomic status were more strongly associated with children's active school transportation than built environment features (Rothman et al., 2018). However, these authors also assume that the built environment contributes to social characteristics in a location, thus complicating this correlation. Other authors have linked active school travel to gender (Macdonald et al., 2016).

Various instruments have been used to assess parental perceptions of barriers to modal choice. However, these instruments often cannot be compared across countries because they use highly heterogeneous instruments and scores (Huertas-Delgado et al., 2019; Rodríguez-Rodríguez et al., 2020). Aranda-Balboa et al. (2020) reviewed 27 studies about the main barriers for parents in relation to active transport to school among their children, and the authors reported that they didn't identify a specific or common framework for parental barriers, arguing that there is a need for more research in this area (Aranda-Balboa et al., 2020).

3. Methods

To understand parental decision-making processes about how children commute to and from school, we used a mixed-methods approach, sequentially, where the qualitative approach supports and deepens the results obtained through a quantitative study.

Several methods were employed in this study, spread over two steps: (a) an online survey, and (b) a set of two focus groups and two interviews with school directors. The methods were applied sequentially in this order. For the survey, five schools were involved, three in Matosinhos and two in Braga. Two of these schools, one in Matosinhos and another in Braga (e.g., Figure 1 for context), provide the empirical focus for this study and the context of the two focus groups. The two in-depth studied schools have similar profiles (both are private, catering to specific student/parent interests) and are located in these two similar medium-sized cities in Portugal, each with a population between 150,000 and 200,000 inhabitants. Residents in both cities rely

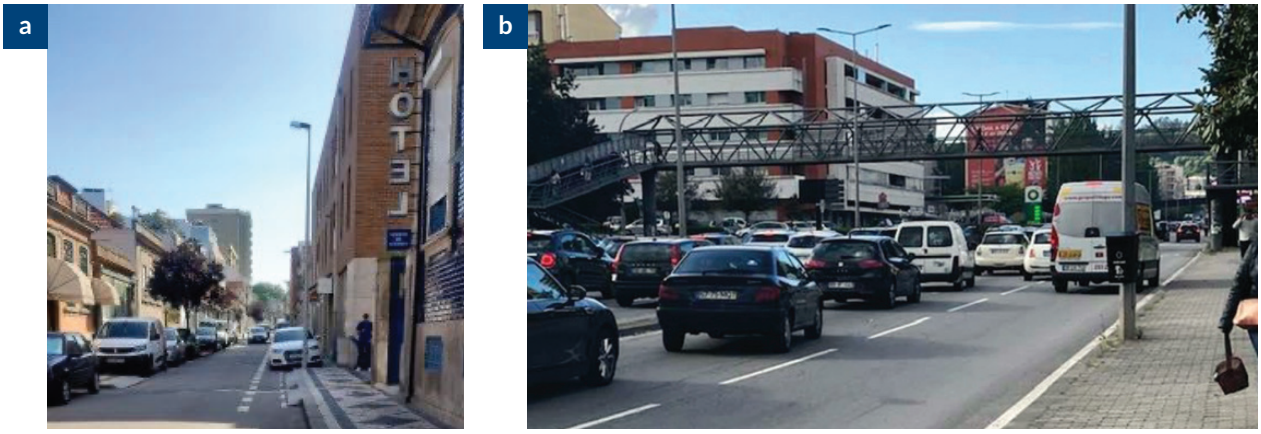

Figure 1. Urban environment near studied schools in Matosinhos (a) and Braga (b).

principally on car-use for mobility: in Matosinhos 65.8% and in Braga 69.7% (both increasing more than 4% between 2011 and 2021). Both schools are located near the city centre in residential neighbourhoods, though with some local mixed-use. Note that the nature of these schools made them more accessible for an in-depth study. At the same time, the specific nature of the schools also allowed us to explore the trade-offs parents make between the choice of school and the distance that would need to be travelled to reach it, among other issues. Throughout data collection, analysis, and interpretation, we remain conscious of this specificity. Table 1 provides an overview of the themes discussed and how they were measured. The survey was carried out in the first two months of 2023. Respondents' profiles are presented in Table 2.

During the second phase of this research, we conducted in-depth qualitative interviews and focus groups at two of the surveyed schools, inspired by the previous findings. We conducted interviews with the school directors of each school to gain a broader school-wide understanding of their perception of parents' choices for their children's mobility and the steps each school potentially takes to encourage certain travel behaviour, or to facilitate car parking, bicycle parking, etc. Furthermore, during this step, we conducted one focus-group per school with seven parents each to understand and explore more deeply how they make their daily choices, and what their fears and experienced barriers are for possibly encouraging more independent and/or active mobility for their child. An overview of the structure of the focus group and the themes discussed are presented in Table 3. The role of safety concerns was zoomed in on especially, as a gap in understanding about this had been identified through the literature review and high importance had been given to this by parents participating in the survey.

Table 1. Survey: Overview.

Indicator	Variable	Measurement					
Transport	mode of transport	walking alone, walking with an adult, bicycle alone, bicycle with an adult, public transport, public transport accompanied by an adult, transport provided by the institution, e-scooter alone or accompanied, by car					
(i) Children's characteristics	child age	scale					
	child gender	1: male	2: female	3: prefer not to reply			
(ii) Built environment	distance to school (reported)	0: < 1 km	1: 1 to 2 km	2: 2 to 4 km	3: 4 to 8 km	4: > 8 km	5: prefer not to reply
(iii) Safety perceptions	hit cross street	1: no concern	2: some concern	3: concern	4: a lot of concern	5: extreme concern	
	hit scooter sidewalk	1	2	3	4	5	
	hit bike sidewalk	1	2	3	4	5	
	hit car sidewalk	1	2	3	4	5	
	violence	1	2	3	4	5	
	pollution	1	2	3	4	5	
	litter	1	2	3	4	5	
	disease public transport	1	2	3	4	5	
	car crash	1	2	3	4	5	

Table 1. (Cont.) Survey: Overview.

Indicator	Variable	Measurement				
(iv) Children's behaviour in free time	sport time	scale				
	screen time	scale				
	time play near house	scale				
	time play outside	scale				
	play outside unsupervised	1: never	2: rarely	3: sometimes	4: often	5: very often
	travel outside unsupervised	1	2	3	4	5
	time screen unsupervised	1	2	3	4	5
	play inside unsupervised	1	2	3	4	5
(v) Adults' socioeconomic characteristics	adult gender	1: male	2: female	3: prefer not to reply		
	adult age	scale				
	degree	1: primary	2: secondary	3: higher	4: prefer not to answer	
	nationality	1: Portuguese	2: Brazilian	3: other		
	postcode city	(will inform GIS study)				
	postcode street					

Table 2. Survey: Respondents' profiles.

		(N) Matosinhos	(N) Braga
Children age	mean	(85) 5 years	(84) 6 years
Children gender	female	(43) 50%	(40) 47%
	male	(42) 49%	(44) 52%
	prefer not to reply	(1) 1%	(1) 1%
Parents age	mean	38 years	40 years
Parents gender	female	(70) 81%	(68) 80%
	male	(15) 17%	(16) 18%
	prefer not to reply	(1) 1%	(1) 1%
Parents education	higher education	(66) 77%	(61) 72%
	secondary	(18) 21%	(22) 27%
	primary	(2) 2%	(1) 1%
Parents nationality	Portuguese	94%	95%
Distance to school	I live 1 km from the school	(23) 27%	(8) 9%
	I live between 1 and 2 km from the school	(19) 12%	(15) 18%
	I live between 2 and 4 km from the school	(17) 20%	(32) 38%
	I live between 4 and 8 km from the school	(10) 12%	(19) 22%
	I live more than 8 km from the school	(23) 28%	(11) 13%

Table 3. Focus groups: Participants and structure/questions.

	Questions guiding the focus groups
Part 1	*Introduction and consent*
Part 2	*Background*: sharing with all. • How did you choose this school? Was its location important for you? Did you for example choose your home after the school so you could live close by? • What is the transport mode that you tend to use? Is it always the same mode or does it change often? Do you always use the same path? • Does the choice of school/home relate to the choice of mode? • Have you often thought about this topic of home–school–home mobility or not really?
Part 3	*Mobility choice*: individual exercise of writing 3 post-its as answers, one idea per post-it, indicating what is most important to the participant in response to each question (see questions below). After answers to all three questions are noted down in this fashion, everyone's post-its are sorted jointly on A3 papers indicating "like" or "don't like/would rather change." Then the responses are shared and discussed per question and sorting. • What are your motivations for this kind of mobility (the path you take, the mode of transport)? • How does this mobility, the path home–school–home, impact your relationship with your child? • And do you feel that this path/mobility has an impact on your child's experience? • Organize the post-its by what you are happy about and what you would like to change. If change: What would you like to be different, why, and how?
Part 4	*Safety*: joint discussion. First only as open question, then prompting with additional questions. • What is the role of safety? And what kind of safety? Traffic safety? Stealing? The child being taken away or mistreated?

4. Results and Discussion

The research revealed a series of themes worth highlighting, which structure this section: distance, independence, safety, perceived benefits of walking, and awareness of diverse possibilities. These differ somewhat from what Aranda-Balboa et al. (2020) and others discuss, though some similar themes emerge, including distance as one major one. We now turn to discussing each of our themes in turn.

4.1. Distance

To contextualize the theme of distance, it is important to note that 27% of the participants in Matosinhos live within a 1 km radius from the school; in Braga this figure was 9%. In Portugal, school choice policies have gone from a relatively strict requirement for children to go to a school within their district, to policies more focused on freedom of choice. Nowadays, parents may thus choose their children's schools according to their values or needs (e.g., schools with disability-specific programs or different learning methods concerned with environmental or music programs). They are allowed to choose a school in their work district or in another city, and between public and private schools, for example. In Portugal, then, most children are allowed to live substantially more than 1 km away from their school (and many do). In our study, children living within a radius of 1–2 km or more from school are usually driven to school by private car, both in Matosinhos (71%) and in Braga (81%).

Generally, the literature states that within about one kilometre, it is more likely that parents will structure their child's trip to school via active mobility (Macdonald et al., 2019). While our results confirm this (65% in Matosinhos and 89% in Braga), a substantial number of parents in Matosinhos (30%) and Braga (13%) still use the car even at these short distances. This challenges the idea that it would be "obvious" or inevitable for active travel to be undertaken when the radius is under 1 km. Other studies also reveal up to 20% of non-active travel being used despite those trips covering under one kilometre of distance (Macdonald et al., 2019). In this study, we dug a little deeper to understand what led parents to avoid active travel even at such short distances.

In the focus groups, most parents elucidating this situation referred to time constraints or convenience. For example, in the focus group in Matosinhos, a parent said, "I just leave my house and drop the children off before I go to work, it's simpler just to use the car" (FG1, P7). We found similar attitudes in the focus group held in Braga. Space-time-geography (Hagerstrand, 1982), then, seems to play a crucial role here: If the car is required for the parents' trip following school drop-off—for work or groceries for example—then the car is quickly chosen also for the drop-off itself. Another space-time geography reason named in one case was that the car provided the parents some alone-time together after bringing their child to school, as they struggled to find this time in other moments. Despite big challenges with parking the car for this purpose near the school (thus often leading to congestion as parents stop on the road while they rush their children out of the car), most parents still choose this over an active mode. However, this may also be due to the relatively young age of the children of parents interviewed (under 10, most 6 or under), as this might impede independent mobility. According to Rothman et al. (2018), parents' attitudes towards the acceptable distance for independent mobility of their children have changed over time. Today, they are more restricted and relate to parental fears and structures of their daily lives. This brings the discussion to themes beyond distance that came up as important in choosing the mode for home–school trips.

4.2. Independence

No children in our sample from pre-school or primary school commute alone or independently to school. The most common age of the children of parents surveyed and interviewed for this study was between 5 and 6 years old. Previous studies suggested that the barriers parents perceive decrease as children get older (Aranda-Balboa et al., 2020; Forman et al., 2008). Although we found some parents who suggest that their children wish to commute in an independent way by walking or cycling, those parents' fears of car crashes or dangerous behaviours prevented them from ultimately allowing this for their child. Trust can work as a catalyst defining whether parents would be willing to let their children walk or cycle to school, alone or with a group of children or another adult. One participant argued, "She doesn't know how to cross the road on her own, let alone get to school" (FG2, P5), and another said, "The problem isn't the kids, it's the drivers who have no respect or consideration for the people on the street" (FG2, P8). One school's director emphasised that the school itself has a strong policy of teaching children to walk and take public transport safely, both of which they do during relatively frequent outings where older children (around 8–10) are paired with younger ones (from 3 years old) to walk hand-in-hand. They notice that, for many children, walking outside—let alone with relative independence—is very unusual.

4.3. Safety

The main concern identified in the survey was about the risk of a child being injured in a traffic accident when crossing a road. The concern next in line was a car crash. As a parent argued, "Often we see people stopping with their car on the sidewalk to leave their child" (FG1, P3), and another parent noted, "People often stop or park near or on the crosswalks" (FG2, P4), highlighting this as a problem for the visibility of children. The parents from Braga who participated were more afraid of a car crash or being hit by a scooter on the sidewalk. Electric scooters are frequently found driving on the sidewalks in both cities, because of the lack of (perceived) safety for them on the roads. During the focus group in Braga, the lack of safety for cycling was especially highlighted, with wishes for (respecting or increasing the amount of) cycling infrastructure high. Several parents there noted that an improvement in conditions for cycling would seriously encourage them to use this option and allow it for their children (also independently).

4.4. Benefits of Walking and Related Perceptions

Increasing rates of walking and cycling can promote the development of social engagement and help create stronger, more trustful, and liveable local communities (Nikitas et al., 2019). Improvements in reducing traffic speeds through street design and regulation can alleviate some of the concerns about road safety and sense of neighbourhood safety. However, most of the obstacles mentioned by parents, such as parking on the pavement or pedestrian crossings or misuse of pedestrian infrastructure, are also civic issues that will likely require more than regulations that are frequently not enforced (as is the case with stopping on the pavement to drop off children: this is not permitted and yet a very frequent practice). In this sense, schools can act as facilitators of active school travel interventions by providing safe and supportive experiences and environments (Buttazzoni et al., 2018; Crawford et al., 2015; N. Ikeda & Nishi, 2019). The schools researched for this study make quite some attempts in this regard, yet there are of course also limits to the immediate impact some of these measures can have. The survey also revealed that the children appearing in the survey spent the majority of their non-school time on screens, and only approximately 10% of their time was spent outdoors, either playing in playgrounds, etc., or doing sports. Their overall relationship with spending time outdoors is thus severely limited, also beyond the commute to school. Schools on their own may thus face this extra challenge when trying to connect the children to civil, relational, and spatially/locally aware behaviour.

Interestingly, awareness of health and well-being issues concerning time spent outside, as well as the physical and mental benefit of walking or other active mobility, is considered important by most parents. Many surveyed and interviewed parents who drive their children to school feel a degree of guilt about it, believing that for various ethical and health reasons, driving is not the "right" thing to do. Nevertheless, the perception that this is the most practical and straightforward thing to do wins out. To some extent, there does seem to be a "cultural" or else perhaps "21st-century" aspect here, as many parents noted that they had witnessed and sometimes even themselves experienced much more active mobility in other countries or, within Portugal, several decades ago, but that this was no longer sufficiently *done* or *encouraged* in contemporary (urban) Portugal, or at least in the studied cities.

4.5. Awareness of Alternatives

It is notable that, during both focus groups, without prompting, parents highlighted examples from abroad or from their own childhood (in Portugal or abroad), where or when they witnessed or experienced travel to school in a much more active and independent way for children. They used descriptions of these experiences, for instance in the Netherlands or Sweden, to explain that they enjoyed that and would like to offer their children similar experiences. However, they also highlight that the (current) situation in Portugal does not allow for this. At the same time, the detailed knowledge the parents shared about the local context showed a high awareness of simple steps that could improve conditions.

5. Conclusion

The analysis suggests that mobility planning in Matosinhos and Braga, similar to other areas in Portugal and Europe, is primarily car-centric and adult-oriented. It often caters specifically to single adult workers, focusing mainly on commuting between home and work. One could speak of a kind of "adultism" (see Smith, 2024) in current mobility and land-use planning. Due to this, parents are pushed to choose the car instead of active mobility to take their children to school. Even when schools are nearby, parents often need cars for subsequent tasks like going to work. This need is widely accepted, leading to behaviours like parking on sidewalks or blocking roads to drop children directly at school entrances—practices less tolerated by childless adults. This situation increases the risks of walking and cycling, discouraging parents from promoting their children's independent mobility. Thus, even parents who prefer active mobility drive their children, perpetuating a vicious cycle. This problem is compounded by increasing screen time and decreasing outdoor activity, utterly detaching children from their bodies and urban environment while reducing their physical activity and physical, spatial, and civic awareness.

Recognising the interconnectedness of these factors can help policymakers, school leaders, and school transport providers understand the feasibility of adding new programmes to their transport agendas and identify ways to introduce and improve uptake (see Nikitas et al., 2019). Several participants of the focus groups said that some of the questions or tasks proposed made them look at the subject from a new perspective. In this sense, the focus groups pointed to the potential of discussion forums for motivating change. However, perhaps these would also need to be performed with mobility planners in the given cities and countries so that action could be taken to facilitate non-car-based trips, especially trips to school. The focus groups suggested that a combination of context-specific knowledge and awareness of alternatives can be relevant for opening avenues of possibility. However, seen more critically, the alternatives perceived in other times and places are sometimes also used to argue that ideal conditions here and now are not sufficiently met by comparison.

The material from this study is much richer than what could be presented in a single article. We chose to focus on the interconnectedness of factors that, while forming a complex situation, seem to have a joint root cause in how mobility *and* land-use planning have prioritised car-based mobility for employed adults. We have also shown several ways this seems to impact children's (and parents') health and well-being and how this current set-up will remain in a vicious cycle if not decisively interrupted. Decarbonising cities and making them more child-friendly seem to go hand-in-hand, and creating a more child- and parent-centred planning system might be key to achieving both.

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Conflict of Interests

The authors declare no conflict of interests.

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Walking to School: What Streets Do Children Prefer?

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Abstract

Active school travel provides children with a daily opportunity to engage actively with their local urban environments. Despite widespread recognition that understanding the underlying factors of children's navigation choices is crucial for developing effective environmental interventions to promote active school travel, there is limited evidence on children's experiences regarding their school journeys. This is due in part to the fact that most studies rely on GIS-calculated routes which may not adequately represent children's actual home-school journeys, and hence actual experiences. This study aims to identify specific environmental attributes influencing children's navigation choices based on children's (9–10 year olds) actual walking routes to school in Newcastle upon Tyne, UK. 45 pairs of selected and avoided streets were compared using a range of urban form (e.g., street connectivity measured through space syntax variables) and street design (e.g., footpath width) characteristics. Statistical analysis highlighted significant design attributes as potential determinants of navigation selections. In-depth street-level observations provided insight into the urban character of these street pairs, identifying the environmental qualities that could offer opportunities for active and safe commuting among children. This study contributes to the literature by broadening our understanding of the environmental attributes that may promote active school travel. Our findings, based on children's actual experiences, may also inform urban planners and designers on designing inclusive child-friendly cities.

Keywords

active school travel; child-friendly cities; children's experiences; neighbourhood design; route selection; street connectivity; street design

1. Introduction

Active school travel (AST) offers numerous benefits for children, including improvements to physical health (Voss, 2018), psychological well-being (Carter et al., 2021), and social welfare (Waygood et al., 2017), along with economic (McDonald et al., 2020) and environmental (De Nazelle et al., 2011) benefits for both the community and individuals. Moreover, walking or wheeling to school provides children with a valuable opportunity to engage with the built/natural environment, confirming their right to participate in the community on an equal basis with adults. Yet there has been a consistent decline in AST rates worldwide (Kontou et al., 2020), with a notable example in England where the percentage of pupils (aged 5 to 16) actively travelling to school decreased from 50% to 44% between 2002 and 2019 (Department of Transport, 2023). Despite a temporary increase in walk-to-school rates from 41% in 2019 to 47% in 2020 during the pandemic, the figures fell back to 43% in subsequent years (Department of Transport, 2023). Previous research has shown that family socio-economic characteristics play an important role in shaping active behaviours for children (Schicketanz et al., 2018). For example, higher household income is associated with lower rates of AST among children (Larsen et al., 2009), possibly because lower-income households may have more limited transportation options. However, according to the socio-ecological models for children's transportation, other factors, such as the design of the built environment, may also affect children's travel choices (Mitra & Manaugh, 2020).

Although an extensive body of literature suggests that the urban environment can encourage physical activity by providing infrastructures and destinations supportive of an active lifestyle (e.g., a large number of destinations accessible within a short walking distance; Zhang et al., 2022), the evidence on the role of the built environment in promoting active trips to school is less conclusive. Previous research investigating the objectively assessed environmental determinants of AST has identified distance to school as a key factor in determining the mode of school travel (Curtis et al., 2015; Oliver et al., 2014; Rothman et al., 2018). However, these studies predominantly analyse the shortest routes to school (usually determined using GIS; Broberg & Sarjala, 2015), failing to capture children's actual home-school journeys, and hence real-life experiences (Ikeda et al., 2018). Emerging methodologies that account for children's actual travel routes to school show a preference for longer routes over shorter ones (Ikeda et al., 2018; Moran et al., 2018), indicating that other factors beyond distance may affect children's navigation choices. For example, traffic calming strategies (Rodríguez et al., 2015), exposure to traffic (Ikeda et al., 2018), ground-level attractions and footpath widths (Argin et al., 2017), as well as street connectivity (Ikeda et al., 2018), significantly influence route choice.

This study addresses the aforementioned research gaps by employing a novel approach that compares streets along actual school routes to those along the metrically shortest ones, using detailed street-level data such as land-uses, street connectivity, and street design characteristics. As a result, this article aims to identify a specific range of urban form and street design attributes that may shape participating children's navigation choices, either positively or negatively.

2. Methods

2.1. Case Study and Sample

The case study was set in Newcastle upon Tyne, a large riverside city of 829,000 people in the north-east of England (UK). The city presents a notable case with low rates of children walking (39%) or cycling/scootering (6%) to school (Schools Health Education Unit, 2019) alongside a high childhood obesity rate (37.5% among 10–11 year olds; Public Health England, 2020). All 74 primary schools of the city were geo-coded in QGIS and grouped into four categories, using a quadripartite matrix of two quantitative dimensions (one spatial and one socio-economic) to ensure a variety of built and social environments. The dimensions were street connectivity, measured by syntactic integration (within 2 km), and socio-economic status, measured by the Index of Multiple Deprivation (see Figure 1). Integration measures how accessible each street is from all others in a network within a defined radius, while the Index of Multiple Deprivation (rank) is a relative measure of deprivation that represents the aggregate social and economic conditions of households in the area based on 37 separate indicators (e.g., income, education, health, etc.), with lower rank values indicating greater deprivation. The average values of both metrics within 2 km buffers around the schools (Giles-Corti et al., 2011) guided the following classification scheme: high connectivity/high deprivation, high connectivity/low deprivation, low connectivity/low deprivation, and low connectivity/high deprivation.

Schools from each category were randomly invited until one from each category accepted, resulting in the selection of four schools across four distinct neighbourhoods as case study sites. Given the limited time and resources, this sampling strategy ensured a manageable sample size for collecting and analysing qualitative data, while also providing enough data for quantitative analysis. Results from an extra school that took part during the pilot study were also included since the data collection methods remained the same.

Figure 1 displays the geographical locations of Schools A, B, and C to the west of the city, while School D and Pilot School are located in the same region east of the city centre. School A is in a multicultural neighbourhood with a population density of 4,179 people/km^2 as of 2020, including many migrants. School B, predominantly characterised by residential land-uses, has a similar density of 4,574 people/km^2. School C has the lowest density (3,284 people/km^2), while School D and Pilot School have the highest

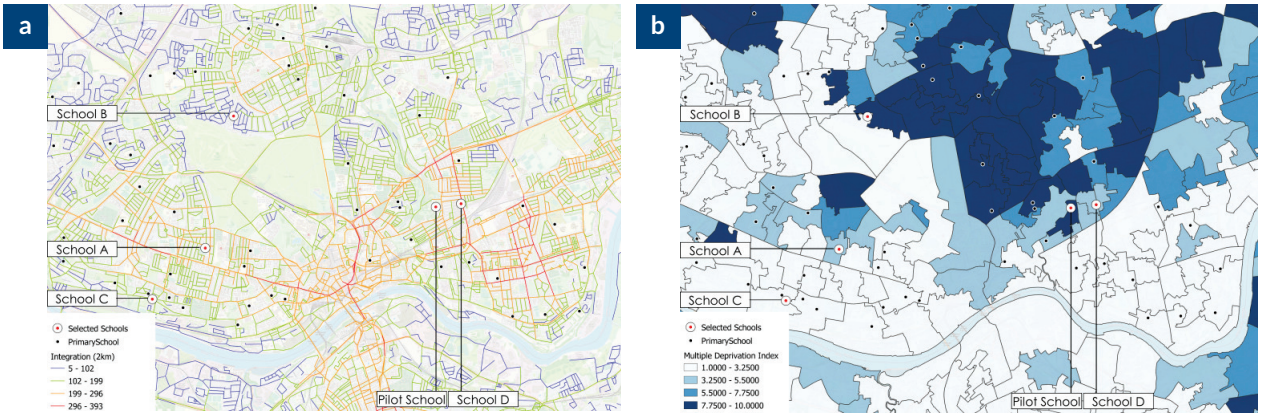

Figure 1. School selection: (a) Street connectivity: syntactic integration (2 km); and (b) the Index of Multiple Deprivation. Sources: (a) Space Syntax (n.d.); (b) Consumer Data Research Centre (2019).

density (7,888 people/km^2). Regarding safety, the average crime rate in the School A neighbourhood exceeds the city average by 34.5%, whereas it falls below 26% around School B. The area around School C has the highest crime rate, a staggering 144% above the city average, making it the most challenging in terms of security. Conversely, the area encompassing School D and Pilot School is considered relatively safe, with a crime rate marginally lower (0.9%) than the city average. The street network configurations also differ significantly across these areas. School A is adjacent to a major road, facilitating easy access to the city centre and is characterised by a regular grid-iron pattern with large blocks, averaging 200x20 m. School B's area features a curvilinear street network with cul-de-sacs, in stark contrast to the mixed patterns of grid-iron and cul-de-sacs found around School C, which is located at a busy intersection. School D and Pilot School benefit from a regular grid-iron network with relatively smaller blocks (150x40 m) and alleys enhancing residential street connectivity. Unique to this area is the active travel infrastructure and placemaking features such as car filters (including bollards and varying curb levels), benches, and urban greenery including trees and planters, which improve both functionality and aesthetic appeal.

All students in year 5 (9–10 year olds) from these schools were randomly invited to the study, with detailed study information sent to their parents. This age group was targeted since the literature suggests a decline in AST among children older than 10 years old (Chillón et al., 2011), but at the same time students of 9–10 years are old enough to provide an accurate description of their journey and neighbourhood experiences (Saunders et al., 1997) and to report their routes to school (Ikeda et al., 2018; Moran et al., 2018). A total of 197 students accepted the invitation, and 145 of these, with the necessary consent, were selected to participate. More details of the sample are presented in Table 1. The study received ethical approval from the Northumbria University's Ethical Committee, UK, on 30 April 2019 (Submission Reference 15592).

Table 1. Characteristics of the sample.

School	Average IMD rank within 2 km buffers around the schools	No. of Year-5 classes	No. of participating students	No. of reported walking routes	No. of diverged walking routes	No. of analysed streets	No. of focus groups
Total	Average 13,797	7	145	56	21	45	21
A	7,228 (low)	2	57	16	v1	0	4
B	16,007 (high)	1	22	9	6	7	3
C	7,849 (low)	2	14	8	3	6	6
D	15,452 (high)	1	25	14	6	24	6
Pilot	16,093 (high)	1	27	9	5	8	2

2.2. Data Collection and Analysis

2.2.1. Measuring the Dependent Variable: Frequently Selected/Avoided Streets Along Self-Reported Routes and Their Metrically Shortest Counterparts

All students participated in a whole-class mapping activity, drawing their typical AST routes from home to school and noting their travel modes. Out of 145 students, 79 participants completed the route mapping task. Among them, 72 walked and 7 cycled to school. Although just 12% of participating children walked or cycled independently, all reported routes involved accompaniment by an adult. Each route was geo-coded

into QGIS to identify individual streets (defined as extending between successive street intersections) along the selected routes. The network map was updated through field surveys and manual analysis of the latest aerial photographs to include missing data, such as short-cuts, walkways, and park paths (Giles-Corti et al., 2011). For each route, the metrically shortest route (from home address to school address) was also computed using the network analyst tool in QGIS for a subsequent comparison with the actual routes. In addition to route analysis (see Michail et al., 2022, for detailed findings), most preferred and/or avoided individual streets (n = 45) along both sets of routes were statistically modelled and studied further to identify any emerging patterns of preference. Individual streets were selected based on their frequency of actual selection versus potential selection as part of the metrically shortest route. For example, a street that is used by four students for actual travel (actual selection, *AS* = 4) but appears on only 2 metrically shortest routes between students' homes and the school (potential selection, *PS* = 2), would have a frequency of selection (*FS*) rate of 2 (4–2). Conversely, a street not selected by any students would have an actual selection rate of 0, but a potential selection rate of 3 if it lies on 3 shortest routes, giving it a frequency of selection of –3 (0–3). Figure 2 illustrates these calculations.

2.2.2. Focus Groups

In addition to the whole-class mapping activity, 19 map-based focus groups were conducted with children who provided relevant consent to be voice-recorded. The activity aimed to elicit children's underlying reasons for their school route preferences. To allow for meaningful and in-depth discussions, groups of three to four were formed. Each group received an A0 high-resolution satellite map, five colourful prompt cards, and stickers representing children's feelings and experiences (favourite, fun, easy, uncomfortable, and

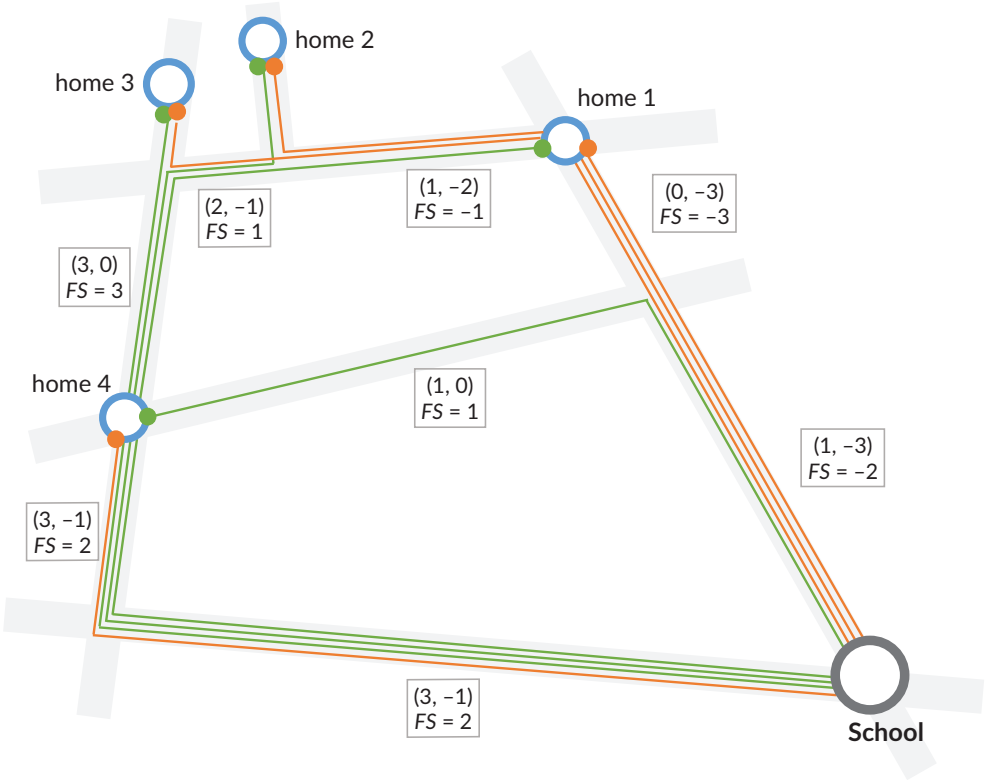

Figure 2. Calculation of street selection frequency. Note: *AS* appears in green and *PS* in orange.

dangerous) to elaborate on their travel experiences. The focus groups took place the same day in a separate classroom and lasted about 20 minutes each. They were audio-recorded, geo-coded in QGIS, and analysed using thematic analysis on NVivo. Risks and mitigations of working with children, including researcher bias, children's equal participation, peer influence, and power imbalance between the researcher and the participants, have been considered. See Michail (2024) for a more extensive overview of the focus groups, as well as the risks and mitigations related to working with children. Results from focus groups conducted during the pilot study were excluded due to methodological differences with the main study. While a detailed analysis of children's comments is presented elsewhere (Michail, 2024), relevant comments are included in this article to provide qualitative context to the statistical analysis.

2.2.3. Built Environment Characteristics of Streets Along the Routes

To investigate the built environment characteristics along both *AS* and *PS* street pairs, street design features were documented using field surveys and Google Street View, and syntactic analysis was conducted to evaluate street connectivity in case-study neighbourhoods. Street-level variables that can be measured objectively (i.e., binary = yes and no = and/or continuous) were analysed to allow for the replication of the study. Five categories of built environment features were defined for each street: land-uses; placemaking features; active travel infrastructure; traffic-environment; and street connectivity, using various syntactic measures of street network design, as described in Table 2.

Table 2. Description of the built environment features.

Variable	Description
Land-uses	
Residential	The total number of doors normalised by 100 m
Commercial	The total number of doors normalised by 100 m
Institutional	The total number of doors normalised by 100 m
Vacant	The length of vacant buildings normalised by 100 m
Greenspace	Existence of a greenspace (yes/no)
Placemaking features	
Setback distance	The average setback distance between buildings and footpath (in m)
Fence Height	The average fence height (in m)
Benches	Presence of benches along the route (1 = yes and 0 = no)
Street Trees	The total number of street trees normalised by 100 m
Graffiti	Presence of graffiti along the route (1 = yes and 0 = no)
Active travel infrastructures	
Street signs	Presence of street signs along the route (1 = yes and 0 = no)
Street lighting	Presence of street lighting along the route (1 = yes and 0 = no)
Footpath width	The average footpath width (in m)
Cycle path width	The average cycle path width (in m)
On-street cycle path length	The total length of the on-street cycle path normalised by 100 m
Bike racks	The total number of bike racks normalised by 100 m
Bus stops	The total number of bus stops normalised by 100 m
Slope	% average total slope/total length of the street

Table 2. (Cont.) Description of the built environment features.

Variable	Description
Traffic-environment	
Traffic light crossings	The total number of traffic light crossings normalised by 100 m
Zebra crossings	The total number of zebra crossings normalised by 100 m
Street width	The average street width (in m)
Speed limit	The average speed limit along the route
On-street parking	Presence of on-street parking along the route (1 = yes and 0 = no)
Off-street parking	Presence of off-street parking along the route (1 = yes and 0 = no)
Street connectivity	
Integration (global)	The distance from each street to all the others within the system (continuous variable)
Integration (local)	The distance from each street to all the others within the system within a set radius (continuous variable)
Normalised angular choice (global)	Measures how often a street falls on the shortest path between any two street segments in the system by taking into account the depth of the street segment in the system. This is calculated from each street segment to all others within the system (continuous variable)
Normalised angular choice (local)	Measures how often a street falls on the shortest path between any two street segments in the system by taking into account the depth of the street segment in the system. This is calculated from each street segment to all others within the system within a set radius (continuous variable)
Metric reach (800 m)	The total street length accessible from each street segment within a certain metric radius (continuous variable in m)
Directional reach (20°, 2D)	The total street length accessible from each street segment within a certain number of direction changes (continuous variable in m)

2.2.4. Statistical Analysis

A standard protocol was implemented to identify relevant independent variables and develop regression models to predict children's street preferences. First, to avoid multicollinearity, a correlation analysis among the candidate variables was conducted. To eliminate multicollinearity (Yang et al., 2022), variables with significant correlations ($p > 0.7$) were not considered in the same model, and those with a variance inflation factor (VIF) of 5 or greater were excluded (Akinwande et al., 2015).

Next, the remaining attributes were tested as predictors in univariate analysis: paired t-tests or Wilcoxson signed-rank tests (for characteristics that showed a normal and non-normal distribution respectively) were conducted using SPSS software to identify whether the differences between the values attributed to the built environment features for *AS* and *PS* street pairs were statistically significant. The final set of variables in the univariate analysis, at the 90% confidence interval level significance ($p < 0.1$) in line with earlier children's physical activity studies (Hinckson et al., 2014), were then entered into a multiple regression model to estimate the differences between (a) the *AS* frequencies and (b) the *PS* frequencies of streets to identify the underlying built environment attributes affecting route choice. The independent effects of these features were then analysed in multivariate regression models. A total of three models were developed to understand the contribution of each set of variables to the overall model:

Model 1. Street connectivity measures only.

Model 2. Street connectivity + land-uses measures.

Model 3. Street connectivity + land-uses + placemaking features + active travel infrastructure + traffic-environment measures (full model).

Finally, insignificant variables ($p > 0.1$) in the full model (Model 3) were removed in a stepwise fashion, commencing with the variable with the highest p-value, to develop a reduced model. The Akaike information criterion (AIC) and coefficient of determination (R^2, adjR^2) were utilised to evaluate each model's strength and compare models. Lastly, those streets with the highest differences between their frequencies were compared visually and numerically with their shortest counterparts to provide detailed insight into how these selected urban streets look on the ground and how they differ in character from their shortest counterparts. Due to the limited sample size, the statistical analysis was developed for the entire sample, without investigating individual school neighbourhoods.

3. Results

3.1. Selected Streets (AS) Versus the Avoided Streets (PS)

The descriptive statistics (mean and standard deviation) for the design attributes of the selected and avoided streets are summarised in Table 3. Streets in School A area were not included in the analysis due to an inadequate sample size ($n = 1$). The t-test/Wilcoxon signed-rank test results show whether there is a significant difference in the values of these attributes between street pairs.

Table 3. Means and standard deviations of dependent and independent variables by street selection status ($n = 45$).

Explanatory attributes	Selected street		Avoided street		Mean difference (selected-avoided)
	mean	std.	mean	std.	sig.
Street selection					
Difference between frequency of selection and shortest	2.36	0.57	−2.58	0.70	***
Street connectivity					
Global integration[a]	0.02	0.00	0.04	0.00	*
Local integration[a]	0.90	0.03	0.84	0.03	
Global choice[b]	386.92	12.86	169.85	27.97	**
Global Normalised Angular Choice[b]	1.03	0.19	0.95	0.17	
Metric reach (800 m)[b]	1,678.27	427.11	1,725.44	257.89	
Directional reach[b] (0,20°)	1,007.92	321.23	680.76	432.97	***

Table 3. (Cont.) Means and standard deviations of dependent and independent variables by street selection status ($n = 45$).

Explanatory attributes	Selected street		Avoided street		Mean difference (selected-avoided)
	mean	std.	mean	std.	sig.
Land-uses					
#Residential/100 m[b]	6.10	3.25	2.75	4.03	**
#Commercial/100 m[a]	0.42	1.45	1.62	3.06	**
Greenspace (yes/no)[b]	0.32	0.48	0.08	0.27	**
#Institutional/100 m[b]	0.26	0.43	0.01	0.00	**
#Vacant/100 m[a]	0.12	0.18	0.41	0.18	*
Placemaking features					
Average setback distance[b]	6.61	1.86	1.08	1.42	***
Average fence height[b]	1.13	0.67	1.24	0.90	
Benches (yes/no)[b]	0.00	0.00	0.23	0.43	***
#Street trees/100 m[b]	0.90	1.51	0.63	1.25	*
Active travel infrastructures					
Street signs (yes/no)[b]	0.68	0.48	0.46	0.51	
Street lighting (yes/no)[b]	1.72	0.46	1.73	0.53	
Footpath width[b]	2.87	1.01	1.01	2.21	**
Cycle path width [b]	0.56	0.77	0.07	0.37	***
#Bike racks/100 m[b]	0.51	1.77	0.33	1.06	
#Bus stops/100 m[b]	0.11	0.14	0.36	0.14	*
Slope[b]	0.01	0.2	0.02	0.03	*
Graffiti (yes/no)[b]	0.08	0.28	0.35	0.48	**
Traffic-environment					
Zebra crossings (yes/no)[b]	0.08	0.02	0.00	0.00	***
Crossing islands (yes/no)[b]	0.08	0.28	0.00	0.00	
Traffic lights (yes/no)[b]	0.24	0.44	0.12	0.33	**
Street width	7.66	3.68	6.29	3.22	
Speed limit	19.20	8.12	21.54	9.24	
On-street parking (yes/no)	0.80	0.41	0.69	0.47	
Off-street parking (yes/no)	0.36	0.08	0.12	0.08	*

Notes: [a] Wilcoxon ranked; [b] paired t-test; *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

According to these results, a significant difference exists between the selected and the avoided streets for several attributes from each built environment category, suggesting that children preferred to walk along alternative streets with certain built environment characteristics, such as increased directional accessibility and reduced number of bus stops, rather than just minimizing the distance. These students diverged from the metrically shortest streets probably because they preferred streets with increased directional accessibility from their surrounding context (i.e., straight and longer streets) and streets with available off-street parking and green spaces, more zebra crossings, traffic lights, residential uses, increased

setback-distance, average footpath width and cycle path width, as well as fewer commercial activities, vacant buildings, and more benches.

3.2. Built Environment Attributes Associated With Street Selection

The diagnostic and coefficient results for 3 different multivariate regression models estimating the difference between the frequency of selection of the walked street (*AS*) and the frequency of potential selection as its shortest counterpart (*PS*) are presented in Table 2. All VIFs are below 2, indicating that multicollinearity was not an issue. The strength of the "connectivity" model (Model 1) is low (adjR^2 = 0.13, AIC = 209.87), with the full model (Model 3) being the strongest (adjR^2 = 0.48, AIC = 202.14).

When street connectivity measures were included only, directional reach (0 direction changes, 20°) was positively and significantly correlated with the output variable. Directional reach remained significant across models when other variables were also considered. The predictive power of the model increased considerably (adjR^2 change = 20%) when land-use variables were included in the model. In terms of land-use measures, the number of residential buildings per 100 mt (std β = 0.31, $p < 0.05$) was positively and significantly associated with the difference in selection frequencies of the actual street and its metrically shortest, avoided counterpart. Similarly, the availability of green space along the street was positively (std β = 0.26, $p < 0.1$) related to the outcome variable, albeit marginally. In other words, the more residences that open onto the street, as well as the presence of green space (e.g., parks and parklets), the more likely a child will choose that street over the metrically shortest counterpart during the school journey.

The final model (Model 3) exhibited a substantial improvement over the previous model (Model 2) in terms of adjR^2, explaining about 50% of the variation in the outcome variable. Of the street-level design attributes, average footpath width (std β = 0.52, $p < 0.01$) exerted the most influence on street choice. In fact, when standardised coefficients within the overall model are compared, it is found that average footpath width, along with directional reach, is the most significant variable related to decision-making in children's navigation. The presence of zebra crossings and off-street parking along the street exhibited marginal influence ($p < 0.10$).

Table 4 presents the results of the three multivariate regression models.

Table 4. Multivariate regression models estimating the difference between the *AS* (walked) and *PS* (avoided) frequencies of streets.

	Model 1 (street network)			Model 2 (street network + land-uses)			Model 3 (full model)		
Explanatory attributes	β	| t |	std β	β	| t |	std β	β	| t |	std β
Constant		1.67			1.99**			1.70*	
Street connectivity									
Global integration	−1.09	1.48	−0.28	−1.22*	1.80*	−0.32*	−1.37	−1.61	−0.36
Global choice	0.00	0.91	0.15	0.00	0.89	0.13	0.00	−0.60	−0.15
Metric reach (800 m)	−0.00	1.30	−0.21	−0.00	1.15	−0.17	0.00	0.26	0.05
Directional reach (0, 20°)	0.02**	2.07**	0.44**	0.03**	2.30**	0.44**	0.06**	2.37**	0.52**

Table 4. (Cont.) Multivariate regression models estimating the difference between the *AS* (walked) and *PS* (avoided) frequencies of streets.

	Model 1 (street network)			Model 2 (street network + land-uses)			Model 3 (full model)		
Explanatory attributes	β	| t |	std β	β	| t |	std β	β	| t |	std β
Land-uses									
#Residential/100 m				0.15**	2.41**	0.31**	0.12*	1.95*	0.25*
#Commercial/100 m				−0.16	1.09	0.28	−0.50**	−1.97**	−0.50**
Greenspace (yes/no)				−0.90*	1.83*	−0.26*	−1.03*	−1.97*	−0.30*
Other attributes									
Average setback distance							0.09	1.60	0.25
Benches (no)							−0.21	−0.32	−0.06
#Street trees/100 m							0.11	0.32	0.06
Average footpath width							0.78***	2.91***	0.52***
Slope							−1.75	−0.82	−0.16
#Bus stops/100 m							−0.85	−1.46	−0.21
Zebra crossings (yes/no)							−3.20*	−1.89*	−0.38*
Traffic lights (yes/no)							−0.07	−0.14	−0.02
Off-street parking (yes/no)							−0.67*	−1.73*	−0.24*
No.	45								
R^2	0.21***			0.43***			0.67***		
Adjusted R^2	0.13***			0.33***			0.48***		
AIC	209.87			204.31			202.14		

Notes: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$; two-tailed tests.

The reduced model (Table 5) showed moderate improvements over the full model, with a 10.42% increase in adjR^2 and a 4.64% improvement in AIC (AIC = 192.77, adjR^2 = 0.53), and no multicollinearity concerns (max VIF = 1.90). Similar to the full model, directional reach (0, 20°) was positively correlated ($p < 0.005$) with the difference in selection frequencies of selected and avoided streets. Surprisingly, global integration had a significant ($p < 0.005$) and strong negative effect (std $\beta = -0.44$) on-street choice. All three land-uses variables appeared to be statistically significant. Significant positive associations included the number of residential uses (std $\beta = 0.31$, $p < 0.008$) and the presence of green spaces (std $\beta = 0.28$, $p < 0.034$) along the street. The number of commercial uses, on the other hand, had an inverse effect on the output variable (std $\beta = -0.34$, $p < 0.027$). In other words, children walking to school preferred streets with an increased number of residences and green spaces and a reduced number of commercial activities, such as shops and restaurants, during their school trips. Of the street-level design characteristics, average footpath width (std $\beta = 0.41$, $p < 0.006$) had the strongest impact. Other significant street-level attributes positively affecting street choice included average setback distance (std $\beta = 0.24$, $p < 0.05$), and the presence of zebra crossings and off-street parking (std $\beta = 0.29$, $p < 0.02$, std $\beta = 0.23$, $p < 0.05$, respectively).

Table 5. Reduced model estimating the difference between the *AC* (walked) and *PS* (avoided) frequencies of streets.

Explanatory attributes	*β*	| t |	std *β*	std error	*p*-value
Constant	25.46	3.04	0	8.37	0.005
Street connectivity					
Global integration	−1.67	3.01	−0.44	5.54	0.005
Directional reach (0, 20°)	0.02	3.04	0.44	0.00	0.005
Land-uses					
#Residential/100 m	0.14	2.80	0.31	0.05	0.008
#Commercial/100 m	−0.34	2.31	−0.34	0.15	0.027
Greenspace (yes/no)	−0.98	2.20	−0.28	0.44	0.034
Other attributes					
Average setback distance	0.09	1.98	0.24	0.04	0.050
Average footpath width	0.62	2.90	0.41	0.21	0.006
Zebra crossings (yes/no)	−2.47	2.44	−0.29	1.01	0.020
Off-street parking (yes/no)	−0.64	2.04	−0.23	0.32	0.050
No.			45		
R^2			0.63		
Adjusted R^2			0.53		
AIC			192.77		

3.3. Street-Level Observations Along Frequently Selected (AS) and Avoided (PS) Streets

To provide detailed insight into how these selected and avoided streets look on the ground and how they differ in urban character, streets with the highest differences (2, or −2) between their *AS* and *PS* frequencies were compared visually and numerically. The width of the line on the maps represents the frequency (1–3) of selection/avoidance. Figures 3, 4, and 5 illustrate these streets per neighbourhood. The selected streets along the actual routes are shown in green, while the avoided streets are shown in orange.

Figure 3 compares the frequently selected (*AS*) streets along the actual routes to their avoided (*PS*) counterparts along the metrically shortest routes during home-school trips in School B area. These snapshots indicate that children preferred to walk along local streets with medium motorised traffic, as opposed to pedestrian-only ones, with increased directional accessibility, wider footpaths, and the presence of a green verge between the footpath and the carriageway. The selected streets also have a higher average setback distance as compared to their avoided metrically shortest counterparts. This finding supports the results of linear models and might indicate that children prefer to walk along these streets due to the existence of residential front gardens and/or urban green features.

Observations from street pairs in School C area (Figure 4) display similar patterns of selection. Children's decision-making in urban navigation appears to be influenced by the directional accessibility of streets along with the existence of green spaces, the lack of vacant buildings, and increased setback distance between the footpath and the buildings. Moreover, the existence of a cycling path as well as bus stops along the actual street (Figure 4a) may promote its selection as part of the journey to/from school.

Figure 3. Frequently selected and avoided streets in School B area.

Figure 4. Frequently selected and avoided streets in School C area.

Finally, a comparison of the selected streets and their counterparts along the metrically shortest walking routes in School D and Pilot School areas (Figure 5) demonstrates similar findings. Students in this neighbourhood preferred to walk along streets with increased directional accessibility, a higher number of residential uses as well as larger setback distance and footpath width. In addition, children avoided major streets with heavy car traffic or alleys without any motorised traffic, possibly due to personal safety (i.e., to avoid high traffic volumes or stranger danger) and comfort/ environmental issues (i.e., to avoid noise and pollution along the major streets). On the other hand, they preferred streets that had green spaces, traffic lights, or a car filter. Similar to the finding in School C area, Figure 5e and Figure 5f indicate that the existence of a cycling path may be an underlying reason for children's street preference.

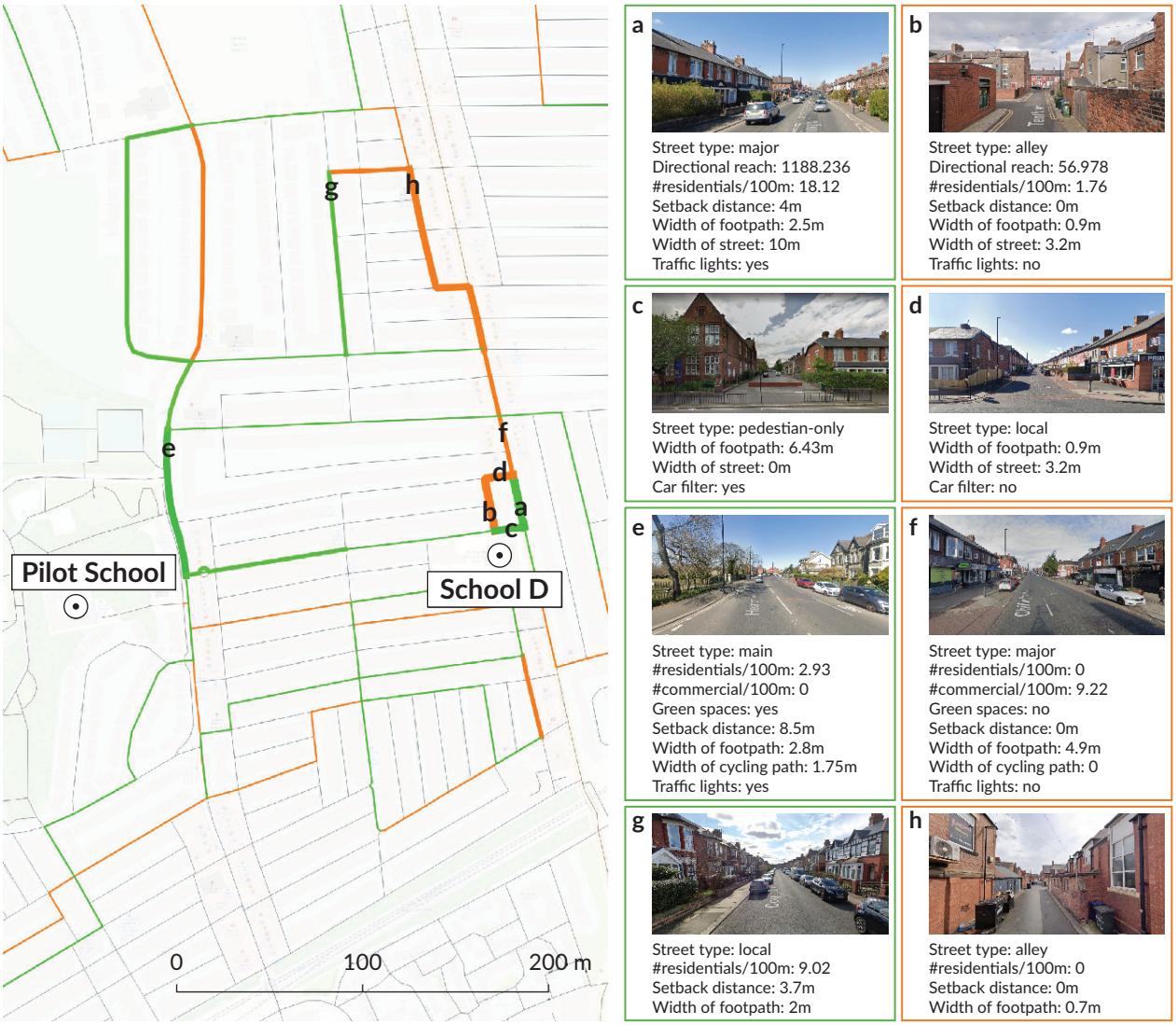

Figure 5. Frequently selected and avoided streets in School D and Pilot School areas.

Overall, these examples indicate some underlying trends in children's street selection regardless of the geographical context. Increased directional accessibility and residential uses appeared to shape street selection in tandem with certain street-level design attributes including wider footpaths, larger setback distances, as well as the presence of house gardens, green verges or green spaces, traffic lights, and cycling paths. In other words, children preferred to walk along more direct, linear, and continuous streets that provide such pedestrian-friendly urban characteristics.

4. Discussion

4.1. Pedestrian-Friendly Urban Forms

4.1.1. Street Network Design

The results of this research demonstrate that street network design is a key factor in children's navigation during AST. The statistical models revealed that street network design had a considerable impact on children's

preference for street choice, even when considering street-level design and land-use around schools. This finding contributes to the limited understanding of how street network layout influences children's school travel, a factor that is frequently disregarded in favour of street-level features.

More importantly, the findings highlighted the significance of the spatial structure of street networks, specifically the alignment of streets, in children's route choice behaviour. Directional accessibility appeared to be the most significant correlate of street choice, indicating children's preference for more direct and linear streets with reduced direction changes. Focus group discussions supported this quantitative conclusion. As one School B student put it: "It is easy to go….All I have to do is go straight down…yeah! I walk." This finding supports research suggesting that the perceived convenience of direct travel routes is a major aspect in route selection (Helbing, 2017). On the contrary, street connectivity measure integration was negatively associated with children's preferences. Although contrasting with some past research (Ikeda et al., 2018) indicating that connected routes offer increased opportunities and accessibility for children, this finding is supported by evidence in northern Europe (Dessing et al., 2016), and may suggest that integrated streets within their surroundings are considered unattractive by active travellers due to heavy traffic commonly associated with higher accessibility (Giles-Corti et al., 2011). This finding highlights the necessity of measuring street network design through multiple syntactic measures to identify which specific characteristics of the street networks may promote AST.

4.1.2. Land-Use

The results of this research suggest that the spatial structure of the street network works mutually with land-use to support active travel. The linear models and street-level observations showed that children mostly preferred streets with more residential uses and fewer ground-floor commercial activities, which contradicts previous research that suggests residential uses discourage AST (Rothman et al., 2021). This finding could be explained by children's sense of ownership on residential streets where they, their friends, and relatives live. In focus groups, children expressed a preference for familiar streets, stating, "cause that's our road." Moreover, our findings suggest that the presence of off-road parking on residential streets, often observed as front garden parking spaces, may increase the likelihood of route selection by children and their parents, underscoring the positive impact of residential streets on children's navigation choices.

On the other hand, statistical analysis showed that children avoided streets with a higher number of commercial activities along their journey to school. While this contradicts past research linking increased commercial land-uses to an increased likelihood of AST (Argin et al., 2017; Torun et al., 2020), one insight into this relationship is that commercial activities are typically located on main streets with higher traffic volume, reducing interest in alternative routes. As one student pointed out, the number of cars a street attracts can affect the travel experience: "Sometimes that just walking up that pathway it is quite peaceful…but at the same time, it can be dangerous, depends on the number of cars." Based on these findings, ensuring that commercial land-uses are more evenly distributed throughout the neighbourhood and along school routes, rather than being grouped along traffic-busy roads, is necessary to support AST.

Finally, our analysis showed that children preferred to walk along streets with urban green features (e.g., parks, street trees, and green verges). Adding urban green features along school streets could facilitate social interactions (Salih et al., 2020) during the school journey and afford opportunities for children to stop, rest,

and play, supporting increased free play and physical activity. This aligns with prior studies that found a positive correlation between recreational open spaces and AST (Tewahade et al., 2019; Wilson et al., 2019). Children's positive attitudes to street trees may be linked to the travel comfort provided by their shades (Donnellan et al., 2020) or the aesthetic effect of street greenery. The existence of urban green features may also be attributed to children's inclination towards streets with lower levels of pollution. For instance, one participant during focus groups remarked: "We don't want to go on Ashley Road because there's lots of noise."

4.2. Active Travel Infrastructure

Several modifiable active travel infrastructure features emerged as significant environmental features underlying children's AST behaviour. These were primarily linked to perceptions of comfort, convenience, and safety in streets and footpaths, as described by participating children: "There are loads of cars like actually on the pavement, and it's just like this narrow, you can't get through" and "when you cross this big hill there…when you crossing the road, the cars don't really say like this way or this way." These findings are consistent with previous studies on AST, which highlighted children's discomfort due to unsafe active travel infrastructures (Wilson et al., 2019) or the absence of them (Kirby & Inchley, 2009). Based on the results of linear models, the availability of zebra crossings and wider footpaths emerged as significant predictors of street preference. More specifically, in-depth street-level observations concluded that traffic lights were a common characteristic of most selected streets, regardless of their geographical locations, which is in line with previous research (Dessing et al., 2016). This feature significantly facilitated AST, as described by a participant during focus groups: "Yeah it's easy, cause there is a traffic light." Findings affirming pedestrian-friendly active travel infrastructure as an enabler of AST are corroborated by earlier research (Rothman et al., 2019). The importance of this finding has two implications. First, it indicates that modifications to active travel infrastructure around schools can support AST (as evidenced by both our statistical models and children's school journey experiences). Second, this finding highlights the methodological contribution of this study associated with the application of a refined street analysis as opposed to a GIS-based shortest route analysis.

4.3. Contributions and Limitations

This study adopted an innovative approach to exploring how neighbourhood design influences children's navigation choices, distinguishing itself from previous research by investigating the environmental characteristics of travelled streets rather than relying on GIS-calculated ones. This novel approach offers a more precise insight into the environmental factors children encounter on their school commutes, a method less explored in prior studies (Dessing et al., 2016). This refined scale of analysis enhances our understanding of children's environmental exposures during active transportation. Moreover, this research enhances route-choice behaviour models by integrating linear models with detailed field observations of environmental characteristics along actual versus shortest routes, offering deeper insights into the factors influencing children's navigation preferences. A novel aspect of this study is the incorporation of syntactic measures of street network design, a relatively under-explored aspect in AST research, to better account for the spatial configuration of street networks. By demonstrating the relationship between street network design and AST, this study contributes to a more nuanced understanding of how spatial structure influences children's active travel decisions.

Despite our research contributions, the study's limitations should be acknowledged. These include a small sample size due to limited resources. Despite this, systematic and random sampling across diverse neighbourhoods offers a detailed view of AST barriers/facilitators according to children's experiences. The focus on frequented streets may introduce bias, as children taking the shortest path were excluded. Future research could benefit from more efficient data collection methods like GPS tracking for larger, more accurate samples (Shatu et al., 2019). Additionally, the study focused solely on data from accompanied children, which opens up a critical avenue for future research. Previous studies suggest that the level of companionship, such as walking with parents or friends, can influence children's travel route choices (Yarlagadda & Srinivasan, 2008). Future research should explore these differences among various groups, such as those accompanied and unaccompanied. However, because our study used a participatory strategy to analyse children's opinions on their travel experiences, we ensured to account for their viewpoints. Furthermore, linear models may not fully capture the intricate relationship between the built environment and travel behaviours (Tao et al., 2020). Future studies should explore the non-linear effects of built environment features on navigation behaviour, possibly through intervention studies with multilevel designs, to better understand how specific built environment characteristics influence children's route selection. Finally, data collection was conducted on different days and seasons in each school, which may have influenced both quantitative and qualitative results. However, given the relatively stable weather conditions in the north of England during these months, we expect the themes that emerged to be representative of the winter months when children predominantly travel to school.

5. Conclusion

Overall, the findings from this research demonstrate the significance of pedestrian-friendly urban forms (i.e., more direct and continuous streets and mixed land-uses) and AST infrastructures (i.e., wider footpaths and safe crossings) in supporting children's AST behaviour. By using children's actual navigation choices, the results of this study provide evidence of how neighbourhood and street design may affect children's route selection, which could be used by local stakeholders in similar regions to help create child-friendly environments and promote AST.

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Conflict of Interests

The authors declare no conflict of interests.

Data Availability

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to confidentiality.

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Understanding the Factors Affecting Traffic Danger for Children: Insights From Focus Group Discussions

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Abstract

Children's safety on urban roads is a critical concern with young pedestrians and cyclists being among the most vulnerable groups to traffic-related dangers. The prioritization of motor vehicle traffic in road infrastructure poses significant risks to child pedestrians and cyclists navigating city streets. Furthermore, children's independent mobility has been restricted due to traffic danger and their parents' concerns about it. Given the important implications of this issue, a serious gap was identified in that no measure of traffic danger exists, with outcomes (e.g., collisions) being used as a proxy. Identifying factors contributing to traffic danger, how they interact, and how they impact traffic are imperative to identify where mitigation is needed to address these problems. This article delves into the complexities of traffic risks for children, focusing on intersections and streets. Six focus groups, including experts (n = 3), parents (n = 2), and children aged 8 to 12 (n = 1), were conducted to gather insights on factors impacting traffic danger. Thematic analysis revealed eight key themes, highlighting the importance of addressing traffic volume, speed, vehicle size, road design, driver behavior, visibility, and land use. These findings contribute to a comprehensive framework for understanding traffic danger for children. Additionally, the article examines how stakeholders' perspectives align with standard measures of traffic danger in the literature.

Keywords

children; focus group; qualitative analysis; traffic danger

1. Introduction

Children's traffic safety is of great importance as traffic fatalities continue to be a primary cause of death (WHO, 2023). Young pedestrians and cyclists are particularly vulnerable to traffic danger, so all factors contributing to the problem need to be examined (Cloutier et al., 2021). It is important to note that generally two types of research have been conducted on traffic danger for children (Amiour et al., 2022): the first examines the relationship between traffic and context (including road characteristics, land-use, etc.) on child pedestrian and bicycle collisions (objective safety); the second examines the perception of danger by parents and children for active transportation (subjective/perceived danger) which often limits their right to independent travel. However, although associations between various factors and *outcomes* of traffic danger (e.g., collisions, injuries, death) exist, no measure of traffic danger exists. Without a measure of the problem, we must rely on (thankfully) infrequent occurrences such as collisions as a proxy. This is akin to measuring weight gain (an outcome), but not having a measure that relates to what causes it (e.g., calories, physical activity). Further, it relies on exposure in that if children are removed from such dangerous locations a collision cannot happen. It is not that the street or intersection is safe, but that it is so dangerous that children's right to travel has been eliminated (similar arguments can be seen in the work by Hillman et al., 1990).

Research on traffic danger primarily focuses on adult safety and neglects children's needs and particular characteristics. In previous studies, the primary focus has been on experts' perspectives regarding traffic danger often neglecting the viewpoints of children and their parents. This article presents the perspective of experts and the perceptions of parents and children on traffic danger in order to identify criteria that should be considered when developing a measure of traffic danger. A qualitative approach is taken to better understand the complexities of traffic danger for children. The insights derived from focus group discussions are used here to unravel the complexities surrounding this issue and to better understand the traffic danger imposed on children. It should be noted that this research is part of a larger project that will develop a multi-criteria-decision-aiding tool for assessing traffic danger in cities that considers children as residents with the right to independent travel.

2. Literature Review

Traffic danger is a significant concern for public health with millions of fatalities globally each year with children being particularly vulnerable. In Canada, it resulted in 1,768 deaths in 2021 (Transport Canada, 2021). Among these fatalities, 15.8% were pedestrians and 6.7% were youths aged 4–19. Besides physical harm, traffic danger also restricts children's independent mobility, impacting their societal participation (Mitra, 2013). Understanding the factors that create traffic danger is crucial (Xu et al., 2020).

There are several factors that influence traffic danger, including the built environment, infrastructure design, and traffic characteristics. Some examples are traffic volume, speed, and presence of conflict points resulting from street design (Smith et al., 2020). Recent reviews have shown that the built environment significantly influences children's collision risk (Abdollahi et al., 2023; Amiour et al., 2022; Cloutier et al., 2021; S. Richmond et al., 2022). Factors such as pedestrian density, road density, crossing major roads, and mixed land use all affect injury frequency. Additionally, the design of intersections, the presence of pedestrian crossings, and the availability of safe footpaths are crucial elements that impact children's traffic safety. For instance, S. Richmond

et al. (2022) concluded that road features like traffic calming measures, adequate lighting, and proper signage can significantly mitigate traffic danger for children.

Many studies in the field of child pedestrian safety have overlooked the perspectives of children themselves concerning their own safety. Including children's perspectives in safety research is important, as their unique viewpoints can contribute to a more comprehensive understanding of traffic safety and hazard identification (Meir et al., 2015).

Studies indicate that children's active mobility is shaped by parental views on traffic safety and neighborhood conditions (Mitra et al., 2014). In Australia, focus group discussions with children and parents underscored the importance of family routines, neighborhood characteristics, social norms, and safety in shaping independent mobility experiences (Crawford et al., 2017). That research identified traffic danger as a key concern by parents, but did not investigate what exactly is traffic danger from their perspective or from the children's perspective. Although traffic danger is often given as a reason to restrict children's independence, the factors driving parental perceptions of traffic danger remain inadequately explored. Research has identified disparities between objective traffic danger measures and the perceptions of parents and children revealing a gap in understanding (Amiour et al., 2022).

The complexity of traffic danger for children is evident in the literature (Yannis et al., 2020). However, knowledge on children's and parents' perspectives typically only mentions traffic danger without much nuance. Further, studies on traffic danger focus on the outcomes such as collisions or training children to deal with traffic (Miskolczi et al., 2023), but not on what creates traffic danger. When examining such an issue it is important to include the individual directly impacted, especially if they are a vulnerable group. To get at the complexity of traffic danger multiple perspectives will be gathered including those of experts, parents, and children. The study sought to gain understanding of participants' views and lived experiences in relation to traffic danger. Children as vulnerable users, parents as adults attuned to the dangers imposed on children, and traffic experts as adults with specialized knowledge.

In order to understand the details of traffic danger for children, a number of perspectives must be explored. These perspectives include different groups of stakeholders: children are a key vulnerable user, parents are the adults most likely attuned to dangers for children, and traffic experts have professional experience and knowledge on the subject. The perspectives of these groups are sought through focus groups as qualitative methods are an appropriate means to investigate individual and group attitudes, beliefs, and perceptions (Stewart & Shamdasani, 2014). Focus groups are a powerful tool for gaining insight into the nuances of traffic danger for children (Agran et al., 2004; Stewart & Shamdasani, 2014). Focus groups are open in nature, allowing unknown opinions to emerge, both from individuals and from groups. In traffic safety studies, focus group discussions have proven to be a valuable tool for gaining insights from these different stakeholders (Adler et al., 2019). The use of focus groups is an effective and convenient way to collect data about the perceptions, attitudes, and beliefs of children, youths, and parents (Adler et al., 2019).

The objectives of this article are (a) to identify the specific factors that contribute to traffic danger for children as identified by children, parents, and traffic experts; (b) to explore the differences and similarities among these key stakeholder groups; and (c) to examine how their understanding of traffic danger aligns with or diverges from the established knowledge base.

3. Methodology

Structured focus groups were conducted separately with 8 experts of a variety of backgrounds, 14 children (between the ages of 8 and 13) and 12 parents. Children aged 8–13 were chosen as this is often the age range in North America when many children begin to conduct independent trips (Cervesato & Waygood, 2019), thus making their experience with traffic more pertinent as parents likely judge traffic when escorting them when they are younger. Focus groups serve as a valuable qualitative method to gather these perspectives, allowing for the emergence of unknown opinions (Adler et al., 2019). They offer a convenient means to collect data on the perceptions, attitudes, and beliefs of children, parents, and experts, providing detailed insights into the phenomenon under study. The qualitative analysis process was divided into four steps, summarized in Figure 1.

3.1. Design

Focus groups were conducted across three participant categories: experts, parents, and children. Each was queried about factors impacting children's traffic safety with follow-up questions designed to delve into the interactions between these factors. Questioning strategies tailored to each group helped elucidate these influences. The experts began with general inquiries following an introductory overview, while parents received a presentation on objectives, transitioning from broad questions to more localized concerns about their neighborhoods. The children's session involved a child-friendly presentation and concrete questions simplified from pilot testing feedback. The questions progressed from general to specific to better identify traffic danger elements that were supported by examples. Ethical approval was granted by the research ethics committee of Polytechnique Montréal (Application No.CER-2223–63-D).

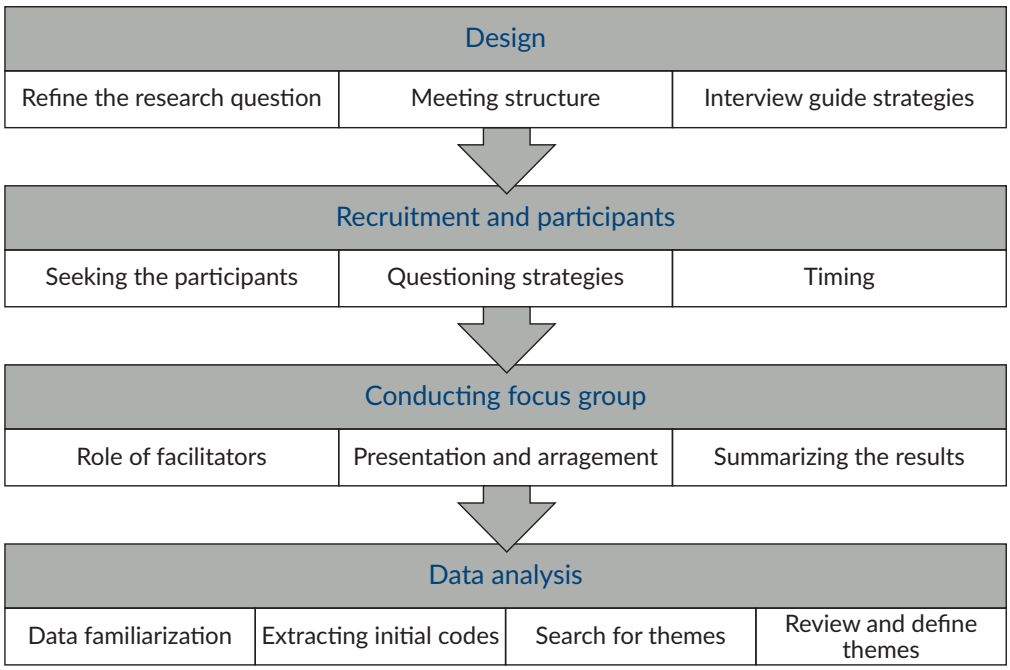

Figure 1. Overview of the methodology.

Three different questioning strategies and interview guides were developed. The experts' focus groups were each three hours long and started with an introduction to the project, the objectives, and the method. Then, two main questions were asked to them:

- "In general, what are the important factors that influence traffic danger for children?"
- "Are there other factors that specifically affect children's traffic danger?"

For the parents' focus groups, we prepared a simple presentation (both in French and English) containing: an introduction to the project, an explanation of the objectives, and a list of questions. The questions for the focus groups with parents and children were tested with parents and children not involved in the study. The questions and focus group approach were modified following that step. Our approach with these non-experts started with more general questions, then more specific questions were asked related to their neighborhood and surrounding area to help them focus on concrete examples. The parents' focus groups were 1.5 hours in length. The questions were as follows:

- "What are the important factors that influence traffic danger for children?" (That question was asked to first gather general ideas of what contributes to creating traffic danger);
- "Do you know any dangerous streets in your neighborhood?" (This was asked to focus parents on a concrete example that they are familiar with to facilitate the next question);
- "What about crossing that street? Are there any factors that can prevent your children from crossing a specific street?" (This question was asked to focus individuals on traffic danger in the street as children will enter streets whether to cross or fetch an item);
- "Are there any changes that can be made to make that street safer?" (This was asked to both help identify issues not previously identified, but also to know what parents thought would make streets safer);
- "Imagine a safe street *without* sidewalks. Tell us what can make this street safe enough for your child to walk there without an adult?" (This question was asked to further focus the parents on traffic danger in that public space).

For children, we prepared a presentation for children and tested it with children. Following the test, adjustments were made to better explain the objectives and elicit diverse responses. The questions were concrete, specific, and easy to understand (according to the children). The focus group discussions were 1 hour with children. Following an introduction that said the purpose was to talk about traffic danger, they were asked these questions:

- "Are there streets you avoid in your neighborhood? Or streets that you aren't allowed to use? Tell us about that street." (This approach was used to focus the children on a concrete example they would be familiar with);
- "Imagine a street that there would be no worries if you walked on it. Tell us about that street." (This question was used to elicit responses of what a safe street was from the perspective of the children);
- "Now, imagine if there were no sidewalks. Tell us about how that street could be safe for you to walk and use." (This question was asked to encourage the children to think about the traffic danger on the street).

3.2. Recruitment and Participants

Various recruitment methods were tailored for each stakeholder group. Experts were invited via online platforms like X and mailing lists of transport professionals. Parents of children aged 7–14 and children aged 8–13 were specifically recruited for their respective focus groups. At the age of 8–13, children start to gain a better understanding of road safety and can realistically estimate risks (Cieśla, 2021). This age range is critical as children begin traveling independently and face unique traffic safety challenges (Schoeppe et al., 2014). We focused on this age group to capture children's direct experiences as pedestrians learning to be independent. This allows us to understand the safety concerns and developmental considerations of both younger, more dependent children and older, more independent children. For parents, the age range of their children was 7–14 as parents of younger children (7 years old) are preparing their children to be independent or will be able to think about traffic danger for their children and parents of children who are older (14 years old) are able to reflect back to that transition from dependent to independent. In Montreal, recruitment involved posting flyers in English and French on neighborhood Facebook pages and distributing paper flyers with QR codes for registration in public areas. An incentive of $30 was offered to each participant, both parents and children.

The focus groups were held online using the Zoom application between May and June 2023. In total, six focus groups were held: three with experts (n = 8 experts primarily in English as they were from various areas of North America), two with parents (one in French n = 9, one in English n = 3), and one with children (in French, the dominant language in Montreal n = 14). A total of eight boys and six girls were in the children's group, with five aged 8–9, seven aged 10–11, and two aged 12–13. Parent groups involved three men and nine women across two sessions. As for experts, they came from different fields including engineering, education, planning, public health, and non-governmental organizations (NGOs).

3.3. Conducting the Focus Groups

Focus groups were led by the first author with assistance from a native speaker of English or French and senior researchers who provided guidance. Participants were informed that the discussion would be recorded and an assistant took notes in case of any technological issues. An online whiteboard with "sticky-notes" via MIRO was utilized to foster diverse opinions. Once the participants became accustomed to using sticky-notes, they were prompted to respond in "private mode" to minimize the influence of others' answers initially. After this initial phase, all responses were shared and discussed openly, and any ambiguities were addressed (i.e., why did they think it influenced traffic danger? Is it a positive or negative influence?). Following this, another round was conducted to capture any additional factors potentially sparked by others' contributions. An illustration of the online whiteboard can be found in Figure 2. Different colors relate to different participants.

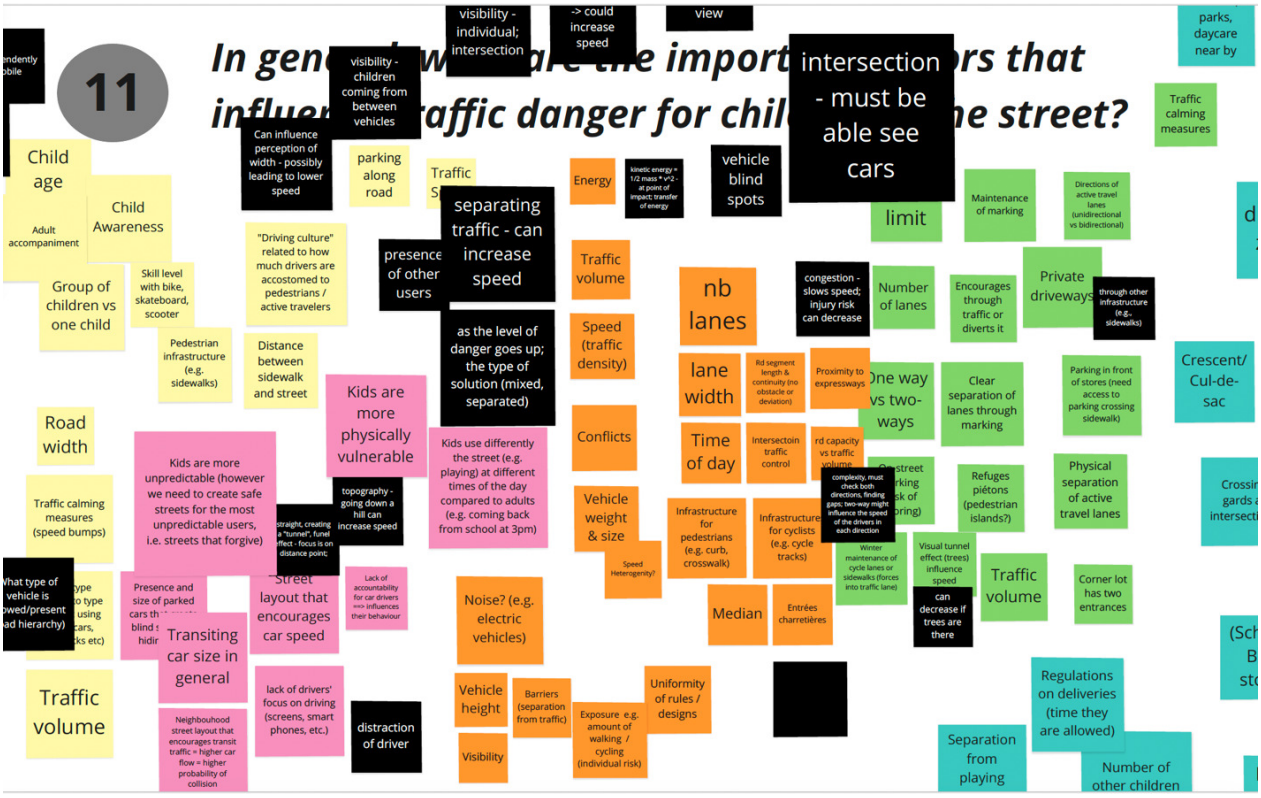

Figure 2. Example of MIRO screen during a meeting with experts.

3.4. Data Analysis

Considering our emphasis on uncovering themes concerning traffic danger for children, a thematic analysis represents the best way to analyze the focus group content. A thematic analysis is the process of identifying patterns or themes within qualitative information (Maguire & Delahunt, 2017). Our methodology comprised four steps that are described next.

3.4.1. Familiarization With the Data

Initially, audio recordings were transcribed and meticulously reread to ensure that we understood the information completely. As a result of this immersion, participants' perspectives were better understood which paved the way for future analysis.

3.4.2. Development of Initial Codes

Data were organized into meaningful segments to reduce the extensive information into manageable chunks. Participants' inputs and discussions were examined for potential keywords. Which stakeholder group(s) (parents, children, or experts) mentioned the keyword was noted as well. This step is illustrated in Figure 3. Having a positive sign next to the keyword means that it increases traffic danger, while having a negative sign means that it decreases traffic danger. The use of these keywords as codes helped to identify themes.

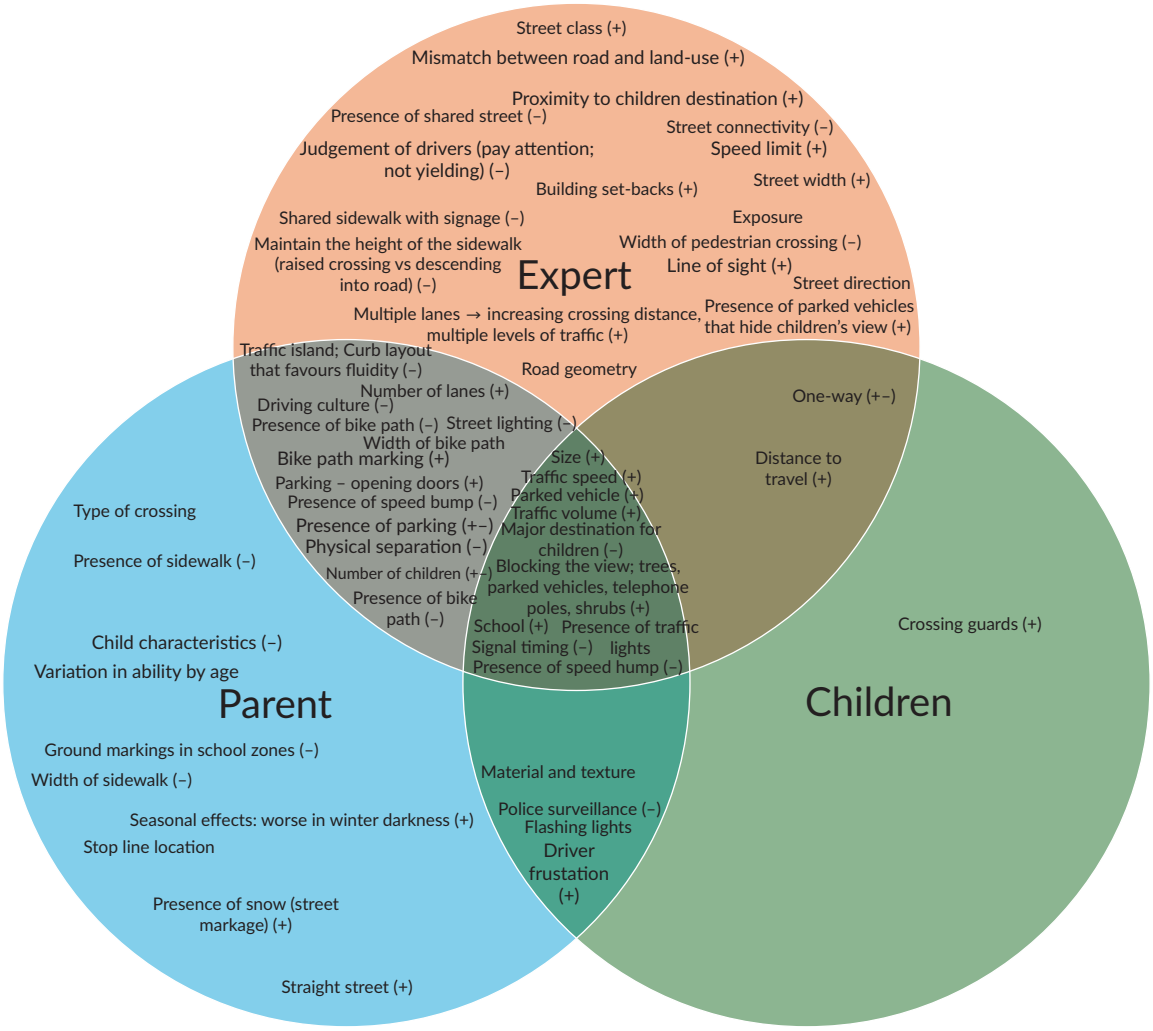

Figure 3. Keyword identification by stakeholder type.

3.4.3. Search for Themes

Eleven main themes emerged from the focus group discussions. Their impacts on traffic danger were assessed as positive, negative, or both. Codes were grouped into themes based on similarities. For instance, codes related to traffic volume and vehicle speed were combined into a theme named "traffic characteristics." Figure 4 illustrates the classification of these preliminary themes and sub-themes.

3.4.4. Review and Defining Themes

The next step involves a detailed review and refinement of themes identified in Step 3. Each theme's codes are closely examined to ensure that they are categorized correctly with special attention to overlaps. For example, if a code fits multiple themes, its placement is carefully considered. This phase may also uncover new insights such as design characteristics that impact children's traffic safety. New insights might prompt the creation of new themes to address previously unnoticed connections. This step defines the final themes from Step 3 findings and considers the relationships between classes. For example, interconnected factors like speed and traffic volume are combined into a single theme. The objective is to establish a coherent and meaningful

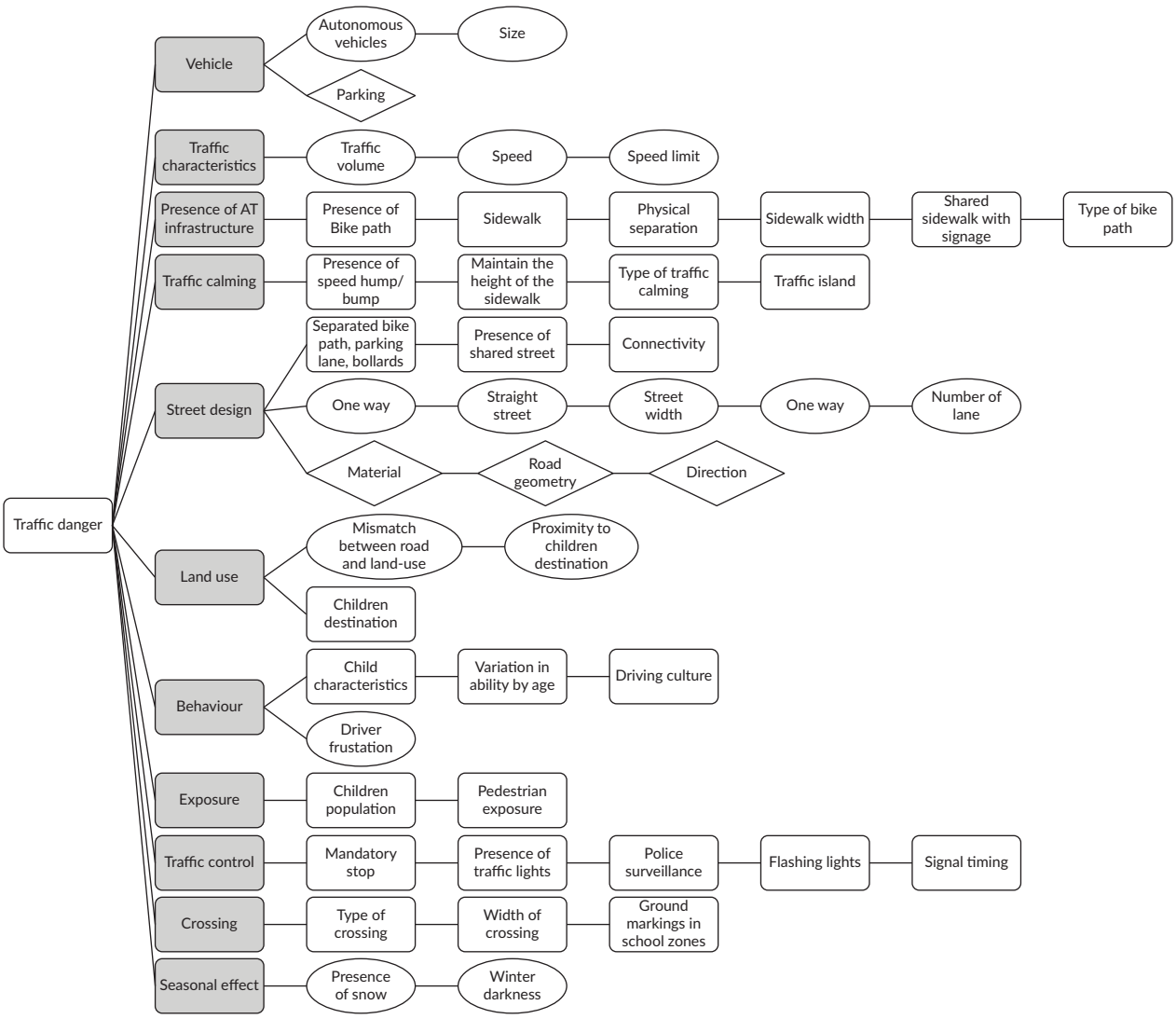

Figure 4. Preliminary themes and their effect on traffic danger (positive effect in circle, negative effect in square, both positive and negative effect in lozenge).

thematic structure that captures the complexities of the research topic. Figure 5 shows final themes as follows: traffic characteristics, infrastructure/design characteristics, vehicle characteristics, behavioral characteristics, visibility, land use, seasonal effect, and exposure.

Based on discussions with our participants, particularly the expert group, several key points related to exposure were highlighted. This theme is mainly associated with crash risk, indicating that a higher number of child pedestrians can increase the risk of a collision resulting in an injury or death. Additionally, it is critical to note that traffic danger, exposure, and seasonal effects are all significant factors influencing the risk of injury in children.

Exposure directly impacts crash likelihood. A higher number of child pedestrians in an area correlates with an increased risk of injuries. The severity of injuries is significantly affected by traffic danger which consists of several components and is the main focus of this research. Seasonal effects also play a crucial role in

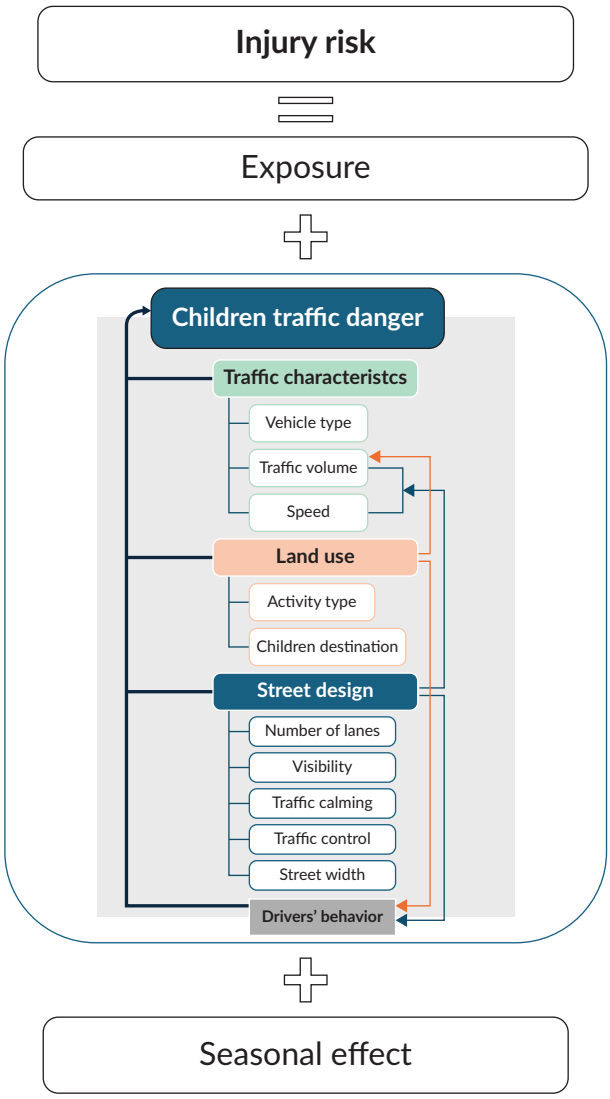

Figure 5. Themes and sub-themes highlighted during workshops on traffic danger for children.

shaping the risk profile for child pedestrians. Seasonal variations impact all aspects of traffic danger and exposure, with changes in weather conditions, daylight hours, and seasonal activities altering the risk profile. Understanding the interplay between these elements—exposure, traffic danger, and seasonal effects—is essential for developing effective strategies to enhance child pedestrian safety.

4. Results

In this section we outline themes discussed by each stakeholder group in the focus groups and offer selected responses to illustrate their perspectives. The results of the focus group discussions are summarized in Table 1. It should be noted that "consensus variables" are those on which all stakeholder groups have the same opinion. Non-consensus variables are those on which stakeholders have differing views or are mentioned by only one of the stakeholder groups.

Table 1. Summarized results.

Theme	Consensus Variables perceived to influence children traffic danger	Non-consensus variables (no consensus on their influence on children traffic danger) or only mentioned by one group (which group is named)
Traffic characteristics	Traffic volume Speed	Importance of traffic volume at intersection Importance of speed in street segment
Infrastructure design characteristics	Street width Intersection design Traffic calming Traffic control Active transport infrastructure	
Vehicle characteristics	Presence of trucks	Autonomous vehicles
Behavioral characteristics	Driver's behavior	Children's behavior
Visibility	Position of vehicle	Importance of street design
Land use	Relevance of school zone	Other destinations
Seasonal effect		Daylight hours in the winter
Exposure	Pedestrian volume	

4.1. Traffic Characteristics

Participants in all focus groups agreed that speed and traffic volume are the most important factors regarding traffic danger for children:

> The biggest effect is traffic speed and volume. Other factors might just be an additional factor, but I wouldn't consider them as the main factor. (Expert, public health specialist)

> To reduce the consequences of the collision, it is necessary to ensure that the speed is reduced. (Father of three children)

> It's dangerous to cross because people driving on the road drive fast and it's scary. (Girl, 10-years-old)

Some experts argued that traffic volume and speed vary based on location: vehicle speed is seen as crucial between intersections (street segments), while traffic volume is what primarily determines traffic danger at intersections.

4.2. Infrastructure Design Characteristics

There are many sub-themes in this theme and numerous street and intersection designs were discussed, especially in the expert meetings, including street width, number of lanes, street class at intersections, type

of traffic control, one-way streets, presence of traffic calming measures, and bike paths. Intersections and street segments were dealt with in separate meetings with the experts:

> For a child crossing a two-way street, it might be difficult to assess gaps. At the same time, two-way streets may encourage slower speeds. (Expert, NGO representative)

> Adding a median [also known as a traffic island] on a street is effective because it reduces roadway width. Any measure that reduces road width is effective [to reduce traffic danger]. (Expert, engineer)

Experts also noted the difference between traffic control measures as a crucial factor:

> Fundamentally, a traffic light allows, for half the time, vehicles to go through at speed. This is one of its key purposes. Whereas with a stop sign, all vehicles should come to a stop or near stop. Death is more likely at a traffic light as a result. (Expert, engineer)

According to parents, characteristics of the intersection are important: street width, type of traffic control, and presence of pedestrian crossings. Parents talked about the difference between pedestrian signals' protected phase and other situations:

> What is dangerous is when the pedestrian light is at the same time as traffic. We have seen it....The pedestrian light should have priority...and cars cannot turn on the pedestrian light. This was not the case before, and it was very dangerous. (Mother of two children)

Finally, children mentioned a variety of design characteristics such as street class, traffic control measures, and active transportation infrastructure. They also often compare how different design affects traffic volume and speed:

> When it's small streets and there are stop signs, it feels like it's safe. There are fewer cars that pass quickly. (Girl, 8-years-old)

> I prefer one-lane streets. Because four-lane streets are often highways, and there, cars go much faster. (Boy, 11-years-old)

4.3. Vehicle Characteristics

According to all participants, the presence of bigger vehicles and trucks increases the danger level for children on the street and at intersections. All participants, but especially parents and children, strongly believe trucks are more dangerous than other vehicles:

> Due to vehicle size increases, SUVs have larger blind spots that can hide the pedestrian. The measures that work today may not work in the future. (Expert, urban planner)

> If the child is still small, perhaps if it's a truck or a vehicle that's higher, he [the driver] won't be able to see the child. (Mother of 8-year-old boy)

> This is what scares me most: trucks passing by. (Girl, 10-years-old)

> Some cars are very big and can't see us even if there are lights. (Girl, 8-years-old)

Experts also brought up electric vehicles as part of this theme. According to them, given their quiet operation, children may be less likely to notice their presence, posing a potential safety concern. Additionally, experts expressed concerns primarily about the safety and reliability of autonomous vehicles, highlighting potential issues in their ability to navigate complex traffic situations and respond to unpredictable human behavior.

4.4. Behavioral Characteristics

Despite many design characteristics being mentioned by all focus group participants, discussions about traffic danger led to comments about driver and child behavior, particularly at the parents' and children's focus groups. Parents also felt that children needed to be made aware of traffic danger through education. Participants in both the parents' and children's focus groups discussed the importance of drivers observing road safety rules, especially traffic lights, stop signs, and speed limits:

> There is a crossing guard next to my school. But it's still dangerous—It's a big street in Montreal and cars run red lights. (Girl, 11-years-old)

The experts did not mention behavioral factors other than the influence of active transport users on driver's behavior:

> The presence of other active transport users teaches people that this is to be expected and makes drivers more aware. (Expert, NGO representative)

4.5. Visibility

Another theme mentioned mainly by experts was (a lack of) visibility. For street segments, visibility should be lower. Narrowing how far a driver can see will naturally lead them to drive slower. However, at intersections, it was argued that children are less visible to drivers because of their height, especially when obstacles are present like trees and parked vehicles in the street:

> Buildings and trees can make pedestrians less visible. (Expert, engineer)

Visibility concerns by parents are mainly explained by the size and positioning of vehicles, as well as how parked vehicles can obscure the visibility of their children to other drivers. They, as well as experts, mentioned the importance of changing infrastructure to improve visibility, especially for smaller children:

> Where the crosswalk was elevated, it allows the child to be higher and to be seen, at that time. (Mother of 8-year-old boy)

> You can also design intersections so that crossings are level with sidewalks. This will increase pedestrian visibility. (Expert, urban planner)

4.6. Land Use

Land use was cited by experts as a factor affecting traffic danger for children. Since school is a primary destination for children, it was much discussed. Several opposing views were expressed about how school presence affects traffic danger for children:

> Land use plays a role. Presence of schools and more commercial areas cause more pedestrian use and a mismatch between land use and road design can be an issue. (Expert, urban planner)

> In the commercial area, the danger is more about the maneuvers of vehicles than the amount of pedestrian. (Expert, engineer)

Parents and children did not explicitly mention the influence of land use, but parents discussed the relevance of school zones:

> The school zones are so small! A child walks more than a school zone to go to school. School zones are like 300 meters before school, it's useless. My daughter walks a kilometer to school. She crosses areas of 50 [km/h]. (Mother of two children)

4.7. Seasonal Effect

Another factor mentioned mainly by parents is the seasonal effect. The main issue is related to sidewalk maintenance in winter and changing visibility due to fewer daylight hours in the winter. Furthermore, some participants in the expert group emphasized the importance of renewing street markings quickly after the winter. This factor was not mentioned by children:

> In winter, the biggest concern is how dark it is. You've got early nights, late mornings, and children going to school in the dark. That's a big issue. (Expert, urban planner)

4.8. Exposure

Parents argued that more children walking in the neighborhood might enhance safety, while experts debated exposure, acknowledging its technical complexities with respect to traffic danger:

> The amount of exposure [to cars] and the amount of walking is a factor when you think about the risk of injury. (Expert, public health specialist)

4.9. Interactions

Another key outcome of this research is that the influences of the various factors are not always linear and often interact, meaning that they should not be considered in isolation. For example, "Does more traffic always increase traffic danger?" The experts' response was "No," as a lot of traffic moving slowly does not create the same risk of injury or death as less traffic moving quickly. As such, traffic volume and speed should be considered together. Other examples were that speed limits and the number of lanes should be considered together as more lanes (and wider lanes) can facilitate higher speeds.

5. Discussion

This study explored the multifaceted factors that influence traffic danger for children through separate focus group discussions involving experts, parents, and children. Stakeholder groups all agreed that traffic volume and speed play a crucial role in contributing to traffic danger for children. This result is supported by previous literature demonstrating the critical importance of addressing these variables to mitigate children's road safety risks (Cloutier et al., 2021). However, despite agreeing on this issue, discussions among experts revealed divergent views on the importance of speed depending on if one is considering intersections or street segments. In previous studies, speed had a great impact on children's traffic danger (Cloutier et al., 2021; Rothman et al., 2014), but occasionally their results differed at intersections. As an example, a study by Bennet and Yiannakoulias (2015) found no relationship between pedestrian-motor vehicle collisions and speed at intersections. Various viewpoints highlight the complexities of the issue, which emphasizes the multifaceted relationship between road design and traffic behavior.

All focus groups recognized the safety hazard posed by larger vehicles such as SUVs and trucks for children. Recent research supports this concern, highlighting the role of vehicle design in traffic danger (Cloutier et al., 2021). These larger vehicles often have substantial blind spots, affecting whether those outside the vehicle are visible to the driver. As children are smaller this can mean that such vehicles are endangering children more. Other studies connect larger vehicles with children's injury severity (Rothman et al., 2014). A holistic approach that integrates considerations for those outside the vehicle into vehicle design is needed to address the danger for pedestrians, particularly children. Implementing greater restrictions such as speed regulators and sensors for larger vehicles is necessary to mitigate the risk. Additionally, studies recommend equipping large vehicles with pedestrian/cyclist detection systems, side underrun guards, and blind spot cameras/sensors to improve safety (Shladover, 2021). Intelligent transportation systems that use sensors and cameras to detect pedestrians and automatically apply brakes have also shown promise in reducing collision risks (Oladimeji et al., 2023).

According to our participants, street and intersections design have an influence on children's traffic danger. Several factors were considered including street widths, intersection designs, traffic control measures, as well as infrastructure that supports active transportation. While previous studies have found a correlation between road/intersection design characteristics and traffic danger (S. A. Richmond et al., 2022), our study highlights the importance of evaluating this relationship along with traffic characteristics like speed and volume. For instance, to evaluate the impact of street width on safety risks, it is necessary to consider the speed and volume of traffic on that street simultaneously. There may be significant differences in the safety implications of a wider street based on whether vehicles are traveling at low speeds in heavy traffic versus at higher speeds in light traffic. Using this multi-dimensional approach allows a deeper understanding of the risk factors and allows the development of more contextually relevant solutions when compared with viewing design elements in isolation.

Experts highlighted visibility concerns caused by parked vehicles and other obstructions (like buildings) which can obstruct drivers' view of children at intersections. Studies show that barriers to children's visibility at intersections decrease safety (Schofer et al., 1995). However, the experts also noted that limiting driver visibility on road segments could potentially reduce traffic danger by decreasing speeds and focusing the driver's attention closer. While better visibility at intersections may improve safety, wide-open roads can

encourage speeding. It is clear that visibility is crucial in design and planning, but its impact on safety varies depending on whether one is assessing a road segment or an intersection.

Both driver and child behavior were emphasized as key factors contributing to traffic danger in the discourse. However, it was clear that children's behavior related to suffering risk, whereas driver behavior created traffic danger and greater risk. This illustrates the inherent relationship between road users' actions and children's safety. Children highlighted how driver behavior was scary and dangerous when they disobeyed rules, drove quickly, and operated large vehicles. Parents also discussed driver compliance to road rules and speed limits as important, but also talked about teaching children about road safety. On that latter point, a review of educational interventions for pedestrians (14/15 were for children) found no improvement on safety (Duperrex et al., 2002). In fact, research does not show that children's educational interventions reduce actual traffic danger (Akbari et al., 2021). In addition, children's perspectives on drivers who do not adhere to rules highlight the importance of reorienting the conversation towards the danger imposed rather than just the danger suffered. Overall, in consensus with Vision Zero (a traffic safety vision that aims for no deaths or severe injuries), the focus should be on designing safe systems rather than blaming individuals (Kim et al., 2017), especially those who are not creating the danger.

While previous studies have demonstrated the influence of land use types on traffic danger (Abdollahi et al., 2023; Ewing & Dumbaugh, 2009), our study suggests evaluating the relationship through the lens of pedestrian-vehicle interactions and levels of exposure. Certain land uses like schools or commercial areas can directly increase the number of pedestrians on surrounding streets, heightening their exposure to vehicles and potential conflicts. A more detailed study would be necessary to fully understand how specific land use contexts affect pedestrian behavior, traffic patterns, and the nature of their interactions with vehicles and ultimately affecting risks of injury or death.

The results suggest that a Multi-Criteria Decision Analysis (MCDA) method can be effectively utilized to incorporate stakeholders' insights as a crucial input in traffic danger assessments. Implementing MCDA allows for the inclusion of the relative importance and, in some instances, the non-linear nature of variables in these assessments. While some studies on traffic safety have employed MCDA methods (Alemdar et al., 2020; Stević et al., 2022), these studies often did not directly consider the input of vulnerable stakeholders. Furthermore, they primarily focused on prioritizing a limited number of streets related to their objective which limits their ability to comprehensively examine a city's network of streets.

6. Limitations and Future Research

A significant challenge in this research was securing reliable participants for the parents and children's focus groups. Participants needed to be available for an hour or more. The initial approach led to undesirable outcomes. In the parents' group, about half showed interest only due to the incentive and were not actively engaged. In the children's group, despite prior instructions for camera activation to verify participants' ages, reluctance to do so caused uncertainties, resulting in one session's cancellation. This problem was absent in the French groups, which included participants previously involved in related research. To address these issues, we suggest not mentioning financial incentives in initial (public) invitations and instead expressing gratitude post-participation to ensure genuine interest in the research. Furthermore, scheduling conflicts prevented the participation of key experts like police officers and policymakers, affecting the study's outcomes.

A strength of this research was the direct involvement of children and parents and the ability to gather information from them about traffic safety. However, only one focus group was carried out with children who were primarily based in Montreal, so it is not known how generalizable the results might be. The context of smaller urban centers or different driving cultures might elicit new or contrasting opinions. Furthermore, the random selection of participants and the mixed gender make-up of the groups may have had an impact on how participants answered focus group questions. Including individuals of different genders in the discussions likely introduced a diverse range of perspectives, experiences, and communication styles, which could have influenced the dynamics of the conversation. The researchers, however, tried to promote a non-threatening, confidential atmosphere that encouraged open dialogue among participants in the focus groups.

Our research focuses on understanding the factors that influence traffic danger based on the perspectives of stakeholders. The primary objective is to develop a comprehensive methodology for assessing traffic danger at a granular street-by-street level to enable cities to identify areas where traffic danger may be limiting children's independence. While we recognize that new technologies such as interactive applications and simulations can play a significant role in educating children about traffic danger, our purpose is to measure the source of the problem: traffic danger. As in all such research, it is not possible to identify every potential factor, and our research results are limited to the discussions among participants. Not all children will have experienced travelling alone and technologies that help children better understand traffic danger (Trifunović et al., 2024) could be used to test whether this impacts perceptions of what creates the threat of injury.

7. Conclusion

This article examined the intricate factors influencing traffic danger for children, using insights from experts, parents, and children gathered through focus group discussions. Thematic analysis revealed underlying patterns regarding traffic danger for children. Several themes were consistently discussed by all three stakeholder groups: traffic speed, traffic volume, trucks, and large vehicles, and how road design can increase or mitigate traffic danger. Other potential influencing factors such as land use, education, seasonal effects, and exposure were mentioned but were not felt to have the same level of influence.

Each stakeholder group contributed uniquely to the outcomes. Children expressed more concerns about driver behavior and traffic. This highlighted larger streets as being more dangerous and how adults' actions in vehicles are a source of danger. They often relied on emotions to articulate their experiences. Parents provided insights on reduced visibility from inside vehicles, the size limitations of school zones, and the illegal or dangerous behavior of other parents driving their children to school. Experts delved into a broader range of influences that focused on how street design can exacerbate or mitigate dangerous conditions. They also discussed contextual factors like land use that were seen as related more to exposure than increased danger. Another key takeaway was that many factors had non-linear impacts and interact with other factors so they should not be considered in isolation.

The results support context-specific design interventions. They emphasize how human behavior and road design are interconnected and impact traffic danger. It emphasizes the need for tailored interventions in areas frequented by children, especially outside school zones. This research contributes to the ongoing discourse on child road safety and helps guide future efforts to create safer and more child-friendly urban

environments. To ensure child safety in transportation, physical design and human behavior must be integrated. A collaborative approach is essential to ensuring a safe and sustainable road environment where children's safety is prioritized over drivers' convenience preferences. Due to the multifaceted nature of this problem and the potential interactions between different factors, future research should explore these dynamics and prioritize these key themes. Adopting a multi-criteria evaluation approach could enhance the assessment of traffic danger. In addition, evaluating interventions through discussions with vulnerable users and evidence-based policymaking are crucial.

The findings from this study can be directly applied to enhance urban planning and traffic safety measures. Urban planners and policymakers can use these insights to design safer street environments that prioritize child safety. For instance, implementing traffic calming measures, improving visibility at intersections, and ensuring safe crossing points near schools can significantly reduce traffic danger for children. Moreover, this research underscores the importance of involving diverse stakeholders, including children and parents, in planning and decision-making processes to ensure that the implemented solutions address the real-world concerns and experiences of the most vulnerable road users.

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Conflict of Interests

The authors declare no conflict of interests.

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ARTICLE

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"Where Do Children Go?": Exploring Children's Daily Destinations With Children, Parents, and Experts

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Abstract

Research on children's destinations has primarily focused on school trips, yet their lives are more than that. Different destinations contribute to children's quality of life in different ways, but this is rarely examined. For our research, focus groups were conducted with different stakeholders to better understand non-school destinations, namely by identifying common, daily, and informal destinations and perceptions of how they relate to children's well-being. Online focus group discussions were conducted with children (aged 8–12), parents (with children aged 7–13), and experts from different cities across Canada in May and June 2023, to obtain diverse opinions about children's destinations. The analysis was conducted based on a prior review to categorize children's destinations, identify informal destinations, green and grey places, and the relation between those destinations to children's well-being. Discussions with parents, children, and experts highlighted the diversity of destinations relevant to children. Leisure destinations were one of the most mentioned in the discussions. Spaces without specific rules or structures were identified by experts as beneficial for children's cognitive, social, physical, and psychological health. Parents mentioned primarily formal places, whereas children and experts mentioned primarily informal ones. Green destinations were more associated with physical well-being, though children dominantly associated green destinations with psychological well-being as well. All groups dominantly associated grey-type destinations with social and cognitive well-being. Using these results, urban planners can develop strategies to improve children's access to their daily destinations that support their well-being.

Keywords

children's destinations; children's travel; focus groups; health and well-being; non-school trips

1. Introduction

Children's travel destinations differ from adults' due to the distance that they can travel, their walking speed, and their autonomy (Cervesato & Waygood, 2019; Cordovil et al., 2015). Therefore, their travel is often much more local. Also, children's travel can be limited by a number of factors, including parents' concerns about traffic safety (Tavakoli et al., 2024; Waygood et al., 2017, 2020), social safety concerns such as "stranger danger" (Fyhri et al., 2011; Mitra, 2013), the existence of sidewalks or the design of streets (Ewing et al., 2004; Mitra, 2013), and the quality of residential blocks (McMillan, 2007; Mitra et al., 2010).

Despite children's trips being more likely to be local, recent research on children's independent travel to non-school destinations suggests that studies should not focus only on school trips (Desjardins et al., 2022). Prior research has found a wide range of destinations where children travel such as outdoor spaces, shopping destinations, relatives' homes, and buildings with indoor activities (Babb et al., 2017). These studies identified a broad range of destinations beyond home and school, emphasizing that access to diverse daily destinations within a reasonable distance enhances children's mobility (M. Kyttä, 2004). Children's destinations can also be viewed as green (natural) or grey (man-made) spaces, allowing different activity types. Green spaces are often open spaces that are predominantly natural. These places promote cognitive functioning, mental health benefits, community engagement, and physical activity (Russo & Andreucci, 2023; Vidal & Castro Seixas, 2022). Also, children's spatial experiences and growth are facilitated by man-made or grey destinations that extend their everyday structured environments (Broberg et al., 2013). In addition to promoting exploration, play, and environmental awareness, natural and built environments can meet children's diverse needs.

Having the opportunity to travel to a variety of daily destinations for children is linked to different aspects of well-being domains (Pollard & Lee, 2003). Those domains include the physical domain (e.g., physical activity and exercise), psychological domain (e.g., mental and emotional health), cognitive domain (e.g., learning and exploration), and social domain (e.g., interactions, social capital, and community connections). The ability to travel to non-school destinations can contribute to different aspects of their well-being.

A prior scoping review (Desjardins et al., 2022) about non-school destinations for children found that researchers have used a variety of methodologies to identify where children travel. Some commonly used methods are: using questionnaires (Badland et al., 2015; Egli et al., 2020), GPS trackers (Babb et al., 2017), mapping activities with SoftGIS (A. M. Kyttä et al., 2012, 2018), or accessibility tools (Badland et al., 2015). However, an important point to note is that many informal destinations may not have been captured in the mentioned methods. These destinations can be gathering spots, hidden play areas, or undiscovered corners of the neighborhood that children frequent, but they do not always receive attention in research studies that use formal classifications. Creating child-friendly environments that promote healthy development and active lifestyles requires an understanding of the types of destinations children prefer, whether they are formal or informal, natural, or artificial. In-depth discussions such as focus groups with diverse stakeholders might be one method that could help give a more comprehensive understanding of where children go.

There are two main gaps in the current literature regarding child-relevant destinations and their impact on well-being. First, there are valuable insights about how children relate to the environment from research on appropriation (how children make their "own space"), children's placemaking (active shaping of

environments; see Lynch, 1981), affordances (environmental features enabling or restricting action; see M. Kyttä, 2004), or children's activity spaces or territorial range (Babb et al., 2017). However, those studies mostly relied on mapping activities to identify children's meaningful destinations—something that, as previous studies suggest, can miss destinations that are not documented in GIS data or captured well by a list of formal destinations (Babb et al., 2017; Badland et al., 2015; Broberg et al., 2013; Desjardins et al., 2022). These informal places relate to informal play areas, neighborhood alleys, or friends' houses that likely play an important role in children's daily lives. Therefore, it is necessary to investigate and recognize these types of destinations to gain a fuller understanding of how they impact children's daily experiences.

Secondly, the relationship between child-relevant destinations and all well-being dimensions has yet to be fully explored and categorized in detail in the current state of research. The topics of physical well-being (Yang et al., 2023) and social well-being (Gong et al., 2024) have recently been discussed, but those studies have analyzed only one or two facets of well-being out of several possibilities, and this from the perspective of parents rather than that of children. However, children's perspectives should also be considered since their opinions may differ from parents' (Smeds et al., 2023). Therefore, it is necessary to understand how different child-relevant destinations relate to well-being more holistically and from the perspective of different stakeholders to obtain a fuller understanding of children's experiences and needs. Applying this approach could help urban planning and policymaking to create environments that promote children's development and well-being.

Focus groups with diverse stakeholders offer the opportunity to gain a better understanding of children's destinations and how those destinations might be associated with multiple aspects of well-being. Using this method, several studies have either focused on the perspectives of children (Furneaux & Manaugh, 2019) or both parents and children at the same time (Ergler et al., 2013). Other researchers conducted focus groups with experts or parents to understand their perspectives on child-related topics (Adler et al., 2019; Vogl et al., 2023).

No comprehensive comparison of perspectives from children, parents, and experts has been conducted to cover where children go and how those destinations might be related to multiple well-being domains. In particular, the perspectives of children in terms of the places they visit (especially without supervision) might be different and should be captured. The characteristics of those places are not typically analyzed, in particular whether they are green (natural) or grey (human-made) spaces. In this way, it is possible that parents may focus on children's organized activities, whereas children (when in control) might focus more on less formal, more local destinations. Whether or not there would be differences in the characteristics of those places concerning being formal/informal or being natural or human-made is not typically analyzed. Experts bring specialized knowledge and broader perspectives to studies on children's destinations, but it is not clear how their opinions might relate to parents and children. Experts might identify issues and barriers that parents and children may not mention or be aware of and offer evidence-based recommendations, thus ensuring the findings are based on proven strategies. Therefore, it is crucial to engage a wide range of stakeholders. The results of focus groups can be used to identify important destinations that children would like to access or need to access as well as areas that need specific attention.

The objective of this research is to identify the non-school destinations for children between the ages of 8–12 in a Canadian context. Through these discussions, two key questions are considered:

1. What are the most relevant daily destinations and informal places that children commonly travel to?
2. How might these daily destinations relate to the different domains of children's well-being?

The focus group approach with relevant stakeholders will explore the most relevant daily and informal places frequented by children. This approach should help shed light on previously unaddressed aspects of children's travel destinations. This study focuses on understanding how different stakeholders relate various destinations to well-being dimensions.

This article is organized as follows: The next section presents the methodology for conducting each focus group, followed by the results of each group. Next, a discussion section covers the overall contributions of the research. The article concludes with our findings.

2. Methodology

Focus groups serve as a foundational approach to exploring participant perspectives and enriching our understanding of their needs (Adler et al., 2019). They facilitate an environment where participants are encouraged to present their viewpoints, share experiences, and actively engage in discussion (Adler et al., 2019). Therefore, using focus groups to capture genuine responses could provide a deeper understanding of children's needs in terms of identifying their daily destinations.

Focus groups were conducted separately with the different stakeholder groups: the primary stakeholders—children, their guardians or parents, and experts who are actively involved in children's independent travel and built environment impacts on children's mobility. The focus groups enhance participant interaction and discussion beyond individual interviews, thus providing a platform for diverse perspectives (Adler et al., 2019). Figure 1 summarizes the process (details of each step are described below).

2.1. Design of the Focus Groups

Selecting stakeholders with significant input on children's destinations was the first step in designing the focus groups (Banville et al., 1998; Marais & Abi-Zeid, 2021). Given the multiple stakeholder groups (Banville et al., 1998), both "standard" and "fiduciary" stakeholders have an important role in addressing children's travel and accessibility to their daily destinations:

1. "Standard stakeholders" are individuals directly affected by and influencing the problem who have a substantial influence on solutions (Banville et al., 1998). We primarily involve planners, parents, and children between the ages of 8–12 because of their direct connection to the research.
2. "Fiduciary stakeholders," representing individuals acting on their behalf (Banville et al., 1998). While they may influence how a problem is solved, they are not personally affected. An example of this type of stakeholder could be individuals who are engaged in the decision-making process (planners or local child-safety associations; see Banville et al., 1998). Through their involvement, the findings of the study can be translated into practical, actionable strategies to improve children's access to destinations that are beneficial for their health and well-being. Often, experts are directly involved in formulating and implementing policies, which makes their participation important to understand the practical implications of research findings, as well as to develop interventions that can be effectively integrated

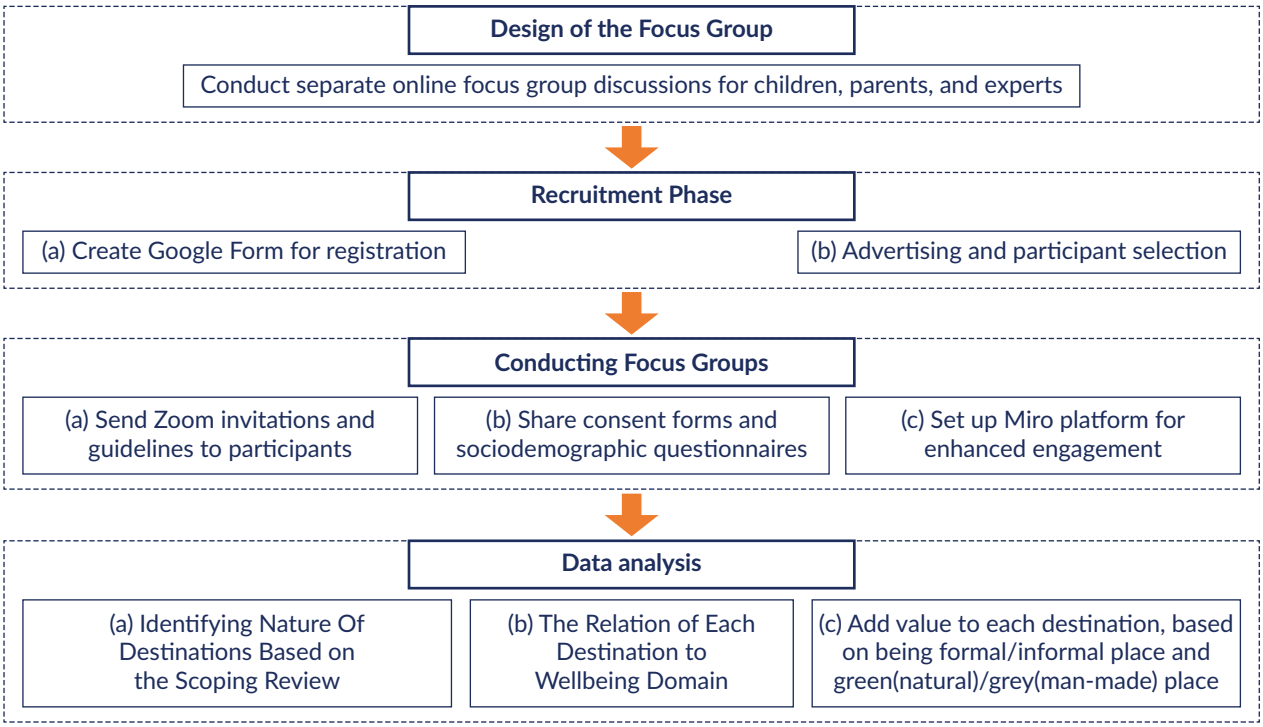

Figure 1. Summary of focus groups' process.

into existing frameworks. Also, since experts are exclusively adults, it is important to understand the differences between their perspectives and children's perspectives. Getting such feedback can improve professionals' understanding of the topic. Furthermore, since previous research had not related destinations to well-being domains, part of the objective of this research was to find out whether there were differences in how experts, compared to children and parents, assigned destinations to well-being.

Including both "standard" and "fiduciary" stakeholders ensured a comprehensive view, incorporating the perspectives and influence of those directly affected and those advocating for them.

Five online focus groups were conducted in May–June 2023, with children (age 8–12) and parents of children (age 7–13) in English and French, and with experts from various Canadian cities in English.

2.2. Recruitment Steps

Participants were recruited through various social media platforms including Facebook, LinkedIn, and Twitter (now X) in March and April 2023. Parents and children were offered a $CAD 25 certificate compensation, while experts were not offered a certificate. Two separate Google form surveys were used: one for children and parents to gather information on location and children's ages with the aim of including respondents with varied experiences; and another for experts to identify their roles as professionals, academics, advocacy, etc. To obtain different professional perspectives, experts were asked to specify fields like engineering, urbanism, geography, psychology, sociology, politics, education, etc. It was possible to go from one form to the other.

Overall, 166 responses were received from French and English parents. Parents and children were then randomly selected from different urban areas and age groups. Thirty-seven expert responses were gathered. Doodle polls facilitated the scheduling of separate focus groups for children, parents, and experts, ranging from 4 to 10 participants each. The focus groups were recorded with participants' permission.

An online whiteboard and presentation tool called Miro was used to facilitate active participation in the discussions along with Zoom to allow for verbal communication. For all groups, a short demonstration on using Miro to add "sticky notes" was given, followed by a few minutes for participants to practice, ensuring everyone could provide input. When needed, alternatives such as typing in the Zoom chat were used, and an assistant input the ideas on Miro.

At this point, an issue arose with the initial broad "cast the net wide" recruiting approach for parents and the children's discussion groups. Despite requiring computer participation for better Miro facilitation, many individuals joined the first meeting on mobile phones, thus limiting their engagement. This only resulted in some limitations in the amount of information that could be gathered. As the information was valid, it was retained. In contrast, in the children's focus group, participants were adults on phones rather than the expected children. It became evident some joined just to claim the gift certificate and were not "honest" participants. Therefore, the recruitment approach changed, and the data from that children's session was not included. Parents who had participated in a recent study on children in Montreal by researchers not involved in this research were solicited. Also, using the researchers' networks, friends were requested to advertise to people that the researchers did not know (to limit bias).

All stakeholders were tasked with assigning the different destinations to the well-being domains to (a) test whether they understood this categorization approach and (b) examine how they saw these destinations impacting children's lives.

In all five sessions, the moderators encouraged all participants to actively contribute to the discussion. Participants were invited to use as many sticky notes as they wanted to list different destinations, and they could return to add new places if they remembered any additional ones. The approach used (an online whiteboard) allowed for parallel contributions, meaning that participants could contribute at the same time without being unduly influenced by others. The moderators then asked the participants to expand on contributions that were not evident. The moderators further made a point of directly asking participants who were not voicing their contributions as frequently (everyone contributed quite a few sticky notes in each round).

2.2.1. Parents' Focus Groups

Using the second approach, separate meetings took place with 10 French-speaking parents from Montreal and four English-speaking parents from Vancouver (1 person), Montreal (2 persons), and Saskatoon (1 person). The parents' sessions lasted approximately 90 minutes. Table 1 provides the description of participants in the meeting with parents.

Table 1. The description of participants in the meeting with parents.

Parents (n = 14)	Percentage
Location	
Montreal	85.7%
Saskatoon	7.1%
Vancouver	7.1%
Parents' Age Range*	
35–44	57%
45–54	36%
Child's age*	
7 years old	7%
8 years old	14%
9 years old	14%
10 years old	29%
11 years old	21%
12 years old	7%
Gender*	
Female	71%
Male	14%
Other	7%
Education Level*	
Certificate or diploma from a college, CEGEP, or other non-university institution	7%
Bachelor's degree	50%
Master's degree (for example MA, MSc, MEd, MBA)	29%
Doctoral degree (i.e., PhD)	7%
Ethnicity*	
Other North American origins	7%
European origins	50%
Latin, Central, and South American origins	7%
Work Status*	
Full time	86%
Student	7%
Total annual household income before tax*	
I prefer not to answer	7%
$30,000 to $49,999	21%
$75,000 to $99,999	21%
$100,000 to $150,000	14%
Parents' residential location in urban setting	
Center of the city	64%
Periphery	36%
Preferred language	
English	29%
French	71%

Note: * As a result of respondents not answering all questions, the total percentage does not equal 100% in some cases.

The first question asked about the diversity of destinations related to children's travel was (quoted from the questionnaire):

> Where do your children typically go during a week (excluding vacation trips and such)? We would like to know about the diversity of the destinations!

To build on each other's ideas, the question was asked three times to collect as many responses as possible. To prevent parents from influencing one another at the start, they were given five minutes to enter their ideas before their notes were shown to others. The scoping review summary was then shown to parents (Desjardins et al., 2022). Parents were then asked if any new ideas had occurred to them.

The second part of the discussion explained how different destinations could support children's well-being. Four main dimensions of well-being that relate to children's travel were introduced (Waygood et al., 2017, 2020):

1. Physical well-being: Anything that involves movement contributes to physical well-being, with a preference given to activities that raise the heart rate and physical health development.
2. Psychological well-being: Refers to individuals' emotions and feelings as well as their mental health development.
3. Cognitive well-being: Children's cognitive well-being includes discovering their world (formal and informal) and developing their intellectual abilities.
4. Social well-being: Includes concepts such as social connections with friends and the wider community.

Finally, parents were asked to categorize the destinations based on their perceptions.

2.2.2. Children's Focus Group

Interviews were conducted separately in two sessions with seven French-speaking (from Montreal) and four (2 from Saskatoon, one from Montreal and one from Vancouver) English-speaking children. Group discussions with children designed for one hour. Table 2 provides the information about children who participated in the discussion.

The children's focus group sessions needed a specific methodological and ethical approach. In terms of methodology, we made sure children felt comfortable and were able to express themselves freely. To facilitate understanding and keep the children interested, we used simple language and engaging slides. Also, interactive activities (such as asking questions within the context of games) helped facilitate discussion. To meet ethical standards, it was mandatory to obtain the informed consent of the children and their parents before each session. As the focus groups were online, this likely gave parents a greater sense of safety as the child remained at their home, the parent was the one who received the link, and they could keep "one ear open" to judge the appropriateness of the discussion.

The research questions were simplified and asked through games to encourage children's participation. Two different questions were asked about places children like to go (quoted from the questionnaire):

> It's a game! Please tell us what are your favorite places that you go to. You have 2 minutes to reply!
>
> Are there places you would like to go to that we didn't mention? These need to be real options for a normal week—so nothing like "Disneyland!"

Table 2. The description of participants in the meeting with children.

Children (n = 11)	Percentage
Location	
Vancouver	9.09%
Montreal	72.73%
Saskatoon	18.18%
Child's age	
8 years old	9%
9 years old	9%
10 years old	45%
11 years old	27%
12 years old	9%
Gender	
Female	36%
Male	64%
Residential location in urban setting	
Central neighborhoods	55%
Periphery	45%
Preferred language	
English	36%
French	64%

For each well-being domain, children were asked specific questions to identify how various destinations contribute to their well-being (quoted from the questionnaire):

> Social well-being: Other than school, where are the places you meet and hang out with your friends to have some fun, play or talk? Where are the places that you meet other people? Like neighbors or even adults that you don't really know but maybe you chat with.
>
> Psychological well-being: Where are the places that make you happy? Where are the places that make you relaxed? Where are the places that make you excited?
>
> Cognitive well-being: Other than school, where do you learn about things? Or discover your surroundings? This can be by yourself, with friends, or learning from adults.
>
> Physical well-being: Of the places we talked about, where do you move a lot? We mean, more than just walking—it can be dancing, hiking, anything that makes you breathe a little hard.

2.2.3. Experts' Focus Group

Six people participated in the expert meeting. The experts worked in the domains of public transport, community engagement, and active travel. They were a mix of professionals (4) and academics (2). A 90-minute discussion was held with the expert group. Using the "hidden" sticky note approach, the first question gathered diverse destination perspectives from the experts (quoted from the questionnaire):

> Where do children typically go during the week (excluding vacation trips and such)? We would like to know about the diversity of the destinations.

Experts were also asked about informal destinations for children. The objective was to focus on non-structured places that children use for play or leisure that are not (generally) identified by GIS. The previous review about non-school destinations was discussed (Desjardins et al., 2022), and accordingly, experts were asked if there were additional destinations that they could think to add.

Next, the discussion focused on how the mentioned destinations could support children's health across the four well-being domains. The experts assigned destinations to the domains and discussed any ambiguous or multi-domain ones.

2.2.4. Data Analysis

The qualitative focus group data analysis proceeded as follows in the next sections.

2.2.4.1. Categorization of Destinations

Participants frequently mentioned specific names of places (e.g., parks, grocery stores, ice cream shops) in different discussions. Data was categorized and grouped based on the categories identified in the scoping review's typology (commercial, leisure, educational, green, social/cultural, sports, public transport). This step ensured that the data reflects the real conditions as expressed by the stakeholders. Accurate categorization was ensured by multiple rounds of verification.

2.2.4.2. Assignment to Well-Being Domains

Participants assigned each destination to one or more well-being domain(s): physical, psychological, cognitive, and social. A multi-domain classification was allowed to capture the diverse impacts of each destination. The assignments were reviewed with participants' when it was not clear.

2.2.4.3. Examination of Destination Characteristics

Destinations were assessed to determine if they were formal (structured activities) or informal (unstructured activities). Destinations were also classified as green (natural spaces) or grey (human-made environments).

3. Results

3.1. Identifying the Nature of Destinations Based on the Scoping Review

This step aimed to categorize the destinations by their nature following a previous scoping review of children's non-school destinations (Desjardins et al., 2022). The nature of locations was determined by the descriptions from parents, children, and experts. For places children identified by name—such as Crèmerie (an ice cream shop), Renaissance (a thrift store), and Volcano Island (a natural play park)—they were asked follow-up questions about the purpose and activities there to determine the appropriate category. Figure 2 shows the Miro application board where parents, children, and experts wrote their ideas.

Figure 2. Miro board related to the question about where children go on for parents (left), children (middle), and experts (right).

Next, the classification results of destinations are presented by stakeholder type.

3.1.1. Parents' Focus Group

The destinations most frequently mentioned by parents were recreational activities, leisure places, children's sports activities, and various types of commercials. The destinations are presented by category in Figure 3.

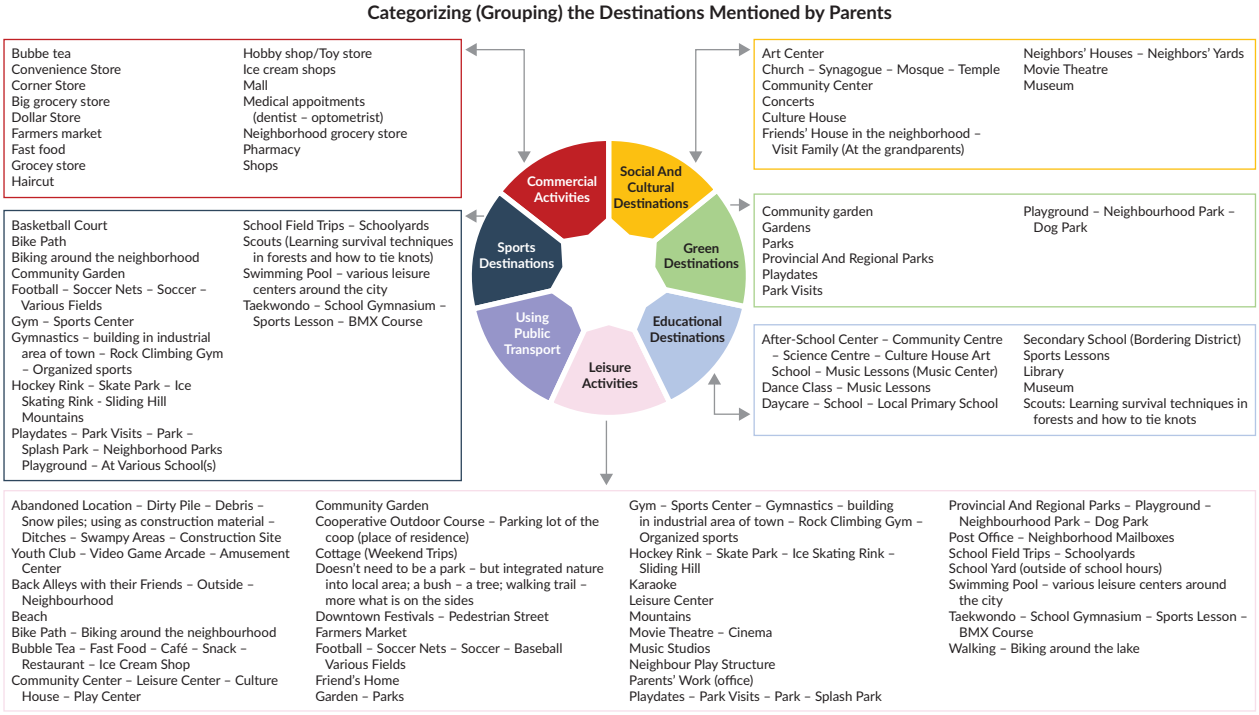

Figure 3. Categorizing destinations mentioned by parents.

3.1.2. Children's Focus Group

Children predominantly mentioned leisure places and green destinations like parks, playgrounds, fields, and rinks for sports activities. Figure 4 presents the destinations mentioned by children.

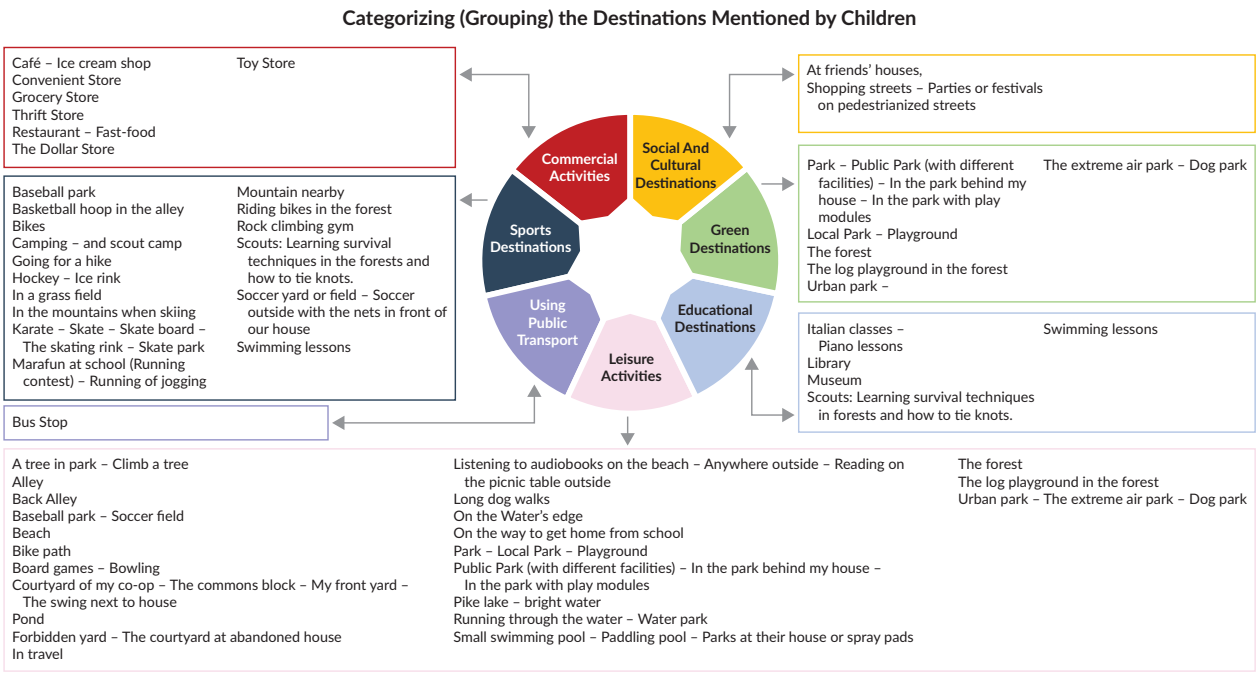

Figure 4. Categorizing destinations mentioned by children.

3.1.3. Experts' Focus Group

The expert discussion analyzed formal destinations children routinely visit for specific purposes (e.g., schools, grocery stores), and informal destinations children visit like empty lots, woodlots, yards, groves of trees, etc. The categorization of destinations mentioned by experts is shown in Figure 5.

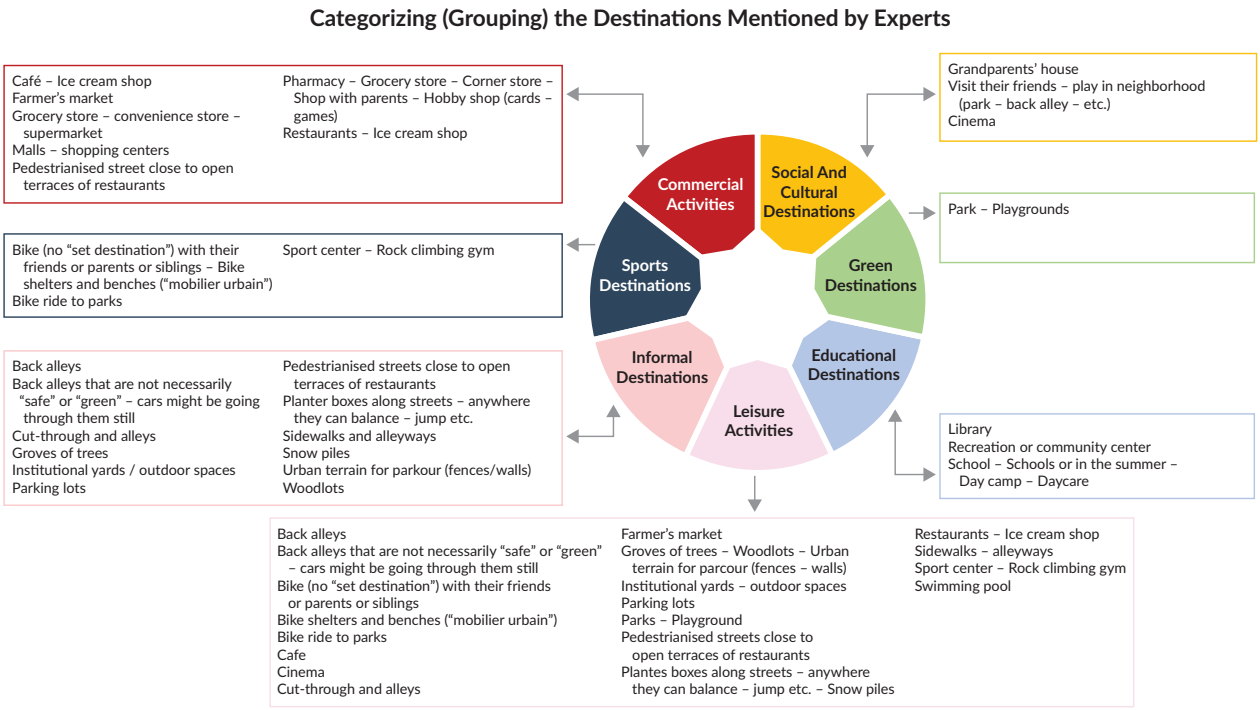

Figure 5. Categorizing destinations mentioned by experts.

3.2. The Relationship Between Destinations to Well-Being Domains and Identifying Formal/Informal and Green/Grey Destinations

3.2.1. Parents' Focus Groups

Parents predominantly mentioned formal locations which are primarily in grey (human-made) contexts. Across the different domains of well-being, formal destinations were consistently the most common (such as dance class, school, daycare), but the second most common was informal in the physical well-being domain (such as friend's home, snow piles, mountains), though some of those are a mix of formal and informal (e.g., sports such as hockey rink, skate park, soccer nets can be both).

For psychological destinations, they mentioned playing in playgrounds, back alleys, parking lot of the residence, or going to the places regarded as "their [children's] space," which were mostly associated with green and natural places.

Cognitive well-being was associated with grey and formal places like educational experiences such as school field trips, and library visits, as well as artistic pursuits such as visiting museums.

For social well-being activities, parents assigned community events at local centers, and having outdoor playdates to that section. Figure 6 presents the results of the discussion with parents and the category of each destination that it is assigned to.

3.2.2. Children's Focus Groups

Children associated physical well-being with informal places such as a basketball hoop in the alley, climbing on trees (in the alley), abandoned places (called forbidden yards), bike paths, beaches, and public parks: "In the park behind my house, in the play modules, in the mountains when skiing, the bike path, the pool, the park, the skating rink, at the pool, at the beach." In the physical domain, children primarily mentioned informal locations, but it was followed by transport-infrastructure and "destination" type places (typically requiring parental involvement and long-distance travel), without citing formal locations.

For social well-being, children again mentioned engaging in less formalized interactions than their parents by visiting friends' houses, parks, randomly meeting people in the neighborhood, using playgrounds, and common areas within their residences. Destinations such as areas for shopping, food, and drink were typically found in predominantly grey locations.

As for psychological well-being, children discussed going to a *café or ice cream shop* with their parents, meeting a friend at a park that makes them happy, or lying on the ground at the park to feel relaxed. Children's associations were linked to social connections (friends, family) and relaxation (alone or with friends). Nature- and water-type destinations such as lake, hiking, camping, and being in a grass field were the most commonly associated and were dominantly green. Other destinations are places to relax (on the water's edge), shopping (convenience store or toy store), and some more formal places (museum).

For cognitive well-being, some children named day camps (involving learning activities in a forest), libraries, Italian classes, Karate class, skating parks to observe others and learn from them, and outdoor ice rinks. These

Physical Wellbeing—Parents' Focus Group

Destination	Green or Grey	Informal (I) / Formal (F)	Category
Mall – Shops – Pharmacy – Grocery Store	Grey	I – F*	Commercial
Medical appointments (dentist – optometrist)	Grey	F	Commercial
Dance Class	Grey	F	Education
Daycare – School – University	Grey	F	Education
Library	Grey	I – F*	Education
Abandoned Location – Dirt Pile – Debris – Ditches – Swampy Areas	Green	I	Leisure
Back Alley	Grey	I	Leisure
Beach	Green	I	Leisure
Community Center – Leisure Center – Leisure Room – Culture House – Play Center	Grey	F – I	Leisure
Cooperative Outdoor Course	Green	F	Leisure
Friend's Home	Grey	I	Leisure
School Yard (outside of school hours)	Green-Grey	I	Leisure
Snow piles (using as construction material)	Green	I	Leisure
Walking Trail – Biking around the lake	Green	I	Leisure
Walking	Green-Grey	I	Leisure
Bike Path – Biking around the neighborhood	Grey	I	Sports and Leisure
Community Garden	Green	F	Sports and Leisure
Football – Soccer Nets – Soccer – Baseball Various Fields	Green-Grey	F – I	Sports and Leisure
Gym – Sports Center – Gymnastics – Rock Climbing Gym – Organized sports	Grey	F	Sports and Leisure
(Outdoor) Hockey Rink – Skate Park – Ice Skating Rink	Grey	I – F	Sports and Leisure
Mountains	Green	I	Sports and Leisure
Playdates – Park Visits – Park – Splash Park – Neighborhood Parks Playground – At Various School(s)	Green-Grey	I – F	Sports and Leisure
Swimming Pool – various leisure centers around the city	Grey	F – I	Sports and Leisure
Taekwondo – School Gymnasium	Grey	F	Sports and Leisure
Sports Lesson – BMX Course	Green-Grey	F	Sports and Leisure
Scouts (Learning survival techniques in forests and how to tie knots)	Grey	F	Sports and Education
Church – Synagogue – Mosque – Temple	Grey	F	Sports and Cultural
Sledding Hill	Green	I	Green

Psychological Wellbeing— Parents' Focus Group

Destination	Green or Grey	Informal (I) / Formal (F)	Category
Grocery Store – Shops	Grey	F – I	Commercial
Hobby Shop – Toy Store	Grey	F	Commercial
Haircut	Grey	F	Commercial
Medical appointments (dentist – optometrist)	Grey	F	Commercial
Café – Ice cream shop – Out for meals – Restaurant	Grey	F – I	Commercial and Leisure
After School Center	Grey	F – I	Education
Scouts (Learning survival techniques in forest and how to tie knots)	Grey	F	Education
"Their Space" – A Bush; A Fort; A Place to Retreat to – In a tree – Ditches – Swampy Areas – Green and natural space – Doesn't need to be a park – but integrated nature into local area	Green	I	Leisure
Back Alley	Grey	I	Leisure
Cooperative Outdoor Course	Green	I	Leisure
Leisure Center	Grey	F – I	Leisure
Movie Theater	Grey	F	Leisure
Music Studios	Grey	F	Leisure
Parking lot of the coop (place of residence)	Grey	I	Leisure
Playground – Neighborhood Park – Playground – At Various School(s)	Green-Grey	F – I	Leisure
School	Grey	F	Leisure
Gardens – Parks	Green-Grey	F – I	Leisure and Green
Church – Synagogue – Mosque – Temple	Grey	F	Social and cultural
Bike ride in the neighborhood	Grey	I	Sports and Leisure
Community Garden	Green	F	Sports and Leisure
Gymnastics – building in industrial area of town – Sport Lessons (Arena Field) – Rock Climbing Gym – Organized Sports – Swimming Pool	Grey	F	Sports and Education
Mountains	Green	I	Sports and Leisure
Visit friends – At the grandparents	Grey	I	Sports and Education

Cognitive Wellbeing—Parents' Focus Group

Destination	Green or Grey	Informal (I) / Formal (F)	Category
Convenience Store – Grocery Store – Dollar store – Phamacy	Grey	F – I	Commercial
Bank	Grey	F	Commercial
Medical appointments (dentist – optometrist)	Grey	F	Commercial
Art School – Music Lessons (Music Center)	Grey	F	Education
Community Center – Science Center – Arts Center – Culture House	Grey	F – I	Education
Daycare – School – Local Primary School – Secondary School (Bordering District)	Grey	F	Education
Library	Grey	I – F*	Education
Museum	Grey	F	Education
Youth Center – Play Center	Grey	F – I	Leisure
Abandoned Location – Dirt Pile – Debris – Snow piles; using as construction material	Green	I	Leisure
Cottage (Weekend Trips)	Green	F – I	Leisure
Downtown Festivals – Pedestrian Street	Grey	F – I	Leisure
Post Office – Neighborhood Mailboxes	Grey	I	Leisure
Provincial And Regional Parks	Green	F – I	Leisure and Green
Basketball Court (In Park) – Soccer – Various Fields	Green-Grey	F – I	Sports
Biking around in the neighborhood	Grey	I	Sports and Leisure
Church – Synagogue – Mosque – Temple	Grey	F	Sports and Cultural
Community Garden	Green	F	Sports and Leisure
Concerts	Grey	F	Social and cultural
Movie Theatre – Theatre	Grey	F	Social and cultural
Professional Sports	Grey	F	Sports
School Field Trips – Schoolyards	Green-Grey	I – F	Sports and Leisure

Social Wellbeing—Parents' Focus Group

Destination	Green or Grey	Informal (I) / Formal (F)	Category
Grocery Store – Dollar store – Convenience Store – Corner Store – Mall	Grey	F – I	Commercial
Bubble Tea – Fast Food – Café – Snack – Restaurant – Ice Cream Shop	Grey	F – I	Commercial and Leisure
Farmers Market	Grey	F	Commercial and Leisure
After-School Center – Community Center – Science Center	Grey	F – I	Education
Dance Class – Music Lessons	Grey	F	Education
Museum	Grey	F	Education
School	Grey	F	Education
Volunteer Commitment	Grey-Green	I	Education and Leisure
Youth Center – Video Game Arcade – Amusement Center	Grey	F – I	Leisure
Back Alleys with their Friends	Grey	I	Leisure
Constuction Site	Green-Grey	I	Leisure
Karaoke	Grey	I – F	Leisure
Movie Theatre – Cinema	Grey	F	Leisure
Neighborhood Play Structure	Grey	I	Leisure
Neighbors' Yards	Green	I	Leisure
Parents' Work (office)	Grey	F	Leisure
Playdates – Park Visits – Provincial And Regional Parks – Playground – Neighborhood Park – Dog Park	Green-Grey	I – F	Leisure and Green
Post Office	Grey	I	Leisure
Pedestrian Street	Grey	I – F	Leisure
Siblings' Daycare	Grey	I – F	Leisure
Swimming – various leisure centers around the city	Grey	F – I	Leisure
Friends' House in the neighborhood – Visit Family (At the grandparents) – Babysitting – Neighbors' Houses	Grey	I	Social and Leisure
Football – Soccer Nets – Soccer – Various Fields	Green-Grey	F – I	Sports and Leisure
Hockey Rink – Skate Park	Grey	I – F	Sports and Leisure
Scouts (Learning survival techniques in forests and how to tie knots)	Grey	F	Sports and Education
Sports Lessons (Arena – Field)	Grey	F	Social and Education

Figure 6. The color-coded categorization of children's destinations mentioned by parents, relating to well-being domains.

are a mixture of formal and informal learning environments where they can observe others and learn from them. These locations were more likely to be formal and grey.

Children's responses to each question regarding activities that support their well-being and the category of each destination where they were assigned are shown in Figure 7.

3.2.3. Experts' Focus Group

Responses of the experts and the category of each destination are shown in Figure 8. Overall, experts highlighted more grey-type destinations than the previous two groups, but also more informal destinations than the parents group.

Physical well-being included many formal destinations where sports or athletics can be learned and practiced, but this was nearly balanced by informal destinations. Those informal destinations often involved children occupying transport infrastructure such as alleyways, parking lots, and sidewalks. Places where children's affordance might be different than adults also came up such as using urban shapes to run and do "parkour." The destinations in this group are greyer than the previous two.

Cognitive well-being was a major topic in the experts' group. They discussed how children's cognitive well-being is enhanced through exploration at various destinations which were mainly transport-related (bus stops, bike rides to parks) and a few commercial ones (grocery store, corner store). Like the other groups, these destinations were primarily grey locations, though experts were more likely to mention informal places.

The other two domains of well-being were more mixed. Social well-being included multiple types of destinations (ice cream shops, back alleys), with only a few classified as formal (school). Only a couple of destinations that could be termed formal were assigned to the psychological well-being domain (schools, day camps). Experts discussed the psychological and social aspects of different destinations, including how an "ice cream place" can be associated with tradition, emotions, and reconnection with friends. Similar to the other two groups, most destinations here were grey.

4. Discussion

The article presents the outcome of focus group discussions on non-school destinations involving children, parents, and experts. The results demonstrated that the diversity is much larger than captured by a systematic review of literature on such destinations (Desjardins et al., 2022). Further, the destinations were classified as informal or formal, and natural (green) or human-made (grey) which highlights differences in the perspectives of those three stakeholders. Then, it discussed how those destinations might be related to physical, psychological, cognitive, and social well-being from the perspectives of children, parents, and experts. The conceptualization and categorization of destinations by their relationship to well-being domains is a significant theoretical contribution as it directly links the objective of improving children's lives with the potential impact of specific destinations. The combination of these layers (different stakeholders), characteristics, and relationship to well-being provides unique contributions that showcase the differences in perspectives. Using this approach planners can better understand how built environments affect children beyond simple categories like educational, leisure, and commercial.

Physical Wellbeing—Children's Focus Group

Destination	Green or Grey	Informal (I) / Formal (F)	Category
A teen in park – Climb a tree	Green	I	Leisure
Alley	Grey	I	Leisure
Beach	Green	I	Leisure
Forbidden yard – The courtyard at abandoned house	Green	I	Leisure
Lake – bright water	Green	I	Leisure
Long dog walks	Green-Grey	I	Leisure
Park – Public Park (with different facilities) – In the park behind my house – In the park with play modules	Green-Grey	I	Leisure and Green
Pool	Grey	I – F	Leisure
Running through the water – water park	Grey	I	Leisure
Basketball hoop in the alley	Grey	I	Sports
Going for a hike	Green	I	Sports
In the mountains when skiing	Green-Grey	I – F	Sports
Marafun at school (Running context) – Running or jogging	Green -Grey	F	Sports and Leisure
Riding bikes in the forest	Green	I	Sports and Leisure
Skate Park	Grey	I – F	Sports and Leisure
Soccer fields	Green-Grey	F – I	Sports and Leisure
Soccer outside with the nets in front of our house	Green-Grey	I	Sports and Leisure
The skating rink	Grey	F – I	Sports

Psychological Wellbeing— Parents' Focus Group

Destination	Green or Grey	Informal (I) / Formal (F)	Category
Café – Ice cream shop	Grey	I – F	Commercial
Convenience Store	Grey	I – F	Commercial
Toy Store	Grey	F	Commercial
Cultist lake – Pond	Green	I – F	Leisure
Hiking	Green	I	Leisure
Listening to audiobooks on the bench – anywhere outside – Reading on the picnic table outside	Green	I	Leisure
Museum	Grey	F	Education
On the Water's edge	Green	I – F	Leisure
The log play ground in the forest	Green	I – F	Leisure and Green
Urban park – The extreme air park – Dog park	Green	I – F	Leisure and Green
Camping – and scout camp	Green	I – F	Sports and Leisure
In a grass field	Green	I	Sports and Leisure
Rock climbing gym	Grey	I – F	Sports
Mountain nearby	Green	I	Sports and Leisure

Cognitive Wellbeing—Children's Focus Group

Destination	Green or Grey	Informal (I) / Formal (F)	Category
Grocery Store – Thrift Store	Grey	I – F	Commercial
Museum	Grey	F	Education
Italian classes – Piano lessons	Grey	F	Education
Library	Grey	I – F*	Education
Board games – Bowling	Grey	I – F	Leisure
Cabin – Beach on Anvil island	Green	I – F	Leisure
The forest	Green	I – F	Leisure and Green
Baseball park – Soccer field	Grey-Green	I – F	Sports and Leisure
Bike path	Grey	I	Sports and Leisure
Hockey – Ice rink	Grey	I – F	Sports
Karate – Skate / Skate board	Grey	I – F	Sports
Scouts: Learning survival techniques in forests and how to tie knots.	Grey	F	Sports and Education
Swimming lessons	Grey	F	Social and Education

Social Wellbeing—Children's Focus Group

Destination	Green or Grey	Informal (I) / Formal (F)	Category
Convenience Store	Grey	F – I	Commercial
Ice Cream Shop – Restaurant – Fast-food	Grey	I – F	Commercial and Leisure
Softball	Green-Grey	I	Commercial and Leisure
Back Alley	Green	I	Leisure and Social
Courtyard of my co-op – The commons block – My front yard – The swing next to house	Green	I	Leisure and Social
On the way to get home from school	Grey	I	Leisure
Park – Local Park – Playground	Green-Grey	I	Leisure and Green
Small swimming pool – Paddling pool – parks at their house or spray pads	Grey	F – I	Leisure
At friends' houses – Parties	Grey	I	Social
Bus stop	Grey	I – F	Public Transport
In the businesses of festivals at pedestrian shopping street	Grey	I – F	Social and cultural

Figure 7. The color-coded categorization of children's destinations mentioned by children, relating to well-being domains.

Physical Wellbeing—Children's Focus Group

Destination	Green or Grey	Informal (I) / Formal (F)	Category
Grocery store – convenience store – supermarket	Grey	I – F	Commercial
Cafe	Grey	I – F	Commercial and Leisure
Pedestrianized streets close to open terraces of restaurants	Grey	I – F	Commercial and Leisure
Library	Grey	I – F*	Education
Recreation or community center	Grey	F – I	Education
School	Grey	I	Education
Back alleys that are not necessarily "safe" or "green" – cars might be going through them still	Grey	I	Leisure
Institutional yards – outdoor spaces	Grey-Green	I	Leisure
Parking lots	Grey	I	Leisure
Planter boxes along streets – anywhere they can balance – jump etc.	Grey-Green	I	Leisure
Sidewalks	Grey	I	Leisure
Snow piles	Green	I	Leisure
Swimming pool	Grey	F – I	Leisure
Urban terrain for parkour (fences – walls)	Grey	F – I	Leisure
Parks – Playground	Green-Grey	I – F	Leisure and Green
Grandparents' house	Grey	I	Social
Bike (no "set destination") with their friends or parents or siblings – Bike shelters and benches ("mobilier urbain")	Grey	I – F	Sports and Leisure
Sport center – Rock climbing gym	Grey	F – i	Sports and Leisure

Psychological Wellbeing— Experts' Focus Group

Destination	Green or Grey	Informal (I) / Formal (F)	Category
Malls – shopping centers	Grey	I – F	Commercial
Café – Ice cream shop	Grey	I – F	Commercial and Leisure
Schools or in the summer – Day camp	Grey-Green	F	Education
Back alleys	Grey	I	Leisure
Groves of trees – Woodlots	Green	I	Leisure
Urban terrain for parkour (fences – walls)	Grey	I	Leisure
Parks	Grey-Green	I – F	Leisure and Green
Grandparents' house	Grey	I	Social

Cognitive Wellbeing—Experts' Focus Group

Destination	Green or Grey	Informal (I) / Formal (F)	Category
Pharmacy – Grocery store – Corner store – Shop with parents – Hobby shop (card – games)	Grey	I – F	Commercial
Farmer's markt	Grey	I – F	Commercial and Leisure
Restaurants	Grey	I – F	Commercial and Leisure
Library	Grey	I – F*	Education
School	Grey	F	Education
Cinema	Grey	F	Leisure
Cut-through and alleys	Grey	I	Leisure
Play in the neighborhood (park – back alley – etc.)	Grey–Green	I	Leisure
Sidewalks – Alleyways	Grey	I	Leisure
Urban terrain for parkour (fences – walls)	Grey	I – F	Leisure
Bus stop	Grey	I – F	Public Transport
Visit their friends	Grey	I	Social
Bike ride to parks	Grey–Green	I	Spprts and Leisure

Social Wellbeing—Experts' Focus Group

Destination	Green or Grey	Informal (I) / Formal (F)	Category
Malls – shopping centers	Grey	I – F	Commercial
Restaurants – Ice cream shop	Grey	I – F	Commercial and Leisure
Library	Grey	I – F*	Education
School – Schools or in the summer – Day camp – Daycare	Grey-Green	F	Education
Back alleys	Grey	I	Leisure
Cinema	Grey	F	Leisure
Play in the neighborhood (park – back alley – etc.)	Grey-Green	I	Leisure
Urban terrain for parkour (fences – walls)	Grey	I – F	Leisure
Woodlots	Green	I – F	Leisure
Visit their friends	Grey	I – F	Social

Figure 8. The color-coded categorization of children's destinations mentioned by experts, relating to well-being domains.

Focus group discussions highlighted the importance of leisure destinations in children's daily travel. Children prefer common spaces over backyards for social interactions with friends and the wider community which confirms previous research with children (Furneaux & Manaugh, 2019). They mentioned visiting neighbors when shopping or returning from school and going to ice cream shops or dollar stores for social activities. In less urban areas, parents mentioned children collecting mail with friends from centralized mailboxes as a social activity. This aligns with research showing neighborhood involvement promotes children's social skills and frequent socialization (Prezza et al., 2010; Waygood et al., 2020). Back alleys, biking around the neighborhood, and playgrounds were frequently mentioned in leisure activities in all groups. Experts noted shared spaces like alleys and common blocks promote intergenerational connections and enhance the sense of community.

The results show while parents may view a certain destination as offering opportunities from a structured perspective, children will perceive a particular destination based on their enjoyment, social influences, and interactions and experiences (Loebach & Gilliland, 2014; Veitch et al., 2006). Children's responses were mostly categorized as informal destinations such as alleys, abandoned areas, beaches, and public parks for physical well-being activities like climbing trees or playing basketball in an alley. In most cases, these informal destinations were grey or human-made environments such as alleys or in front of their houses. While not necessarily designed for play, grey spaces provide opportunities for independent mobility, exploration, and creative use of the urban landscape for children which was also highlighted by Villanueva et al. (2013). As the informal spaces provide opportunities for meeting friends and engaging in unstructured play, the spaces also contribute to the development of social connections and psychological well-being which is also argued by Summers et al. (2019). These informal destinations are mainly within their territorial range and they are socially, emotionally, and functionally important for children (Broberg et al., 2013). These results align with the concept of affordance—that meaningful places for children are assessed according to the functional quality of the environment that may enable or impede their actions (Desjardins et al., 2022).

In contrast to children, parents mostly mentioned formal destinations like libraries, classes, and structured learning environments were more commonly associated with cognitive well-being which is aligned with prior research (Gemmell et al., 2023). Experts also highlighted informal destinations, but they were more likely to mention grey destinations. This contrast between children's preferences for informal, grey, and green spaces with adults' responses highlights how it is important to get children's input. The results point to the importance of considering both green and grey along with informal places to support the diversity of destinations that link with child well-being.

This study provides a more holistic view of well-being than previous studies, which focused more on physical health (Gong et al., 2024), physical and social (Christensen et al., 2015), and psychological development (Summers et al., 2019). According to our findings, various destinations simultaneously contribute to a variety of aspects of well-being in a complementary approach. Children's activities often involve socializing with friends or visiting neighbors (social well-being), walking or playing with other kids (physical and social well-being), and exploring the neighborhood (physical and cognitive well-being). This result aligned with a prior study's findings that recreational spots could contribute to children's social and physical health (Gong et al., 2024). Parents and children mentioned sports facilities like hockey rinks and soccer fields which provide opportunities for physical activities which aligns with previous research (Egli et al., 2020). This study also highlighted that those destinations are associated with cognitive and social well-being through learning

and social interactions. Parents identified parks, nature walks, alleys, and areas near swamps as key locations for children's psychological well-being, noting that these places provide solitude in distressing times, rest after school, and opportunities for quiet play. Such findings support previous research with children (Janssen & Rosu, 2015; Loebach & Gilliland, 2014). Through increased walking and movement, these destinations can encourage children to explore, have adventures, and engage in unstructured play, contributing to their physical well-being as these destinations may provide children with a sense of adventure, exploration, and opportunities for unstructured play, which could contribute to their physical well-being through increased walking and movement (Loebach & Gilliland, 2014; Veitch et al., 2006). This aligns with research on the positive impact of natural environments on children's psychological development (Summers et al., 2019). Also, according to a prior study, these "local places" have a direct impact on children's physical well-being due to their affordability and the fact that they are near places that are familiar to children (Christensen et al., 2015). Experts and parents agreed that destinations such as toy stores, dollar stores, commercial streets, and grocery stores support cognitive well-being by providing opportunities for exploration and learning through new adventures (for example they need to do calculations) and problem-solving. The multifaceted approach aligns with recent calls for better assessments of children's well-being in urban areas (Brown et al., 2019).

Informal destinations and their relevance to well-being domains are further supported by Lynch with four key aspects (Lynch, 1981): *presence* (access to local public/semi-public areas); *use and action* (possibility to play there freely); *appropriation* (perception of possessing that street with a group of others by frequently using/modifying spaces); and *disposition* (possibility for new children to join).

Our research demonstrates this through the wide variety of local destinations children use (*presence*). The use of informal locations that do not have rules and thus allow them to freely play how they want (*use and action*). Destinations where children frequently visit and manipulate objects to make it "their place" (*appropriation*), such as building snow structures or exploring abandoned spaces. Inclusive play in communal areas like streets, alleyways, and courtyards (*disposition*) that can be seen in previous research on social well-being (Waygood et al., 2021).

Parents' perspectives were often related to Lynch's (1981) concept of appropriation, where children feel ownership over unstructured places with no set rules, contributing to cognitive (creating their own games), social (playing with friends in yards/alleys), or psychological well-being (peaceful spaces to be alone). Playing in open spaces such as empty parking lots allows for creative games (cognitive well-being) or places that are special for children to be alone and feel more peaceful (psychological well-being) like a little corner of the backyard. Experts, children, and parents discussed unstructured destinations like trees, construction sites, swamps, common spaces, and abandoned areas that allow for Use and Action. This is consistent with the findings of a prior study that found children preferred green spaces for emotional experiences and action activities (Desjardins et al., 2022). According to experts, children can also make play spaces out of transitory places, like sidewalks, benches, or even bus stops. These destinations allow children to discover their surroundings through play (Rissotto & Tonucci, 2002; Villanueva et al., 2012), learn about risks (Bento & Dias, 2017), interact with peers (Waygood et al., 2020), and encourage social connections within their community (Waygood et al., 2020).

This research identified child-relevant formal and informal destinations from the perspectives of parents, children, and experts. The findings show that it is crucial for urban design and placemaking to ensure

children have access to safe and engaging spaces that are not always already structured for them (Derr & Tarantini, 2016). Children can interact with their peers in a child-friendly neighborhood through a variety of structured and unstructured activities that support their well-being (Prezza et al., 2010; Waygood et al., 2020). From a spatial analysis perspective, while informal places are important to children, it is difficult to directly measure accessibility to important destinations as such places are often not documented in GIS data.

This research further showed that important formal and informal destinations are both green (nature) and grey (human-made). Children's inputs differed from parents, often being much more about the informal than formal locations. Therefore, this research demonstrates the importance of children's involvement in shaping child-friendly public spaces that support their well-being. It is important for decision-makers to prioritize both formal and informal spaces that respond to children's needs. Additionally, innovative methods for documenting informal spaces in GIS data should be explored to improve children's walking accessibility measurement (A. M. Kyttä et al., 2012). As a result of involving children and the main stakeholders in the planning process, urban design can be more effective and inclusive, creating environments that promote children's physical, social, cognitive, and psychological development.

4.1. Limitations

This study focused on differences between children, parents, and experts, not differences within these groups caused by socio-economic or cultural factors. Although children were asked whether there were destinations that they did not go to but that they would like to go to, the diversity of destinations will be influenced by their lived context, physical capacity, economic situation, and social expectations. As such, there is an opportunity in the future to develop a more exhaustive list of all destinations or an analysis of how participation might differ within a group (i.e., the heterogeneity of children and parents). In other cultures, different destinations would probably exist, and future research could employ our methodology of identifying the characteristics (informal/formal and green/grey) to study how they might differ. As a result of recruitment challenges, participants may have been less diverse and representative. Moreover, when humans respond to other humans in person, there may be a possibility of socially desirable response bias, which results in participants responding in an expected manner (socially acceptable) rather than providing their true opinion. As a result, places not considered appropriate or socially desirable may not have been mentioned. However, the children and parents in our study mentioned places that may not have been legal, such as abandoned lots. Results may also be affected by cultural factors. The types of destinations that children might mention if they are closely supervised and discouraged from exploring unfamiliar places on their own would likely be limited to those they are escorted to.

5. Conclusion

This article reports on focus groups that explored the diversity of children's destinations and their potential impact on children's well-being. The focus groups were held with children (aged 8–12), parents (with the children aged 7–13), and experts. This is the first such approach to categorize children's destinations with respect to the different domains of well-being.

The results highlighted the significance of leisure destinations as places with high levels of affordance (Chaudhury et al., 2017) in children's daily travels, encouraging their social interactions, play, and community

connections. Among the different categories of destinations, parents mentioned mostly formal places like libraries for cognitive development while children mostly referred to informal destinations like alleys and parks for physical play, social connections, and psychological well-being. Experts discussed the importance of a wide variety of destinations for supporting children's cognitive development through active learning. This contrast underscores considering both green natural areas and grey urban spaces and including informal places to support children's diverse well-being needs through independent mobility, exploration, and unstructured play opportunities. Unstructured destinations were described as allowing children to explore and interact with their surroundings while developing cognitive, social, and physical skills.

The study makes several contributions: First, it identifies a diverse range of child-friendly destinations, both formal and informal, from the perspective of children, parents, and experts as key stakeholders. Children's insights about the places they travel daily were essential since their unique experience as the main actors may differ from adults.' Furthermore, the study assessed how various destinations may affect children's health. These results may aid future studies in developing tools to measure children's mobility and accessibility. It demonstrated how both green and grey destinations are important for children's diverse needs. The findings also emphasize the need for inclusive urban planning that takes children's perspectives into account. This systematic approach can be applied to different contexts to integrate formal and informal spaces into urban design, promoting holistic child development. The study clearly highlighted how a diversity of destinations beyond simply schools and parks are related to various aspects of health and well-being. As the use of destinations might vary culturally, future studies in diverse locations are recommended to better understand what is stable and what might be culturally anecdotal.

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Conflict of Interests

The authors declare no conflict of interests.

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From Decline to Renewal? Understanding Children's Relationship With Nature in the Wake of Covid-19

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Abstract

The pandemic has significantly interrupted the already declining relationship between children and nature in recent decades. Despite the widely recognised benefits of contact with nature for general well-being, efforts to improve this relationship and reconnect children with nature have been unsuccessful so far. Although the pandemic may have represented a kind of new opportunity to restart that relationship, several studies indicated a growing gap between those who regularly engage with nature and those who do not, a gap that has been exacerbated by the pandemic. This case study investigates how children perceive their contact with nature before, during, and after the pandemic, and explores its meaning. Participants, aged between 11 and 16 years old, were recruited from schools in both rural and urban areas of Czechia and completed an online questionnaire (n = 123), followed by online group interviews with those who consented. Descriptive analysis was used to analyse quantitative data, and later thematic analysis provided insight into open-ended questions and qualitative data from interviews (n = 20). Results showed that participants spent less time in nature now than they did during the pandemic, although they acknowledged the importance of nature. A commonly cited barrier to spending more time in nature is lack of free time. The overall accessibility and quality of nature in the neighbourhood influenced participants' time spent in and interactions with nature. Although they perceived some benefits, participants were reluctant to use virtual nature because of concerns about reduced contact with real nature and the accessibility of technical equipment. These findings provide valuable insights for local government to address issues such as accessible nature and the quality of natural areas in relation to the relationship between children and nature in the younger population. By creating such an environment, local authorities could improve the impact of nature as a resource for promoting children's mental and emotional well-being.

Keywords

children; nature relationship; post-pandemic; virtual nature

1. Introduction

Contact with nature is a fundamental aspect of life, providing a wide range of health, mental, physiological, and social benefits (Chawla, 2015; Fjørtoft, 2004; Gill, 2014; Keniger et al., 2013; Wells & Evans, 2003). Extensive research across various disciplines has documented that younger generations are increasingly reluctant to engage with nature, particularly when it comes to direct physical interaction. This reluctance may be linked to several factors, including the prevalence of indoor activities, a decline in outdoor play, and increased screen time (Hughes et al., 2018; Skar et al., 2016). Despite this, younger generations demonstrate a growing interest in conservation, ecology, and environmental sustainability (Rios et al., 2021), indicating a sustained interest in nature, albeit in a more detached manner. However, Kahn and Weiss (2017) and Louv (2005) emphasize that early contact with nature is crucial in fostering responsible environmental behaviour later in life. Therefore, it is essential to cultivate a positive relationship with nature from an early age.

The global impact of the Covid-19 pandemic transcended demographic boundaries, prompting extensive social research into its physical, social, and psychological effects. Children were a particular focus, with studies examining the challenges they faced, such as disruptions to routines and social interactions, as well as their resilience (Kaščák et al., 2023; Kusumaningrum et al., 2022; Russell & Stenning, 2023). The disruption of school routines and peer interactions further strained their relationship with nature, contributing to a decline in overall well-being and increased susceptibility to negative emotions (Cusinato et al., 2020; Lee, 2020).

The Covid-19 pandemic exacerbated the already tenuous relationship between children and nature, particularly due to reduced mobility (Larouche et al., 2023). This issue was pronounced for those living in housing without private or shared gardens, limiting their daily contact with nature. While a decline in the relationship with nature was anticipated due to mobility restrictions, research (Rios et al., 2021; Slater et al., 2020) revealed a more complex outcome: an increasing disparity between children who engaged regularly with nature and those who did not. Consequently, virtual nature emerged as a tool to reconnect visually the younger generation with diverse natural environments (Mado et al., 2022; Sprague et al., 2022).

The long-term effects of the pandemic on children's relationship with nature have not been thoroughly explored. Much of the research conducted during the pandemic relied on online surveys, questionnaires, or interviews focused on the spread of the disease and the impact of restrictions. While these quantitative studies provided valuable insights into children's lives during the pandemic, they often did not delve deeply into children's perspectives. Qualitative studies focused typically on the views of parents (Friedman et al., 2022; K. Howlett & Turner, 2022; Lemmey, 2020) or educators (Zwierzchowska & Lupa, 2021) regarding children's relationship with nature, neglecting the children's own perceptions.

To address this gap, this article aims to present a retrospective analysis of young people's (aged 11–16) relationship with nature, their appreciation of it, and their perceptions during and after the pandemic. Participants were recruited from four schools in typologically diverse areas of Czechia, followed by group interviews to explore emerging themes. Additionally, the study examined their perceptions of virtual nature to better understand the evolution of their relationship with the natural world.

2. Children–Nature Relationships: Pandemic

Defining the child–nature relationship is a challenging task due to its complexity and overlap with related concepts such as nature attachment, biophilia, biophobia, and emotional affinity with nature (Mayer & Frantz, 2004; Müller et al., 2009; Nisbet et al., 2009; Wilson, 1986). Given its ambiguity and breadth, connectedness to nature is often viewed as an analytically vague concept. However, this article is informed by the work of Chawla (2014) and Barrable and Booth (2020), who define children's connectedness to nature as their subjective state encompassing affective, cognitive, and experiential dimensions. This connectedness influences positively well-being and environmental attitudes and behaviours. A core assumption of this study is that increased time spent in nature strengthens this connection (Hatty et al., 2022).

The Covid-19 pandemic led to a marked increase in sedentary lifestyles and screen time, driven by factors such as online education and mobility restrictions (Donato et al., 2023; Slater et al., 2020). Children, particularly those without access to private outdoor spaces, experienced reduced contact with the natural environment, affecting adversely their mental health. Households with gardens had more opportunities to nurture children's relationship with nature, while others were limited to public green spaces, such as parks, which impacted positively children's well-being. However, the closure of parks and green spaces during the pandemic restricted physical activity opportunities, disproportionately affecting vulnerable populations (Slater et al., 2020). Overall, the pandemic underscored the importance of urban green infrastructure for mental health, including parks, home gardens, street trees, and other green elements integrated into the urban environment, which provide essential ecological functions and ecosystem services (Marques et al., 2021; Soga et al., 2021).

Previous research (Mitra et al., 2020; Rubáš et al., 2022) suggested that the relationship between children and nature either strengthened or weakened during the pandemic, depending on whether children chose to spend their increased free time outdoors or indoors. Some children, who already had a strong connection with nature before the pandemic, deepened this relationship with the additional free time available (Mitra et al., 2020). Increased screen time due to online education and mobility restrictions was a significant factor influencing this relationship. Conversely, some studies found that children rediscovered the value of spending time outdoors, actively seeking out natural settings (Macena et al., 2023). Thus, rather than simply rediscovering outdoor activities, the pandemic may have widened the gap between children who enjoyed nature and those who were less inclined to do so, both before and during the pandemic (Rubáš et al., 2022).

3. Virtual Nature

As previously mentioned, children's attitudes toward nature are shaped by family, school, and personal experiences. However, the media (internet, television) are supplanting increasingly these traditional influences, either strengthening or weakening the child–nature relationship depending on the nature of the interaction (Heerwagen & Orians, 2002). Modern virtual reality devices, which provide vivid audiovisual stimuli and create the illusion of presence in restorative natural environments, appear to be a logical step in reconnecting children with nature, given their deep engagement with technology and increasing screen time (Litleskare et al., 2020). The concept of virtual nature is multifaceted. For some, it involves real nature reproduced through mediums such as video or sound, while for others, it refers to fully rendered environments with no real basis in nature (de Kort et al., 2006). When evaluating the impact of virtual nature,

it is important to critically assess results, as it is easy to create visually appealing, yet potentially misleading, representations of nature (Valtchanov et al., 2010). Participants in such research may hold biased views of virtual nature.

Over the past year, research on virtual nature has expanded, partly in response to the global pandemic and the resulting inaccessibility of natural environments. Virtual nature or virtual technologies (see Kahn et al., 2009) are tools that mediate, augment, and simulate our experiences of the natural world. Pandemic-related restrictions have accelerated the use of virtual approaches and technologies to disseminate and promote access to historical, archaeological, and natural sites. Virtual environments are also used frequently to promote and make accessible unexplored locations, such as underwater heritage sites (Bruno et al., 2018).

Despite ongoing debates about the educational and cognitive benefits of virtual nature (Mado et al., 2022), Owens and Bunce (2023) argue that exposure to virtual nature can have mental health benefits, particularly in stressful times. Li et al. (2021) concluded that virtual nature promotes relaxation, restoration, and pain relief, similar to real nature, although the benefits are not significantly greater. However, the long-term integration of virtual nature into daily life remains a subject of debate (Litleskare et al., 2020). On the other hand, Ballouard et al. (2011) suggest that reliance on such media may undermine children's knowledge of nature, as they tend to focus on a few popular species (e.g., polar bears, dolphins) while neglecting their local environment. Even during the pandemic, virtual connections to nature were found to be less effective than personal experiences in enhancing children's relationships with their surroundings and fostering environmental awareness (Sprague et al., 2022). Fiorillo et al. (2021) suggest that educational institutions play a crucial role in facilitating these experiences, although there is still some reluctance regarding the objectives, methods, and implementation of such activities.

4. Methods

A mixed-methods approach was employed, incorporating an electronic survey followed by group interviews to achieve the stated research objectives. This methodology was selected to better capture the complex relationship between participants and nature. The methods served primarily as a means to reach the final results. The survey began with broad questions about participants' relationship with nature, progressing gradually to more specific inquiries. A similar strategy was applied during the interviews. As mentioned previously, much of the existing research has focused on quantitative data or adult perspectives on children's relationship with nature during the pandemic. Therefore, this study seeks to generate less common but equally valuable data by incorporating children's perspectives.

4.1. Participants

Seven schools in Czechia were invited to participate in the research, and four schools provided usable questionnaire data for further analysis. In the Czech context, these grammar schools are generally associated with general studies and high academic achievement among students. They are also linked to the upper and middle socioeconomic classes, as quality education becomes increasingly costly (Crozier, 2014). The goal was to ensure equal representation from rural, suburban, and urban schools (see Figure 1). Headmasters, parents, and students were informed about the research in advance and consented to participate. Out of a potential 446 participants, 124 completed the questionnaire, although one response was left blank, resulting

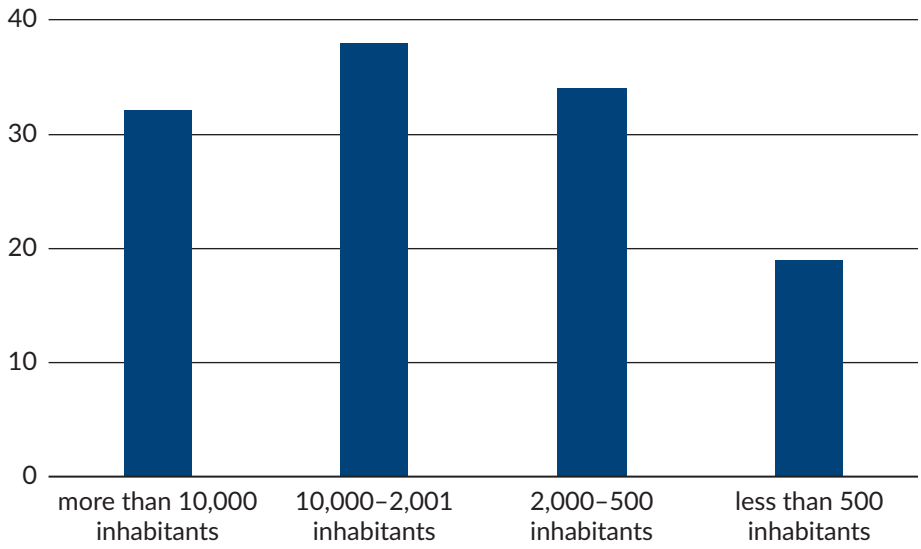

Figure 1. Distribution of participants by municipality size.

in a final sample size of 123 participants, consisting of 50 males and 73 females. Most participants (93) lived in households with access to private gardens, as many homes had attached garden spaces. The high number of independent housing units was observed in both rural and urban areas. Informed consent forms were distributed via email and were obtained from both participants and their caregivers. The consent documents were collected physically with the assistance of teachers. The research was introduced through a brief preamble at the beginning of the questionnaire and a short video created specifically for this study. The chosen age group, 12 to 16 years, represents the period just before children begin to gain some independence in moving around their neighbourhoods. Participation in the research was voluntary and not influenced by either teachers or the researcher.

4.2. Questionnaire

The questionnaires contained both open-ended and closed-ended questions, with the former assisting in the preparation of participant interviews (Table 1). The questions and responses were tailored to be age-appropriate in terms of language and complexity. No intimate or potentially harmful questions were included. The questionnaires, administered by teachers in class, were completed online and took, on average, less than 10 minutes. Teachers were informed of the study's objectives and were available to assist participants with any misunderstandings or queries. For those unfamiliar with the concept of virtual nature, a brief explanation with examples was included in the questionnaire. The primary aim of the questionnaire was to gain initial insights into the participants' relationship with nature, their perception of changes during and after the pandemic, and how they spent time outdoors. A dedicated section focused on virtual nature and the participants' engagement with it in their daily lives.

The virtual nature section was primarily designed to prepare participants for the interviews, as it is a relatively new phenomenon with limited empirical studies addressing it. Therefore, only quantitative questions were used to explore their opinions and perceptions in greater depth during the interviews. Defining virtual nature was essential for research purposes. A simple definition was provided after the first question to ensure that all participants understood the term.

Table 1. Questions contained within the online survey.

Did you visit unfamiliar places in nature during the pandemic? Q Describe what places were involved. q Did you go back to places/nature during the pandemic where you had not been for a long time? Q What activities did you do outdoors during the pandemic? q What types of natural environments did you visit? Q How regularly did you interact with nature during the, i.e., school closures? Q How did the restrictions affect your going outdoors during the pandemic? q Did you seek out nature intentionally? Q Were your outdoor activities any different during and after the pandemic? Q In what ways did your activities change? Q How would you compare how often you went to nature during the Covid pandemic and how often you go now? Q Why do you think going to the outdoors has changed/not changed? q Do you perceive benefits of going to nature in your life? Does going to nature make you feel good? Q How would you rate your relationship with nature—going to nature, being active in nature, physically interacting with animals or plants? Q How would you rate the attractiveness of the natural environment to visit in your area? Q What are your favourite memories from the pandemic? Q
How familiar are you with the concept of virtual nature? Q Do you think that virtual nature, e.g., walking in a virtual jungle with 3D glasses, can increase interest in nature? Q Have you participated in any online virtual tours, e.g., of a national park during the pandemic? Q Would you appreciate it if virtual nature was part of the curriculum at your school? Q Can you imagine that in the future virtual nature could partially replace physical contact with nature? Q
In what size municipality do you live? What is your gender? Do you live in a house with a garden? How old are you?

Notes: Q = quantitative question; q = qualitative question.

4.3. Interviews

Twenty participants, including 13 males and 7 females, agreed to participate in follow-up group interviews. These interviews were conducted synchronously online in groups of four. Whenever feasible, two participants who knew each other were placed in the same group for balance. The purpose of the discussion was to elaborate on the research themes and explore narratives that emerged from the questionnaire results (see Table 2). Given the online nature of the research, interviews were also conducted online, allowing for more flexibility in scheduling (M. Howlett, 2022). This format provided an opportunity to introduce virtual nature tools. With participants' consent, the entire session was recorded, either as a video call or voice-only recording. The transcripts were pseudonymized, and only these versions were used for further analysis.

The group interviews followed a semi-structured format. Several questions were pre-prepared based on the previous questionnaires. The number of questions was kept lower than usual for adult research, as younger participants tend to be more attentive in shorter sessions (Einarsdóttir, 2007). On average, the interviews lasted less than an hour.

Table 2. Thematic questions of semi-structured group interview.

Relationship to nature
How do you spend your time now in general?
Do you feel your parents or family encouraged you or discouraged you to go outdoors to nature before/during/after the pandemic? How?
How did you feel about restrictions during the pandemic?
Did you meet with friends during the pandemic? In nature?
Are you coming back to these places? Why?
Do you feel any nostalgia about that period regarding your free time?
Virtual nature
[Short presentation of several online websites providing some form of virtual nature]
How would you define virtual nature? What does it include?
What is your opinion on virtual nature regarding the relationship with nature?
What seemed to be the problems with applying virtual nature in schools?

4.4. Analysis

Data cleaning involved both manual and semi-automated methods to ensure accuracy and consistency across the dataset. Basic descriptive statistics, including measures of central tendency and dispersion, were conducted. The analysis revealed key patterns, such as variability in participants' relationship with nature, offering valuable insights into children's perceptions of their outdoor experiences. Strategic triangulation was employed by matching the questionnaire results with interview data. Through manual coding and thematic analysis, as outlined by Braun and Clarke (2006), responses were categorized into different themes, enriching our understanding of underlying trends. Multiple rounds of coding were conducted, moving from open coding to selective coding. The first phase involved a thorough reading and immersion in the data. In the second phase, codes were generated, resulting in the identification of 38 initial codes. These codes were compared for similarities and differences, with similar codes being merged. Following this process, 11 general codes emerged from the dataset. In the third stage, themes were identified by grouping codes with shared underlying meanings. These themes were then refined into the following: Time, companionship, mental well-being, physical activity, nature as a goal, nature as a background.

5. Results

5.1. Children–Nature Relationship: Current State

Overall, participants reported that their outdoor activities in nature had varied during the pandemic (yes = 89; no = 35), spending more time in places closer to home rather than moving more spontaneously and choosing more often from options where to go. This was obviously influenced by various mobility restrictions and participants and their families tried to make do with what they had, sometimes even balancing on the edge of restrictions by creating their own or shared spaces such as an outdoor fireplace or secret tree house:

> My family and another three created a secret fireplace beyond our village so we could grill.

Participants often chose places with abundant greenery, anticipating fewer people and discovering new areas away from their usual spots and farther from home. These places included abandoned quarries, small woods, bodies of water, or surrounding hills (Figure 2). The sense of adventure in exploring new but relatively nearby locations was frequently noted. Parental intervention also played a role, guiding participants to remote yet familiar places. As one participant described, mountains and caves were mentioned frequently as main destinations:

> My mother planned a trip to the karst, walks around the river, or mountain hiking. It was our only option to be together while outside.

More purposeful mobility in or around the immediate neighbourhood may have fostered a stronger sense of attachment to place, especially to nature and public spaces (K. Howlett & Turner, 2022; Mitra et al., 2023). Participants, particularly those from urban areas, noted a scarcity of places to spend extended periods close to home. Often, such places were occupied or restricted, leading them to stay at home or travel outside the built environment to maintain social distance. This highlighted a pre-existing issue in some cities regarding the adequacy of third spaces, such as playgrounds, swimming pools, and parks, which were insufficient even before the pandemic (Martori et al., 2020).

In evaluating their current (post-pandemic) relationship with nature, relatively few participants reported that it had improved or remained the same as before. Many cited a lack of time due to school commitments, hobbies, and other interests as barriers to interacting with nature:

> There was nothing better to do than go outside. Now there are many duties (school, housework) and possibilities to do.

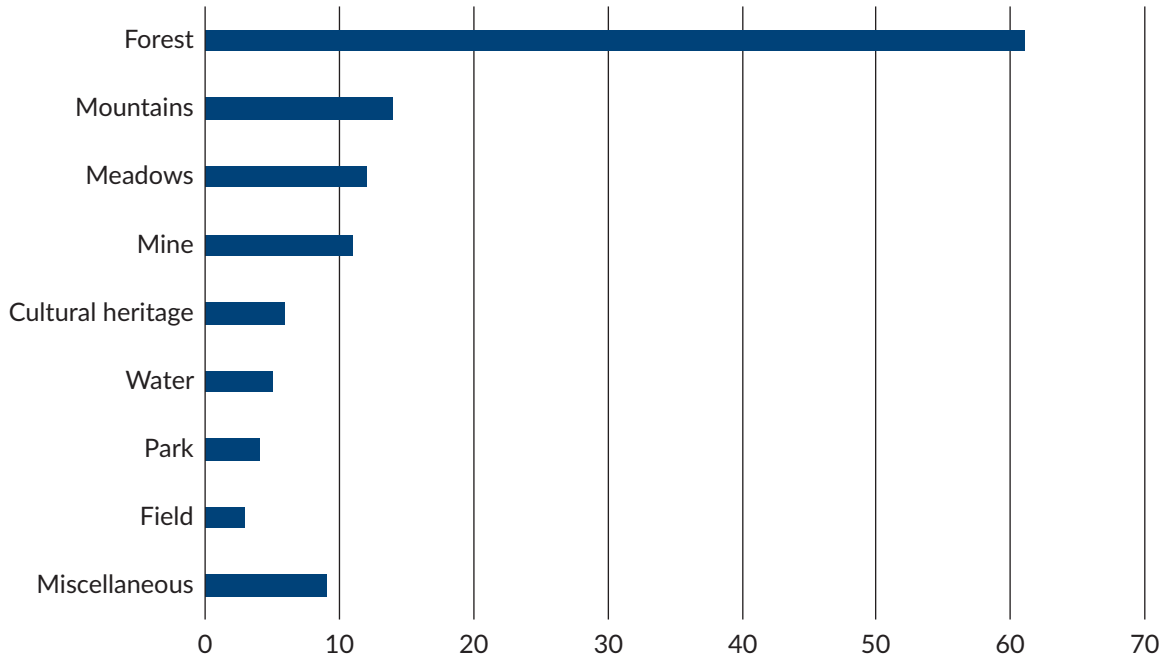

Figure 2. Types of places participants visited during the pandemic.

> I have no time to go into the nature. In lockdown we didn't have hobbies so you had free time, and you were bored at home, so you could go outside.

Only 12 respondents reported regularly visiting newly discovered sites. When asked if they perceived a change in their relationship with nature, participants were split (yes = 42; no = 81). These results are notable given the decrease in perceived time spent in nature during the post-pandemic period (Figure 3).

This split highlights the complexity of the relationship with nature, emphasizing that it involves not just direct contact but also an emotional connection (Gill, 2014). Participants valued knowing that nature was accessible and could be explored as needed. The nature of the places visited and the activities performed there were also significant, as these activities potentially mitigated health, psychological, or social issues (Mitra et al., 2020).

Some participants reported using natural environments for exercise, such as training or working out. This was mentioned 38 times in the questionnaires, with walking being the most frequent activity. In interviews, participants noted that these walks helped them clear their minds, exercise, or escape the confines of their homes. Conversely, those living in apartments recalled spending more time sleeping, playing computer games, and experiencing less school-related stress. Participants indicated that while they travelled further and in larger groups less frequently, they now spent more time in fewer places. The ability to hang out and remain out of sight contributed to their well-being (Pyyry, 2017):

> It was weird to sit anywhere. Nobody knew if it was allowed or not or if someone would come upon us.

Kras and Keenan (2023) found that physical activities like cycling, walking, and running during the pandemic were effective in reducing anxiety, particularly when most social activities were banned. These activities also helped maintain physical fitness and build resilience against illnesses. Access to nature in areas where children live, play, and learn supports physical health, fosters a sense of belonging to other species, and enhances imaginative play with the natural world (Flint et al., 2022).

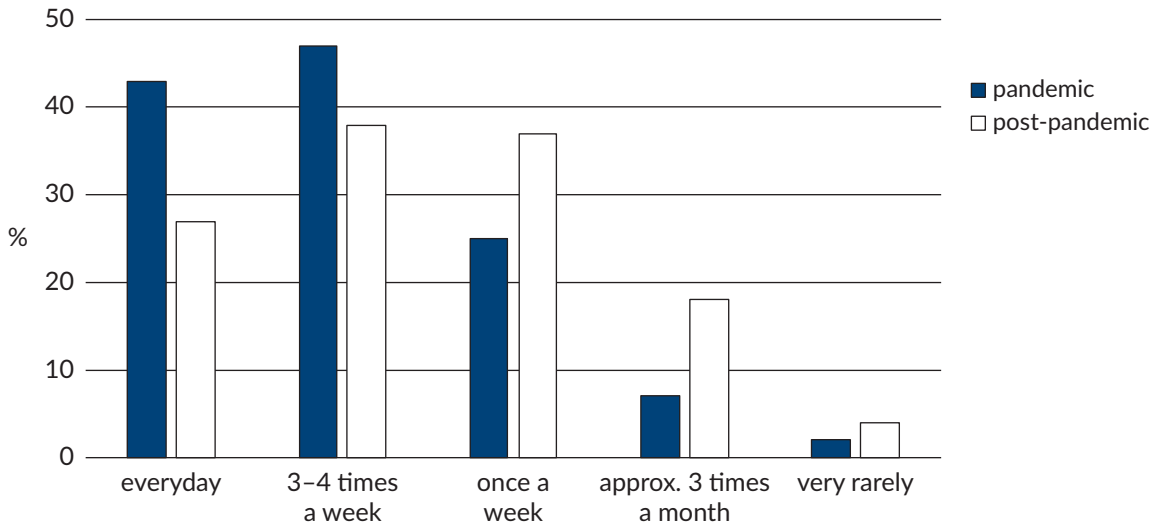

Figure 3. Contact with nature in the pandemic and post-pandemic period.

Parents and family members played a crucial role in facilitating contact with nature, especially if the family had a garden. Those with gardens engaged in gardening activities, while those without used public nature areas or family cabins. Additionally, parents planned trips and activities in nature, whether close to home or further afield, as these were seen as safe and accessible:

> Me and my family went to places I had never been before, and I will probably never be again. Like I was on the mountain Říp.

> Together with my family we visited the surroundings of the local mine and karst.

The importance of parental involvement in fostering a positive relationship with nature among children has been reaffirmed by numerous studies, and this research aligns with those findings. Parents play a crucial role in shaping many aspects of their children's lives, and this extends to encouraging time spent in nature. As Eagles and Demare (1999) point out, parents are key influencers in activities such as visiting natural spaces, and their attitudes towards nature significantly impact their children's relationship with it. By actively engaging in and promoting outdoor activities, parents can cultivate a lasting connection between their children and the natural environment, one that may endure into adulthood.

However, not all parents fully recognize the importance of nature in daily life. According to Kadury-Slezak et al. (2023), some parents may underestimate the role that nature plays in their own and their family's well-being. This underestimation can lead to negative consequences, such as poorer mental health and reduced physical well-being for both parents and children. When nature is not prioritized, families may miss out on the calming and restorative benefits that natural environments offer, leading to increased stress and reduced resilience.

Jackson et al. (2021) further emphasize the positive effects of regular engagement with nature. They highlight that incorporating nature-related routines into daily life—whether through walks in the park, gardening, or simply spending time outdoors—can have a calming effect on individuals. These routines can enhance mental resilience and contribute to overall well-being. For participants in this study, it is likely that nature played a similar role during the Covid-19 pandemic, providing a space for relaxation and a buffer against the stresses of isolation and uncertainty.

5.2. Virtual Nature

Although there is potential within this area, participants throughout the age range and dwelling type did not share the enthusiasm (Figure 4). However, they can see it work in some stages, and especially children from less populated areas saw this as a threatening factor for generally being outside. Although they were a bit reticent, as the results above suggest, the desire to discover new places in reality may be the right way to guide them to use virtual nature, as through it the participants are aware that new places can be discovered.

Participants recognized that there is significant potential for improvement in how remote areas or specific biomes are represented within virtual nature applications. They expressed the belief that more realistic and detailed depictions could enhance user engagement and educational value. However, some participants also voiced concerns that such immersive and lifelike representations might inadvertently discourage physical travel and exploration. The fear was that, if virtual experiences became too convincing, users might feel as

though they had already seen certain natural sites, reducing their desire to visit these places in person. This duality presents a critical challenge: how to enhance virtual nature applications while avoiding the unintended consequence of diminishing real-world exploration and experiences. As one participant stated:

> They will see it and then they will not go there in real life to see for themselves.

Interestingly, the survey data and subsequent interviews revealed that there were minimal, if any, significant differences between genders in how participants perceived the usefulness of virtual nature (see Figure 4). This suggests that virtual nature applications have a broad appeal that transcends traditional gender lines. The universal appreciation of virtual nature among both male and female participants indicates that these tools have the potential for widespread adoption, without the need for gender-specific adaptations or marketing strategies. This inclusive appeal highlights the possibility of integrating virtual nature applications into various educational and recreational settings for diverse audiences.

Furthermore, participants identified a substantial educational opportunity within virtual nature applications, particularly in their ability to present rare and unique natural phenomena—events that most people would never witness in person. Examples mentioned included volcanic eruptions, tornadoes, avalanches, and other dramatic occurrences. The potential for experiential learning through these immersive technologies could allow users not only to witness these phenomena but also to better understand the science and environmental factors behind them. This positions virtual nature as a powerful tool for education, especially in science classrooms or environmental studies programs, where firsthand experiences of such events are typically impossible.

When prompted to elaborate on their views regarding the educational and recreational value of virtual nature, participants often referred to the 3D visualization and immersive qualities found commonly in computer-generated open-world video games. These types of virtual environments, which allow users to explore vast, interactive maps, were favoured far more than simpler or less interactive forms of virtual

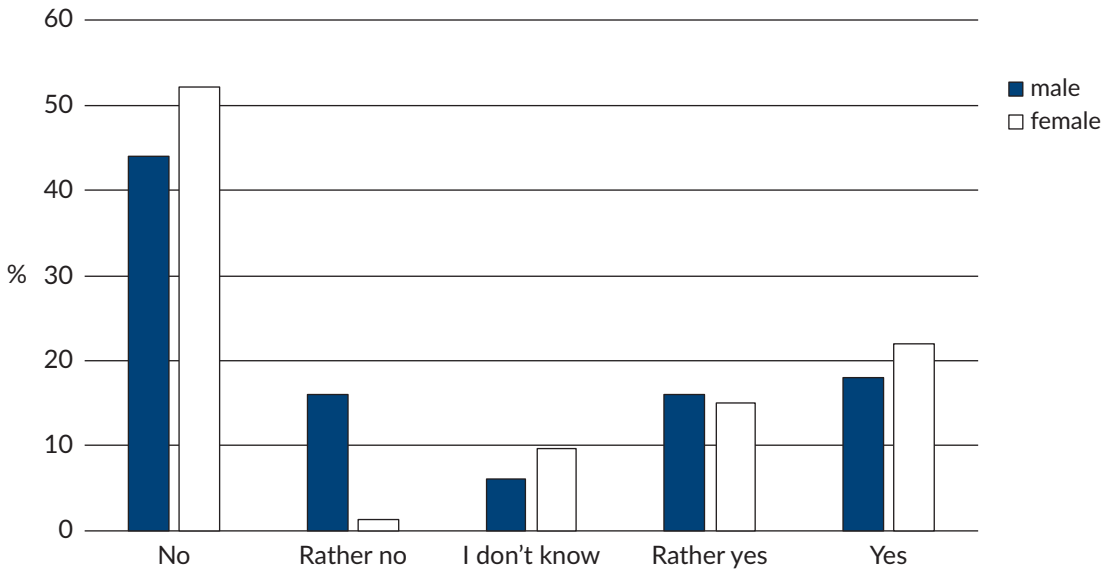

Figure 4. The usefulness of virtual nature in education.

nature. This preference for rich, engaging environments suggests that the gaming community could be a key demographic for the promotion and expansion of virtual nature applications. By incorporating gaming elements—such as multi-sensory stimulation, exploration, and interactivity—developers of virtual nature platforms may find a more enthusiastic and engaged audience.

Despite the excitement around advanced virtual nature experiences, participants also raised concerns about the accessibility of these technologies, particularly for individuals and families from low-income backgrounds. The high cost of the necessary equipment—such as 3D glasses, virtual reality headsets, or other specialized devices—was seen as a major barrier to access. This highlights an important equity issue that could hinder the widespread adoption of virtual nature applications. To achieve success and inclusivity, it will be crucial to ensure that these technologies are affordable and accessible to a broad audience:

> They [other children] could not afford to go on summer holiday; why would they buy such things?
>
> I would not even ask my parents to buy it.

This study highlights potential socioeconomic challenges related to the accessibility of virtual nature. Participants recognized the issues that could arise from these technologies' introduction, showing empathy for those affected, particularly during the initial stages of a potential boom. It is important to reconsider participants' class and educational backgrounds, as these factors significantly influence their relationship with virtual nature (Mado et al., 2022).

Another critical aspect to consider is the level of technical proficiency required to operate virtual nature applications. Several interviewees expressed concerns about their ability to effectively manage these devices, citing a lack of confidence in their technical skills. This concern represents a potential barrier to the adoption and successful use of virtual nature applications, emphasizing the need for user education and support systems.

6. Limitations

When analysing the results, no significant differences were observed, except for minor variations related to gender and urban versus rural settings. These small differences could be attributed to the unique characteristics of Czech cities, which are relatively small and not very dense. This urban layout may limit children's access to nature compared to those in rural areas. Another limitation involves participants' understanding of nature. Interviews revealed differing perceptions: While some considered sitting under a tree on a concrete street as a connection to nature, others associated nature with the natural environment outside urban areas. These differing definitions influenced responses to questions about nature close to participants' homes, leading to inconsistencies in the data. Vague definitions of key concepts like children's relationship with nature and virtual nature offered limited analytical value, despite textual explanations provided in the questionnaire.

Demographic factors also likely influenced the results. Participants predominantly came from middle-class backgrounds, which may have afforded them better access to organized or unorganized leisure activities. Further research is needed to examine how the Covid-19 pandemic has impacted this generation's

relationship with nature. Although this study touches on the topic, it cannot draw definitive conclusions about the role of biophilia or biophobia in shaping these relationships (Wilson, 1986). Additionally, pandemic-related restrictions were treated as a homogeneous experience, despite variations in policies and their impact on daily life over time. Participants were asked to reflect on experiences from three or more years ago, so nostalgia may have influenced their responses, particularly regarding how they spent their time during the pandemic.

7. Conclusion

Overall, participants perceived nature as contributing to their well-being, whether through exercise, solitary walks, or simply being outdoors. These activities provided a sense of belonging and supported their mental and physical health. The Covid-19 pandemic prompted a noticeable shift in children's relationship with nature, with increased appreciation and use of natural spaces during periods of lockdown. However, as society moves beyond the pandemic, participants—especially those in urban areas—face the challenge of finding time for meaningful interactions with nature amid the return to school and extracurricular activities.

Participants acknowledged the independence and free time that allowed them to explore nearby natural and cultural sites during the pandemic. The findings suggest that, with some exceptions, participants generally had a positive relationship with nature. However, they expressed a desire to spend more time in nature than they currently do, raising questions about whether this is due to a genuine lack of time or a perception that time spent in nature is unproductive. The variety of available leisure activities and preferences for non-natural pursuits may contribute to this perception. Notably, the results indicate that more time in nature does not necessarily lead to a stronger relationship with it. Instead, participants seem to have rediscovered the importance of nature for their well-being due to their pandemic experiences.

Given the high demands on participants' time and their numerous responsibilities, it is tempting to recommend educational reforms that emphasize greater independence for young people. However, such changes may be difficult to implement within the rigid structure of the educational system, where schoolwork and homework are time-consuming activities. A more feasible recommendation could be for schools to dedicate more time to outdoor learning, though such initiatives are already underway with varying levels of success. Several studies, including those by Slater et al. (2020) and Soga et al. (2021), have provided guidance to governments and administrators on enhancing children's relationships with nature.

Urbanization is considered one of the factors contributing to the decline in children's connection to nature (Soga et al., 2021; Zhang et al., 2014). Although this study reported positive relationships with nature, there remains a noticeable disparity between participants from urban and rural areas in terms of both virtual and physical nature experiences (see Izenstark & Sharaievska, 2022). This research supports calls to make high-quality natural spaces in cities more accessible to the public.

Finally, this article contributes to the discussion on virtual nature's role in the post-pandemic world from young people's perspectives. While it does not downplay the potential of virtual reality to foster connections between children and nature, it argues that there is still a long way to go before young people fully embrace virtual nature. Rather than dismissing this relationship as a dead end, virtual nature could offer a time-efficient alternative for those with limited time but an interest in connecting with nature. Although participants were

not entirely negative toward virtual nature, many associated it with playing computer games. Girls, in particular, were more sceptical, reflecting their positive attitudes toward physical interactions with nature (Mado et al., 2022). Gamification and increased interactivity could attract more young people to virtual nature. Further research is needed in this emerging field, particularly to explore how virtual nature can be popularized and made accessible to all.

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Conflict of Interests

The author declares no conflict of interests.

Data Availability

The data that support the findings of this study are available from the author, Daniel Kaplan (d.kaplan@mail.muni.cz), upon reasonable request.

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Active but not Independent: Children's School Travel Patterns in a Compact-City Environment in Greece

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Abstract

Children's active travel and independent mobility, especially regarding their daily travel to and from school, is essential for their wellbeing, influencing their physical health, psychology, social and cognitive skills, as well as priming children and youth for active and sustainable mobility choices when they become adults. Although active travel and independent mobility are interrelated concepts, they are quite distinct from each other, since a child's active travel to school, on foot or by bicycle, can also occur with an adult escort. This article investigates children's school commute patterns in a compact-city environment, using a structured questionnaire addressed to parents of elementary school children. The empirical study was conducted in Kordelio-Evosmos, a densely populated municipality in western Thessaloniki, which has one of the highest percentages of child population among Greek cities. The survey included questions about children's school travel patterns, parents' own perceptions of the characteristics of the school route, and their views regarding the overall quality of the neighbourhood environment. Children's age ranged from 6 to 12 years, with 72.82% being 9 years or over. We found that 66.5% of the children commute to school on foot; however, only 14.08% do so on their own. Parents' decision to escort their children along the route contradicts the area's compact-city attributes, such as short distances between home and school and mixed uses. Problematic aspects of the neighbourhood environment such as unsafe crossings, poor pedestrian infrastructure, and drivers' illegal behaviour were found to influence parents' decisions over their children's travel modes.

Keywords

active school travel; children's independent mobility; compact city; elementary school; Greece; parental attitudes; pedestrian infrastructure; traffic danger; walking with adult escort

1. Introduction

The journey from home to school and back constitutes a meaningful part of children's and young people's everyday life and it is influenced by intrapersonal, interpersonal, and physical environment factors (Wilson et al., 2018). School travel modes include active mobility, such as walking, cycling, and roller-skating, and motorised travel, such as school buses, public transport, and private cars, usually driven by a parent or guardian. As a behavioural choice, the mode of school travel depends on many factors, including the age and gender of the child, the characteristics of their family, the distance between home and school, the physical design of the route, the available means of public transport, the climate and weather conditions, and the dominant culture (Lee et al., 2013). During past decades there has been a reduction of active travel in the Western world and an increase in passive modes of mobility (Shaw et al., 2015), leading to the rise of the so-called "back-seat generation" (Karsten & Van Vliet, 2006) with negative consequences on the physical and mental health of children (Rothman et al., 2018) and on street traffic in cities (McMillan, 2007). Active school travel (AST) as a habit of children promotes physical activity and good health (Larouche et al., 2014), while decreasing car dependency (Mammen et al., 2015).

Studies on AST are part of research on children's independent mobility (CIM), a term referring to children's freedom to get around in their neighbourhood unaccompanied by adults (Hillman et al., 1990). Independent mobility is a fundamental right of children, recognised in the UN Convention on the Rights of the Child (1989), which states that children should be able to live in an environment that meets their physical, social, and mental needs (Convention on the Rights of the Child, 1989, Article 27). CIM as a research subject is addressed in studies in various disciplinary fields, from children's geographies (Schoeppe et al., 2016) to transport studies (Mehdizadeh et al., 2016), paediatrics (Mah et al., 2017), and public health (Ramanathan et al., 2014).

Although AST and CIM are interrelated concepts, they are quite distinct from each other, since a child's active travel to school, on foot or by bicycle, can also occur with an adult escort (Mammen et al., 2012). The decision to accompany the child has been found to be primarily influenced by parental concerns about traffic, the child's personal safety, and the child's maturity and cognitive ability regarding navigating their way to/from school safely (Faulkner et al., 2010). Accompanied by an adult or not, the child who travels actively to school enjoys the same benefits of exercise (Faulkner et al., 2009). When escorted, children experience positive emotions, as being accompanied along the way to school gives them the opportunity to interact with the parent (O'Brien, 2001). On the other hand, when a child travels to school accompanied by an adult, they miss opportunities to gain self-confidence and autonomy, exercise social skills, and engage in spontaneous activities such as play (Weir, 2023). To escort the child on the school journey also entails a time commitment and planning ahead for the caregivers, which is a barrier for many parents (Zuniga, 2012). Ideas such as the walking school bus respond to the need for safe active travel while reducing the time commitment for parents. At the neighbourhood level, a group of children, accompanied by two adults, a "driver" at the front and a "conductor" at the back, walk on a set route picking up additional "passengers" at specified stops along the way. Walking school buses provide a structured means of active travel, yet the walking they facilitate is itself a highly supervised and controlled means of transport (Kearns et al., 2003).

2. Children's Mobility Patterns, Their Wellbeing, and Urban Sustainability

Children's active travel and autonomous mobility are both linked with their wellbeing. Wellbeing is a holistic concept, albeit elusive in its definition (Jarden & Roache, 2023). In the case of children, the term "wellbeing" is defined by indicators of material wellbeing, based on objective data, and by subjective indicators, based on individuals' personal evaluation. Within the domain of material wellbeing, indicators of low wellbeing include living under the poverty line, living in homes with few education resources, and lack of employment of parent-adult, while subjective indicators refer to aspects of life such as social connections, perceived quality of life, and sense of life satisfaction (Statham & Chase, 2010). Wellbeing is also connected with the learning opportunities of the child and the financial situation of the child's family (Waygood et al., 2017), as well as with the rights of the child (Statham & Chase, 2010). UNICEF (2020) applied a multi-faceted approach to measure children's wellbeing in 38 developed countries, incorporating children's mental wellbeing, physical wellbeing, and skills for life, which include basic academic and social skills. Although children's mobility mode is not one of the variables studied, the UNICEF report found strong links between happiness and the frequency of playing outside, which is an activity that is supported when CIM levels are high (Weir, 2023). For example, Rissotto and Tonucci (2002) found that children who go to school on their own are more likely to be allowed to go and play outside with their friends than the ones who are driven by car or accompanied on foot. The differences in happiness between children who rarely played outside and those who did so daily were found to be substantial—"more than 1 point on a happiness scale of 0 to 10 (from least to most happy)—in almost every country" (UNICEF, 2020, p. 21).

In their comparative study in 16 countries, Shaw et al. (2015) found a positive correlation between the level of CIM and the country's UNICEF ranking in children's wellbeing. In an integrative review, Waygood et al. (2017) investigated the link between transport mode and children's wellbeing. Results showed that mode of transport plays a role in all domains (cognitive, psychological, physical, social, and economic) of children's wellbeing, with active travel and independent travel having a positive correlation, while most negative impacts are associated with traffic. Empirical studies on how children's mobility patterns influence their wellbeing show that children living in environments that allow them to get around in active and independent ways benefit psychologically and socially and have greater levels of wellbeing (Leung & Loo, 2017; Ramanathan et al., 2014; Stark et al., 2018; Weir, 2023; Westman et al., 2013). In a pan-Canadian study, Ramanathan et al. (2014) found that AST relates to self-reported emotional benefits and a higher degree of feelings of happiness compared to passive modes of transport. Children and parents who travel by car and other forms of passive travel are significantly more likely to experience negative emotions like feeling rushed or tired. Westman et al. (2013) also reported higher levels of pleasure in children who used active mode of school commute. Weir (2023) found that the level of autonomous mobility is linked with children's sense of wellbeing, as it relates positively to the amount and quality of time they spend actively in their neighbourhood for either travel or play, their confidence in getting around, and their sense of control in the use of their neighbourhood.

Children's mobility patterns have a profound effect on their quality of life but also on the overall sustainability of cities. Sustainability combines economic development, social development, and environmental protection with full respect for all human rights and fundamental freedoms (UN-Habitat, 1996). Children's mobility choices, as a collective behaviour, influence the environment (Wu et al., 2020), the economy (Pojani & Boussauw, 2014), and the wellbeing of the community (Ramanathan et al., 2014). Although extensive sociological and environmental research highlights how urban environments and the

form of cities influence sustainable mobility and vice versa, less emphasis has been given to the role of children's mobility in this trend, as well as how it impacts carbon emissions in a city (Gilbert et al., 2017). While many studies connect the rising use of the private automobile with several illnesses in children (i.e., diabetes, obesity, and cardiological problems), its long-term impact on attitudes that will accompany children when they become adults has not been sufficiently examined (Gilbert et al., 2017). By being driven from a small age in the back seat of a car, often for trips of very short distance, children acquire habits that are contrary to the current quest for more sustainable and emissions-free urban environments through the promotion of active travel and use of public transportation (Cook, 2019).

Although there are fluctuations in the degree of independent mobility among various countries, studies show there are common trends that relate the decline of CIM to an increase of fear for children's safety (Leung & Loo, 2017). Indeed, safety concerns, especially traffic danger, seem to be a crucial factor for parents to be reluctant to allow their children to travel independently (Ridgewell et al., 2009). Statistics confirm these parental fears. Traffic accidents are the leading cause of death for the age group 0–24 in the European Union (Sethi et al., 2007). Counterintuitively, to protect children from traffic danger, parents often choose to drive them to school. Apart from being a passive mode of travel, the use of cars for the daily commute to school raises the risk of accidents for children walking or biking, since the volume of traffic in children's routes to school is much bigger (United States Department of Transportation, 2004). Private cars also increase ambient local concentrations of pollutants in school areas (Adams & Requia, 2017). Addressing the need to reduce car usage, Safe Routes to School is a federal-budget-funded program that aims at strengthening children's ability to travel to school safely and actively (United States Department of Transportation, 2004). The emphasis is on active, not necessarily independent travel. Children may be accompanied by adult guards along the route, as in the case of walking school buses.

The multi-faceted importance of children's mobility both for children themselves and for the society and the communities they live in has led to a growing volume of research in the past four decades (Gaster, 1992; Hillman et al., 1990; Pooley et al., 2010; Shaw et al., 2015), including comparative studies that document the decrease in children's active and independent mobility through time in various countries (Babb et al., 2017; Prezza et al., 2001; Schoeppe et al., 2016). In Greece, however, research in this field is much less advanced. Basic data on how children move, at local and national level, are missing, as no national survey on children's mobility has ever been conducted. We only found very few studies on school travel in different geographical regions of the country. In her doctoral dissertation, Kotoula (2021) investigated school mobility patterns of students attending public primary and high schools in eight municipalities of the greater urban area of Thessaloniki, as reported by their parents. Tampaki et al. (2023) studied the mobility modes of high school students in the small town of Orestiada, emphasizing how the use of bicycles could be promoted. In his graduate thesis, Karakatsanis (2010) studied the relationship between AST and levels of physical activity in students aged 11–18 on the island of Samos. In Greece, traffic accidents with children victims are common, thus fear of traffic keeps an increasing proportion of parents away from allowing their children to walk or cycle on their own (Katsavounidou, 2021). At the same time, children's safety is, sadly, connected to the perceived need to "educate children" on traffic rules instead of questioning the problematic environmental conditions and social behaviour that create traffic danger. As Waygood et al. (2017) point out, however, children should not be "burdened with the responsibility of road safety when they are not the ones creating it" (Waygood et al., 2017, p. 47).

This article's study area is the municipality of Kordelio-Evosmos in the western part of the greater urban area of Thessaloniki. Kordelio-Evosmos has one of the highest percentages of children and youth among Greek cities, having attracted mainly young families during the past two decades. We hypothesised that it would have more child-friendly characteristics than other urban areas whose populations have been shrinking in the same period. We aimed to gather data about how children commute to school and to examine how parental attitudes on school travel correlate with the level of sustainability of the urban environment, and especially the conditions of the pedestrian landscape in their neighbourhood. At the beginning of our study, given the lack of previous data, we were interested in both concepts, AST and CIM, as there was uncertainty regarding the nature of the problem: In a densely built, compact city such as Kordelio-Evosmos, which has many positive characteristics such as short distances between destinations and mixed uses, should the focus be on children's autonomy (independent mobility) or on promoting active travel? To make this decision, basic data on school commutes were needed. Thus, in this article we refer to "mobility patterns" regarding children's school travel, keeping in mind the differences between "active" and "independent" mobility, which we take into account in the discussion of our findings.

3. Research Design

3.1. Study Area

The municipality of Kordelio-Evosmos is one of the seven municipalities comprising the greater urban area of Thessaloniki, which is the second most populated urban agglomeration in Greece with a population of 802,392 (Hellenic Statistical Authority, 2023). The study area is located about five kilometres to the northwest of the historic centre of Thessaloniki (Figure 1).

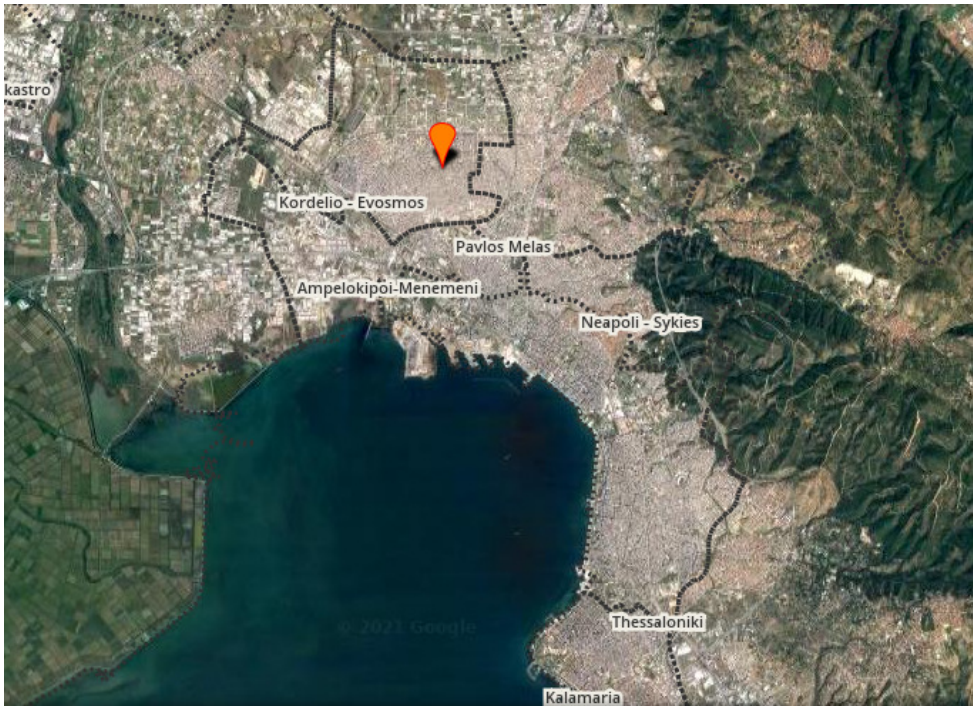

Figure 1. Aerial view of the greater urban area of Thessaloniki showing the location of the municipality of Kordelio-Evosmos. Source: Authors based on Oikoskopio (2024).

Kordelio-Evosmos has a population of 105,426 inhabitants according to the 2021 census (Hellenic Statistical Authority, 2023), covering an area of about 14 square kilometres. The municipality grew in terms of population between 2001 and 2011 at a rate of 31%, which was the second-greatest growth rate among cities in the country, and by 3.48% in the 2011–2021 period. In terms of age demographics, Kordelio-Evosmos is also the second "youngest" city in the country. According to the 2011 Census, the age group 0–14 years represented 19% of the total population (19,333 individuals), thus also lowering the median age of the inhabitants to 35.9 years, while the national median age is 41.9 years (Municipality of Kordelio-Evosmos, 2016). For reasons of comparison, in the case of the municipality of Thessaloniki, the 0–14 age group represents a mere 10.36% of the population (Katsavounidou & Kourti, 2019). One could say that the dominant characteristic of the city of Kordelio-Evosmos is indeed its "youthful" character.

Geographically, Kordelio-Evosmos is located in proximity to the industrial zone of Western Thessaloniki and is traversed by major traffic axes, of metropolitan importance, as well as the railroad tracks leading to the main train station of Thessaloniki. The construction of new multi-story apartment buildings (*polykatoikia* in Greek) at affordable prices, as well as the easy access by car both to the centre and to the periphery of Thessaloniki, have rendered the area attractive for new families of lower- and middle-class socioeconomic status, thus explaining the population growth (Katsavounidou & Kourti, 2019). The built environment of the municipality, mainly in its central part, has distinct compact-city features, which are common in typical Greek cities and towns: high density, mixed uses, narrow street network, and lack of green and open spaces. These characteristics contribute to short distances between everyday destinations and amenities, especially at neighbourhood level. On the negative side, lack of parking spaces and car-dependent lifestyles often result in sidewalks being too narrow or occupied by parked cars.

The total number of elementary school children was 7,626 during the 2019–2020 academic year, in a total of 33 public elementary schools operating within municipal borders. With few exceptions, schools are located in the most densely built parts of the municipality (Figure 2).

3.2. Sample

We used a structured questionnaire addressed to parents of elementary school children (aged 6 to 12 years old). Asking parents about the characteristics of their children's mobility patterns is common in the literature (Mah et al., 2017; Mehdizadeh et al., 2016; Pojani & Boussauw, 2014; Wilson et al., 2018; Zuniga, 2012). The survey took place between May 25 and June 10, 2020, through Google Forms, at a time when restrictions due to the Covid-19 pandemic had been partially lifted and children had returned to physical classes.

We contacted the administrators of parents and guardians associations via email, asking them to distribute the invitation to participate in the survey to their members. Our sample was random, as it was based on the responses we received. No official permission to conduct the research was needed since school administrators were not involved in the process. From an ethical point of view, participants stated their agreement to participate in the survey at the beginning of the questionnaire.

In total, 97 parents completed the survey. These 97 responses corresponded to 103 students, as 6 parents had more than one child attending the same school. Out of the 33 elementary schools in the municipality, responses came from 27 schools (81.81%). The number of responses per school varied from 1 to 18.

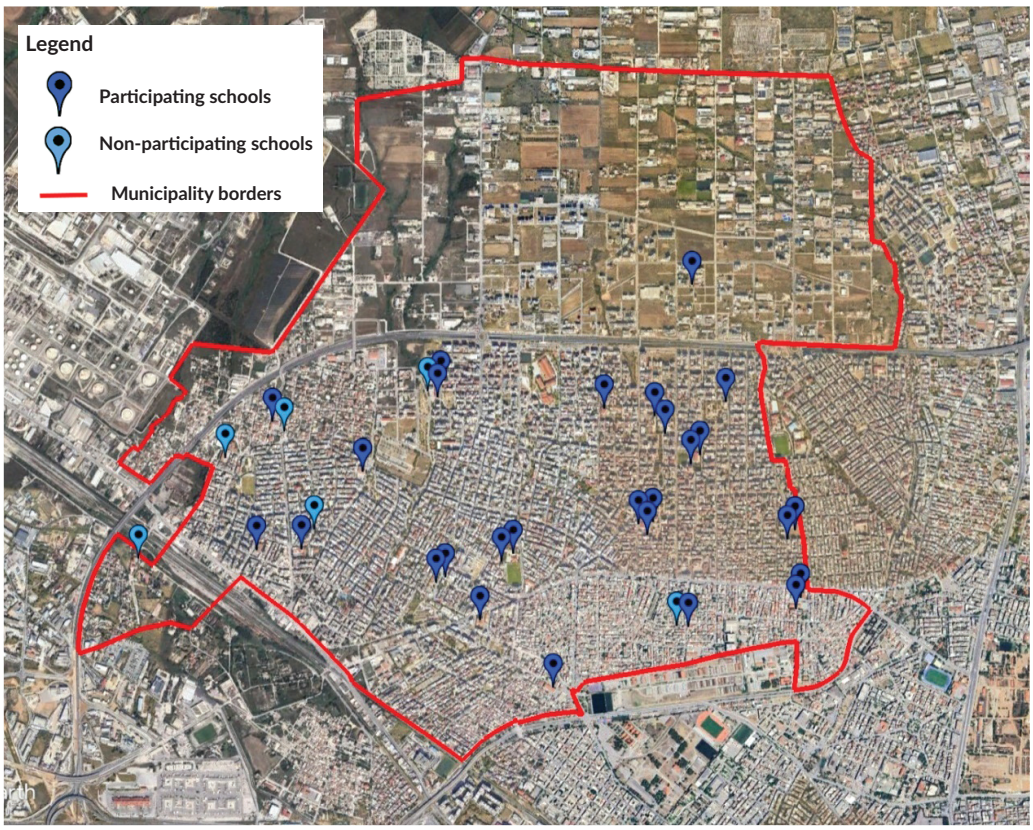

Figure 2. Satellite map of the municipality of Kordelio-Evosmos showing the locations of the elementary schools. Source: Authors based on Google Earth.

The geographical distribution of schools from which responses were gathered covers a large part of the total area of the municipality (Figure 2).

3.3. Questionnaire and Method

The questionnaire was based on the Safe Routes to School survey methodology (United States Department of Transportation, 2004). It contained 26 questions, organised into three groups. The first group included questions about children's age and gender, distance between home and school, duration of the journey, and children's mode of travel to and from school. In the second set of questions, parents were inquired about their child's expressed wish to travel autonomously, the parameters related to their decisions about their child's school travel, and the perceived benefits of AST for children's wellbeing in terms of pleasure and health benefits. The third part of the survey included questions regarding how parents evaluate the urban environment of their neighbourhood, in terms of quality of open space, pedestrian infrastructure, and traffic conditions.

Descriptive analysis was conducted using Microsoft Excel. To identify factors influencing children's school travel mode, statistical analysis was performed using the software GNU PSPP 1.4.1. We used ANOVA analysis to examine differences across groups based on categorical variables such as age, gender, and distance from school. The *F* statistics and corresponding *p* values were analysed to determine the statistical significance of the differences observed.

4. Results

The age of children (n = 103) whose parents (n = 97) participated in the survey ranged from 6 to 12 years old: 4 were 6 years old (3.88%), 24 were 7–8 years (23.30%), 46 were 9–10 years (44.66%), and 29 were 11–12 years (28.16%). No significant difference in gender representation was noticed; girls represented 52% of the total.

To assess the proximity between home and school, parents were asked to report the approximate distance in meters and the walking time this journey takes. Regarding distance between home and school, most children (89.7%) live within a radius of 1,000 meters or less (Figure 3). Parents reported that 91.7% of families live within a walking distance of 10 minutes from school and 52.6% within an even shorter distance (5 minutes or less).

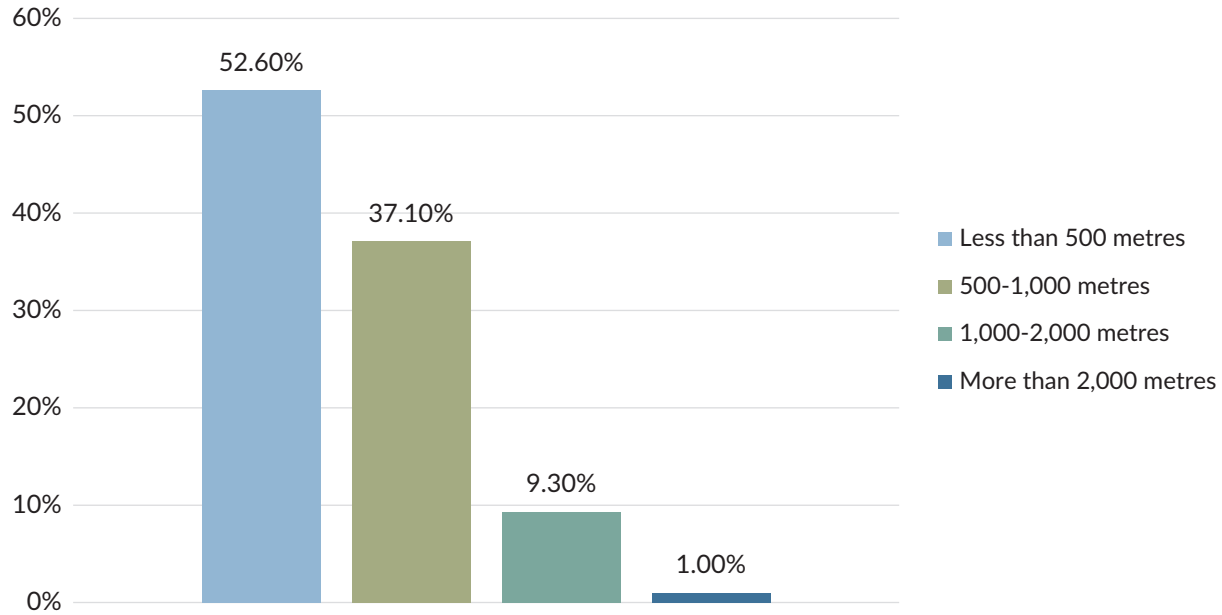

Figure 3. Chart showing results regarding the distance between home and school, according to parents' answers. Most children (89.7%) live within a radius of 1,000 meters or less from school.

Walking is the only means of active travel that was reported. No one travels by bicycle, which is probably due to the complete absence of bicycle infrastructure in the area. The only means of motorised travel appears to be private cars, driven by parents. Greek public schools do not have school buses, and no one reported using public transport. It is noteworthy that there were differences in the mode of commute between the journey from home to school and the return journey (Table 1).

Overall, walking prevails (66.5%), but only 14.08% of children walk without adult escort. More specifically: 15.53% of the children go to school on foot on their own and 12.62% return home in the same manner. Almost half of the children, 49.51%, walk to school accompanied by an adult, and 55.34% return home in this mode. About one out of three children commute in their parents' car: 34.95% on the way to school, 32.04% on the return trip. In the 9–12 age group, there are only slight differences compared to the whole sample: 20.39% walk alone, 45.39% walk with an adult escort, and 34.21% are driven by car. In the oldest

Table 1. Children's mode of commute to school, in the two journeys (to and from school), for all ages (6–12), for the groupp. 9–12 years, and the groupp. 11–12 years.

Mode of child's school travel		Home-to-school journey			School-to-home journey			Median (%)		
		6–12 years	9–12 years	11–12 years	6–12 years	9–12 years	11–12 years	6–12 years	9–12 years	11–12 years
Active mode	On foot, without adult escort	16 (15.53%)	16 (21.05%)	13 (44.83%)	13 (12.62%)	15 (21.05%)	12 (34.48%)	14.08	20.39	43.10
	On foot, with adult escort	51 (49.51%)	32 (42.11%)	10 (41.38%)	57 (55.34%)	37 (42.11%)	14 (48.28%)	52.42	45.39	41.38
Passive mode	By car, driven by parent	36 (34.95%)	28 (36.84%)	6 (20.69%)	33 (32.04%)	24 (36.84%)	3 (10.34%)	33.50	34.21	15.52

group (11–12 years), the percentage of children who walk alone is quite high (43.10%), however parents' involvement in the commute remains high: 41.38% walk with an adult escort, and 15.52% are driven by car.

Asked how they would characterise their child's experience if the daily commute to school was done or could be done (if conditions changed) on foot or by bicycle, 87.6% of parents agreed that it would be a pleasant or very pleasant experience for the child (Figure 4); 93.9% also agreed that it would have a positive impact on their children's health.

In the multiple-choice question about the parameters parents take into account in their decision about children's commute to school, safety from violence and crime (88.66%) and safety from traffic (87.63%) were

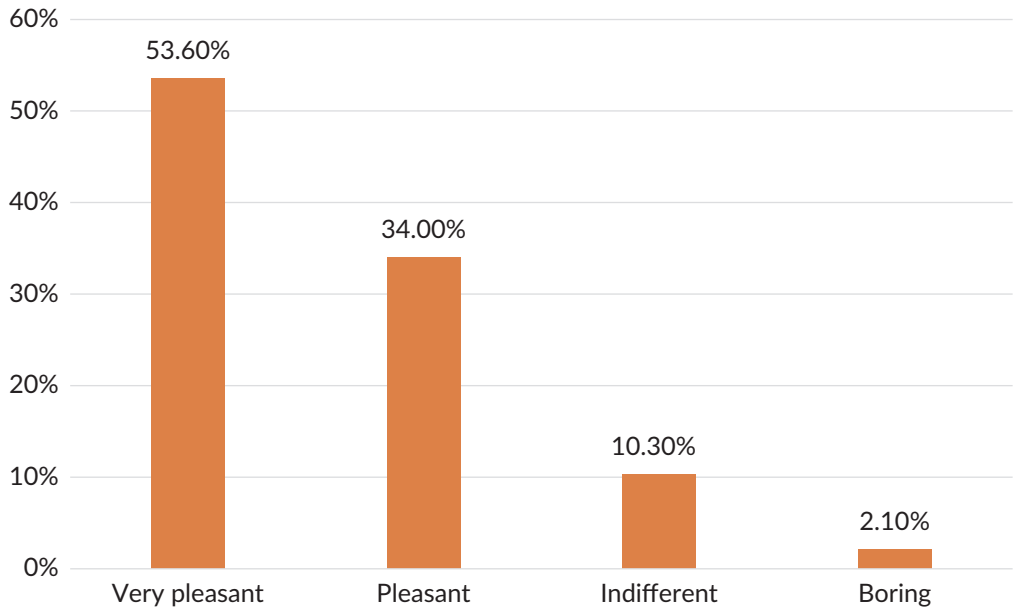

Figure 4. Chart showing results regarding parents' replies to the question "How would you characterise your child's experience if the daily commute to school was done or could be done (if conditions changed) on foot or by bicycle?"

the most common answers, followed by vehicular speed (85.57%), safety to cross streets (83.51%), existence and quality of sidewalks (78.35%), and load of traffic (77.32%).

The final part of the survey contained questions about the environmental conditions in the neighbourhood. Regarding overall quality of conditions for walking, 85.4% of respondents assessed them as bad or mediocre ("very bad," "with many problems," "with some problems"). More specifically, Table 2 shows which problems related to the quality of open space, pedestrian infrastructure, and traffic conditions were considered more prominent. Regarding the quality of open space, lack of greenery (76%), insufficient public lighting (61.5%), and dirtiness (58.3%) appear as the most problematic. Regarding pedestrian infrastructure, absence (72.9%), poor maintenance (63.5%), and narrowness (55.2%) of sidewalks were the most common replies. Regarding overall traffic conditions, 79.2% of the parents replied that these are bad and difficult for pedestrians. In specific, drivers' behaviour was assessed as problematic (93%), as parents reported speeding in residential areas (85.4%), violations of pedestrians' right of way (81.3%), and even violations of red traffic lights (43.8%).

Table 2. Parents' assessment of problematic aspects of the built environment.

Problems in the built environment of the neighbourhood		Responses (%)
Quality of open space	Lack of greenery	76
	Insufficient public lighting	61.5
	Rubbish	58.3
	Air pollution	51
	Poor quality of spaces for walking	49
	Lack of public spaces	33.3
Pedestrian infrastructure	Absence of sidewalks	72.9
	Poor maintenance	63.5
	Sidewalks too narrow	55.2
	Obstacles on sidewalks	53.1
	Lack of ramps	53.1
Traffic conditions	Problematic drivers' behaviour	93
	High speeds	85.4
	Violation of pedestrian's right of way	81.3
	Parked cars obstructing visibility for pedestrians	74
	Absence of traffic signs	66.7
	Violation of red traffic lights	43.8

Statistical analysis was conducted to investigate the relationships between children's mode of school travel (independent variable) and responses to nine selected questions. These questions pertained to (a) the age and the gender of the child, (b) the distance between home and school, (c) parental permission to independent travel, (d) the parent's perceptions of the impact on the wellbeing of the child (pleasure from travelling actively to school, positive impact on the child's health), and (e) the parent's assessment of route conditions (safe crossings, drivers' behaviour, pleasant conditions for walking in the neighbourhood). As our data showed differences in the mode of travel *to* and *from* school, we took into account the mode of the return journey (departure from school). A one-way ANOVA was utilised to assess differences across groups.

Table 3. One-way ANOVA results examining the relationship between children's mode of school travel (on the return journey) and various factors.

Variable		Sum of squares	*df*	Mean square	*F*	*p* (sig.)
Child's age	between-groups	34.57	2	17.29	7.10	.001
	within-group	228.77	94	2.43		
	total	263.34	96			
Child's gender	between-groups	.11	2	.05	.21	.812
	within-group	24.14	94	.26		
	total	24.25	96			
Distance from home to school	between-groups	5,565,951	2	2,782, 976	13.07	.000
	within-group	20,016,523	94	212,941.7		
	total					
Permission to travel independently	between-groups	6.93	2	3.46	25.08	.000
	within-group	12.99	94	.14		
	total	19.92	96			
Child's feeling of pleasure from active travel	between-groups	.05	2	.02	.04	.959
	within-group	55.06	94	.59		
	total	55.11	96			
Positive effect on child's health	between-groups	.01	2	.01	.01	.987
	within-group	39.66	94	.42		
	total	39.67	96			
Safe to cross streets	between-groups	1.51	2	.75	4.89	.010
	within-group	14.33	93	.15		
	total	15.83	95			
Drivers' behaviour	between-groups	.15	2	.08	1.30	.277
	within-group	5.47	93	.06		
	total	5.63	95			
Pleasant conditions for walking	between-groups	.21	2	.11	.90	.409
	within-group	11.03	93	.12		
	total	11.24	95			

The *F* statistics and corresponding *p* values were examined to determine the statistical significance of the observed differences (see Table 3).

The analysis revealed that the age of the child was significantly correlated with the choice of travel mode ($F = 7.10$, $p < .05$). In contrast, gender did not show a significant correlation with travel mode ($F = .21$, $p = .812$). The distance from home to school demonstrated a very strong correlation with the mode of travel ($F = 13.07$, $p = .000$). The highest correlation was observed between the mode of travel and the variable "parents' agreement to give permission for the child to travel independently" ($F = 25.08$, $p = .000$). Additionally, a significant correlation was found with parents' assessment about whether or not the neighbourhood provides safe crossings ($F = 4.89$, $p = .010$). All other variables, including parents' views on the child's feeling of pleasure from active travel, the health effects of active travel, drivers' behaviour, and the pleasantness of conditions for walking, showed statistically non-significant correlations.

5. Discussion

In terms of mode of school travel (Table 1), our sample shows a relatively high percentage of AST: 65.04% of the children walk the route from home to school and 67.96% from school to home (median 66.50%). Johansson et al. (2012) mention that studies from European countries, e.g., Sweden, Estonia, Switzerland, the UK, Denmark, the Netherlands, and Spain, report rates ranging from 50% to 85%; therefore, Kordelio-Evosmos stands somewhere in the median. However, in our study, the percentage of children who walk with an adult escort is 52.42%, very high compared to findings from other countries. More specifically, we found that 47.87% of the children of 9–10 years walk with an adult, while in a Swiss study, only 7.5% of children in the same age group were accompanied by an adult (Bringolf-Isler et al., 2008). One could hypothesise that the age threshold for independent mobility is higher in Greece, but that is not the case, because in our study, even within the group of children of 11–12 years, 41.38% walk the school route with an adult companion. Although distances are short (Figure 3), parents do not seem confident in allowing children to walk alone, even when children have reached middle childhood, an age considered to be a threshold for independent mobility (Jones & Cunningham, 1999).

Statistical analysis (Table 3) showed that the choice of school travel mode is highly correlated to parental agreement to allow the child to walk on their own, confirming that parents' sense of safety determines school travel mode (Mah et al., 2017). Other attributes we found to be statistically related to children's school travel patterns are the child's age and distance between home and school, as previous studies have found (Shaw et al., 2013). The environmental variable that showed the strongest statistical correlation with children's travel mode is the safety of crossing streets. Parents point to unsafe crossings as a major problem along the school route and raise concerns about the overall traffic conditions, as previous studies have also found. Swain et al. (2024) concluded that the fear of traffic accidents among parents influences AST to a greater degree than the distance from home to school and stranger danger. Features such as raised crossings are missing from Kordelio-Evosmos, while research has shown that controlled crossings, such as signalised crossings and zebra crossings, especially if they are raised, are perceived as important for safety (Swain et al., 2024). In line with recent studies (Duffy et al., 2024; Wangzom et al., 2023), our findings confirm that traffic, negative perceptions of safety, and speeding vehicles are all identified by parents as reasons to restrict their child's movement.

Our results showed that parents perceive AST to be beneficial to their children, in terms of their health and experiencing of pleasant feelings (Figure 4), confirming previous research that shows the strong association between AST and children's sense of wellbeing. Overall, positive emotions (both of parent and child) were documented when school travel is done actively (Ramanathan et al., 2014).

In terms of neighbourhood walkability, 85.4% of the parents found walking conditions to be bad or mediocre. Literature suggests that parents who allow their children to walk to school generally perceive walking conditions as more comfortable and convenient, compared to parents whose children commute by non-walking means (Mehdizadeh et al., 2016). This was partially confirmed in our study. Among parents who had a favourable view of the neighbourhood, the use of cars was not differentiated from the general sample (35.71% against 33.50%). However, they did allow their children to walk autonomously more (52.42% against 28.57%).

Specific findings from the part of the study that asked parents to assess the quality of urban space, pedestrian infrastructure, and traffic conditions (Table 2) revealed widespread dissatisfaction among parents regarding the urban environment of Kordelio-Evosmos, especially regarding drivers' behaviour, insufficient sidewalks, and lack of greenery. These findings paint a bleak picture of a highly unsustainable urban environment in Kordelio-Evosmos, a city paradoxically noted for having one of the highest percentages of children and youth populations in the country.

Kotoula (2021) investigated the commuting patterns of Greek children in different districts within the greater urban area of Thessaloniki, revealing significant differences compared to our findings in Kordelio-Evosmos. In Kotoula's study, only 60.7% of children lived within a radius of 1,000 meters from their school, whereas in Kordelio-Evosmos, this percentage was 89.7%. Furthermore, the use of cars for the school commute was lower in Kordelio-Evosmos (33.5%) compared to the broader greater urban area of Thessaloniki (43.4%). These differences suggest that there is a need for further comparative studies on children's mobility patterns, particularly among areas of different socioeconomic characteristics and urban typologies. It is important to note that Kordelio-Evosmos represents a typical example of a Greek urban housing area with compact-city characteristics. Low- and middle-class housing areas in Greece, including Kordelio-Evosmos, are characterised by urban conditions similar to those found in other less-developed European regions, such as Albania. In these areas, beyond pedestrianised downtown areas, there are often poor environmental conditions, such as air, noise, and visual pollution (e.g., from traffic and parking), as well as inadequate urban design that creates spaces unfriendly to walking (Pojani & Boussauw, 2014).

6. Conclusion

Given the scarcity of research on children's mobility patterns in Greece, this study first and foremost provides a set of data on how elementary school children commute to school in a densely populated and compact-city Greek urban environment such as Kordelio-Evosmos. In parallel, we analyse the factors influencing parents' choices regarding school commute and relate them with their overall assessment of the neighbourhood environment.

Our study has some limitations. It was conducted during the Covid-19 pandemic; when the questionnaire survey took place, schools had just reopened after two months of lockdown. The sample was random and rather small. It was addressed to parents only, while other studies (Lee et al., 2013) point out the need to ask both children and parents about their opinions on the choice of travel mode and on the conditions of the route. Given the total absence of basic data on school travel at a national level, our findings cannot be compared to previous ones in other Greek cities or towns. If such data existed, we would be able to investigate historical trends in Greek children's travel modes, differences attributed to diverse urban typologies, and differences between cities. It would be interesting, for example, to compare Kordelio-Evosmos to other cities, such as Trikala, which boasts a unique tradition of cycling among Greek regions and where bicycle use by children and youth is common.

Seen through the dichotomy of "active" versus "independent" travel, as we explain in the Introduction, the results of our study show that, in the case of Kordelio-Evosmos, 66.5% of children travel to school actively (on foot) but not independently (only 14.08% walk on their own). This occurs despite the short distances between home and school (less than 1,000 meters). We cannot conclusively infer from the survey the reasons

why parents prefer to escort their children on their walking trip. Our findings indicate that parents' concerns about safety dangers along the route related to violence and crime and to traffic play a role, especially vehicular speeds and lack of safety to cross streets. Previous studies have found that perceptions of road safety are the key barrier, rather than fear of strangers or distance from school (Zuniga, 2012). The decision to escort could also be attributed to parenting styles that value adult supervision as "good parenting," possibly related to cultural norms about the "vulnerable" child who is "at risk" in public space (Kearns et al., 2003); however, that would be an issue for more in-depth research.

We chose Kordelio-Evosmos for our field study based on the fact that this city is one of the "youngest" in the country, with almost one out of five inhabitants belonging to the age group of 0–14 years. One would expect, given its demographic profile, that Kordelio-Evosmos would offer plenty of good public spaces, along with safe conditions for walking. We found that parents of elementary school children evaluate the conditions of the built environment negatively, not only for their children's school travel but also in terms of the overall environmental quality of urban space. The results of this study highlight parents' worries about the problematic aspects of urban space in relation to safety along the school route. The physical characteristics of the urban environment that inhibit CIM (i.e., poor design of pedestrian infrastructure) are unfortunately combined with the antisocial and life-threatening behaviour of drivers, such as violation of speed limits, illegal parking on sidewalks, and violation of pedestrians' right of way. This combination of environmental and social factors renders the urban environment unsafe and unfriendly for children, obliging parents to accompany them to school on foot or to drive them there by car, having a high toll both on the wellbeing of children and on urban sustainability in general.

In local policy, we think that the issue of active and, even better, independent school travel is highly relevant in this city, and, in our opinion, it should be a priority for local authorities and citizen groups. The already high percentage of walking to school, with or without the company of a guardian, is promising for the implementation of ideas such as the walking school bus, in parallel to infrastructure interventions such as widening of sidewalks and raised crossings. As Greek cities and towns have recently started the process of drafting sustainable urban mobility plans, our findings could inform proposals, especially in areas around schools. Provisions for better pedestrian infrastructure and for safer streets should be included in those plans, ensuring that children have the opportunity to travel safely, actively, and independently, alongside promoting walkability in general. For a better environment for the children and for attaining urban sustainability, Greek cities should invest in pedestrian infrastructure, in parallel to implementing coordinated measures related to drivers' behaviour such as strict enforcement of traffic laws and education.

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Conflict of Interests

The authors declare no conflict of interests.

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REVIEW

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Walkability and Parental Safety Perceptions as Determinants of Children's School Commutes: A Systematic Review

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Abstract

Walking is the oldest, most affordable, and environmentally healthy mode of transport. Its importance is widely recognised in the scientific and political fields, with active school travel being a consensual target goal. Children's active school travel promotes physical activity, independence, and social interaction. Additionally, it contributes to mitigating traffic congestion, reducing air pollution, and enhancing societal well-being. Despite these positive effects, children's commuting patterns and outdoor activities are becoming more restricted due to the continuous growth of motorised traffic and car-oriented urban environment conditions. As a result, school walkability indexes are emerging in literature, although few consider parental safety perceptions. This review offers a comprehensive overview of the existing evidence, examining and summarising quantitative and qualitative studies on school walkability and the impact of parental barriers on children walking to school. The updated information provided in this review highlights the link between the urban environment, parental fear of traffic, and children's school travel behaviour. Using the PRISMA method and a series of in-depth interviews, we developed a comprehensive walkability model. The literature review highlights the importance of geographical differences and social and environmental diversities, requiring different solutions to promoting active commuting to school. Distance and quality of infrastructure are critical factors, but not exclusive. Our interview results suggest that social norms, parents' fear of car traffic, and educational background can influence the results. This study offers insights into perceived walkability, particularly regarding school walkability in a Portuguese context.

Keywords

active commuting; children's travel behaviour; parental perception; school walkability

1. Introduction

In recent decades, children's commuting patterns and outdoor activities have become more restricted due to the continuous growth of motorised traffic and car-oriented urban environments (Larouche et al., 2018). Children's well-being is closely related to the built environment around them, which is shaped by families' daily routines and the health of their urban context. The design of streetscapes, planning decisions, and the policies of national government, municipalities and schools are all crucial in encouraging a shift towards decarbonising urban mobility through active modes of transport, particularly the improvement of children's play areas and safe routes to school.

Encouraging a shift towards decarbonising urban mobility through public transport, shared micro-mobility and active modes of transport, particularly walking, is a crucial challenge for many European cities. They increasingly face the problems urbanisation brings, such as traffic congestion, and challenges regarding road safety, energy dependency, social injustice, and air pollution. In many European car-dependent cities, people with low incomes, those with a physical disability, children, and the elderly have fewer opportunities to access services, parks, recreation, and commerce because they cannot drive. However, children being able to travel to school independently provides intrinsic benefits, such as opportunities for socialisation, exploration, and contact with their city, supporting their social, civic, and cognitive needs.

Additionally, promoting walking and cycling to and from school has the potential to reduce obesity and improve the health of school-aged children (Hino et al., 2021; S. Lee et al., 2020; Mitra, 2013). Active commuting to school (ACS), such as walking and cycling, supports the development of children's social skills and autonomy (Aranda-Balboa et al., 2020), is affordable and environmentally clean, improves air quality (Chillón et al., 2011), and helps to reduce peak-hours congestion (Zhu & Lee, 2009), as well as other benefits.

Despite these benefits, children's ACS and outdoor activities have decreased in recent years (Larouche et al., 2018), particularly in developed countries. Some geographical differences exist, however, with children independently and actively commuting to school in locations such as Japan and the Netherlands, and some cities in Spain, Chile, and Canada. Understanding children's travel behaviour is essential to the overall well-being of society (Hino et al., 2021; Rodríguez-Rodríguez et al., 2021).

Research has demonstrated that promoting ACS among children requires supportive streetscapes and development that safely accommodate children walking and/or cycling. Therefore, researchers have developed school walkability indices. Our understanding of walkability is that it is a construct that expresses the ease with which pedestrians can access destinations in a community (Sallis, 2009). By assessing the environment around schools and neighbourhoods, planning professionals can evaluate the quality of the pedestrian environment for children. This allows for objective, effective and comprehensive pedestrian-related strategies and interventions with the goal of securing improved walking conditions through the planning system.

Although there is a growing body of literature on school walkability and built environment factors (both macro and micro), few studies evaluate multiple levels of attributes, such as parents' social norms. Some authors suggest that parents' safety perceptions, beliefs, and travel-related behaviours may significantly influence the choice of their child's mode of travel to school (Terrón-Pérez et al., 2018). Parents and caregivers are often

viewed as the primary decision-makers in children's commuting behaviours (Huertas-Delgado et al., 2018), with their influence considered the leading social indicator of ACS (Aranda-Balboa et al., 2020; Kerr et al., 2006). Given that the responsibility for selecting the mode of transport to school primarily lies with parents, understanding their concerns and preferences regarding ACS is crucial (Huertas-Delgado et al., 2019; Ozbil et al., 2021; Zavareh et al., 2023).

School walkability indicators for improving children's ACS are not well established in the literature, with some gaps in identifying the main determinants which support policymakers and urban designers in decision-making. Empirical evidence on the factors influencing children's travel behaviour to school is both scarce and complex, requiring further investigation (Ozbil et al., 2021). Additionally, the literature highlights a lack of studies that adequately assess the relevance of existing walkability indices for schools (Chalikavada et al., 2021; Cottagiri et al., 2021; Kunaratnam et al., 2022). Moreover, parents' practices, authority, and safety perceptions are highly contextual and influenced by social factors, meaning that more research is needed to explore and fully understand these differences.

In Portugal, municipalities are transitioning to low-carbon models, aiming to become increasingly green and achieve greater efficiency in resource management, with benefits for quality of life, the environment, and public health (República Portuguesa, 2023). However, the shift from current mobility patterns, which are dominated by individual transport, has been hindered by the evident difficulty in identifying and implementing the necessary measures for change, as well as by the lack of information in this area. This has led to a series of disjointed initiatives that undermine the success and applicability of their intended goals. Nevertheless, some isolated projects and initiatives have been successful. Therefore, we explored these projects to understand their successes, challenges, and the lessons that can be learned from them.

Despite the growing number of studies in this area, there is a need for more research that systematises recent trends and findings on the key indicators influencing children's ACS and how these have been impacted by the development of a motorised society. This study aims to address these gaps by reviewing recent evidence and evaluating which determinants are critical to promoting children's ACS. We seek to answer the following research questions found in recent literature regarding the factors influencing children's ACS:

Q1: What are the most frequently used indicators/determinants in recent studies?

Q2: What are the main findings of recent studies?

Q3: What main features may be important to explore in future studies?

This study contributes to the literature on this topic by (1) identifying influential authors, papers, journals, and countries; (2) synthesising and systematising recent findings, and connecting these findings with the methods used; (3) investigating the association between children's ACS, walkability indicators, and parental barriers; (4) supporting a comprehensive understanding of the indicators that influence children's travel behaviour to school, particularly within the Portuguese context, to guide more objective, effective, and holistic pedestrian-related strategies and interventions for children; and (5) identifying limitations in the existing literature.

The next section of this study outlines the methods used to address the objectives above, followed by the presentation and discussion of the main results, the introduction of a conceptual framework for future studies, and, finally, a summary of the main conclusions.

2. Methods

2.1. Systematic Literature Review

This systematic literature review aims to collect, interpret, and evaluate the methods and findings of relevant scientific work on school walkability indicators that promote children's ACS. A comprehensive overview of the existing evidence, including both quantitative and qualitative analyses, is provided. We employed a systematic review approach based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Tricco et al., 2018). PRISMA follows a four-phase framework: identification, screening, eligibility, and inclusion. Figure 1 illustrates the review process and the eligibility criteria.

Database Search: A systematic search was conducted to examine original articles published between 2014 and 2024 in the following databases: Web of Science Core Collection, Scopus, and Limo. The search strategy included seven categories of key concepts in the field: "active commuting/travel behaviour/mobility," "children," "school," "walkability," "parents/caregivers," "perceptions/barriers," and "pedestrian/urban/physical environment."

Eligibility Criteria: Data collection was conducted between November 2023 and April 2024. To ensure scientific credibility, we applied the following eligibility criteria: (a) Published in a peer-reviewed journal and original research; (b) Published between 2014 and 2024; (c) Written in English; (d) Utilised an appropriate study design, either cross-sectional or longitudinal, and could employ quantitative, qualitative, or mixed methods approaches; (e) Participants included children aged 2–14 years, and their parents/caregivers or relatives; (f) Focused on children's ACS and its main determinants (including information on children's ACS); (g) Explored the association between children's walking and the built environment/school walkability and/or parents' perceptions and barriers; and (h) Examined the correlation between children's walking and at least two groups of indicators (including built environment, comfort, safety, social environment, and context).

Screening: After the initial identification process, 52 of the 1,479 identified studies were selected based on title screening, abstract screening, and keyword relevance; these studies were further evaluated for inclusion or exclusion according to the eligibility criteria. Additionally, the included studies' references were reviewed, resulting in the inclusion of three more studies. These 55 studies were then further screened by reviewing the full texts in accordance with the eligibility criteria, with 27 studies retained. A common reason for exclusion was the age of the children studied.

Bibliometric Analysis: Finally, we conducted a bibliometric analysis to uncover key terms, indicators, trends in children's mobility patterns, methods (tools), and geographical disparities. Data extracted included Authors, Publication date, Source, Title, Abstract, Participants, Location, Mobility patterns (e.g., walking or cycling), Potential & Limitations (Gaps/Arguments), Main findings, Methods, and Indicators used.

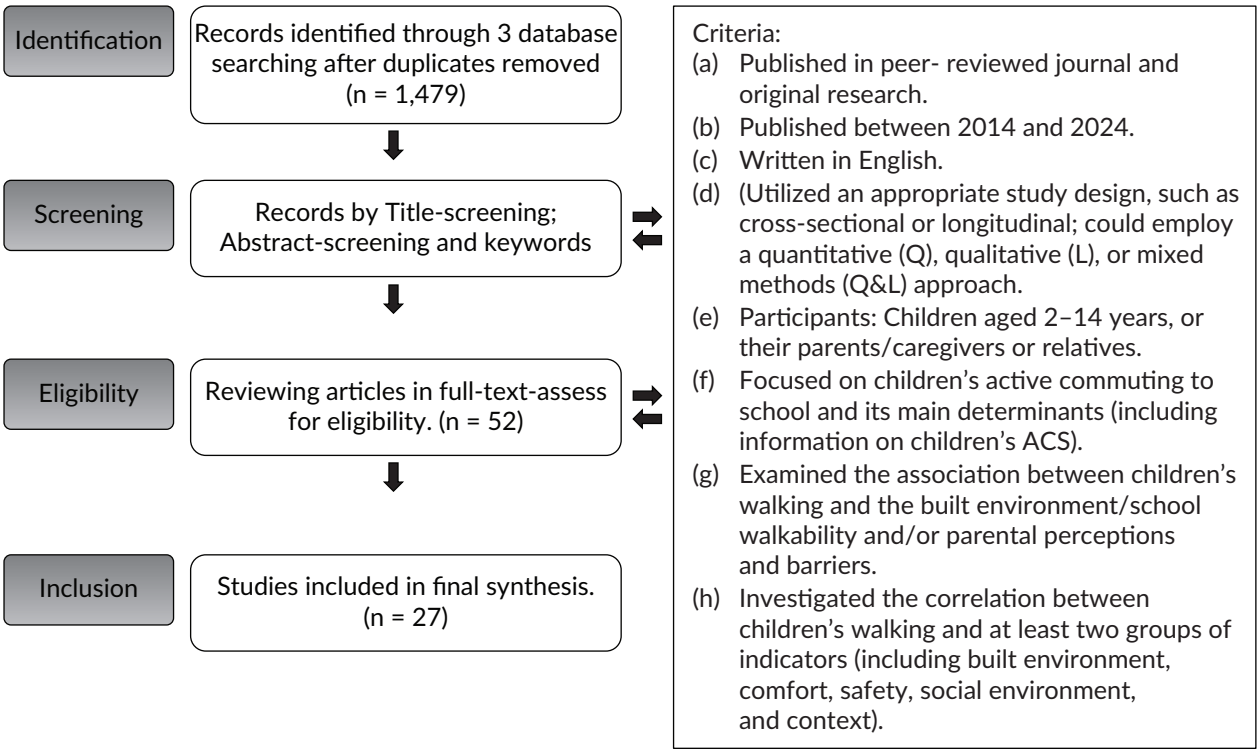

Figure 1. Flow of articles through the review process.

2.2. In-Depth Interviews

We also conducted interviews to establish a stable set of indicators for Portuguese schools. It is essential to conceptualise, categorise, and summarise these indicators to support and inform future interventions aimed at increasing active transport to schools among Portuguese children. We explored a variety of perspectives, including those of parents and caregivers, as well as practitioners, researchers, technical experts, and decision-makers. Parents were selected from focus groups conducted in a related, forthcoming study. This group was considered suitable for the research, as they provided accurate criteria and valuable contributions, enabling a holistic point of view and facilitating qualitative analysis through in-depth interviews. Table 1 below outlines the interviewee selection criteria, and Table 2 presents the guiding structure for the interviews. The main objective was to identify a stable set of indicators tailored to the specific context of Portuguese schools.

Table 1. Interviewees and their selection criteria.

No. (date)	Interviewees	Selection criteria
Inter.1(05.12.22)	Practitioner, *Ergonomist (PhD)*	Has practical experience in developing laws, local projects, and plans for pedestrian mobility.
Inter.2(26.03.23)	Researcher Activist, *Geographer (PhD candidate)*	Works directly with children in the "Pedibus" program within the Municipality.
Inter.3(27.03.23)	Expert, *Urban Planner (PhD)*	Has knowledge of urban planning, strategies to improve mobility, accessibility and city transportation systems.
Inter.4(08.05.23)	Pedagogical-Director, *Psychologist (PhD)*	Understands children's and parents' mobility habits and values in a school that facilitates ACS interventions by providing safe and supportive environments.
Inter.5(08.05.23)	Parent *(University degree)*	Exhibits outlier decision-making and travel behaviours: walks their child to school, then travels to work by bus.
Inter.6(29.05.23)	Couple *(University degree)*	Exhibits typical decision-making and travel behaviour: father drives the child to school, while the mother (a foreigner), who takes the child to school less frequently, uses the bus or metro (as they live outside of walking distance).
Inter.7(21.07.23)	School-Director, *Teacher (University degree)*	Has knowledge and experience regarding the evolution of school legislation and children's and parents' mobility habits and values.
Inter.8(10.11.23)	Couple *(University degree)*	Exhibits somewhat atypical decision-making and travel behaviours: father drives the child to school, while the mother, who only occasionally takes the child to school, walks them the 5 minutes to school.

Table 2. Interview structure.

Guiding questions	
Part-1	Introduction and gaining consent
Part-2	Background
	How important is it to promote children's ACS through walking? What were your childhood experiences of ACS?
	How did you go to school as a child? Was it a pleasant journey?
Part-3	Indicators
	How did you choose your child's school, and your home location?
	How do you decide how children should travel to school?
	What are the challenges to children's ACS, and how did you discover them?
	Are there any challenges to children's ACS that are specific to your local area?
	At what age do you think your child will be able to go to school on their own?
	Is there any kind of support, programme in your area of residence or school that promotes children's ACS?
Part-4	Problems
	If you lived in another context, where most children walked or cycled, would you let your child commute actively to school?
	What are your main fears?
	What would you change in your particular context to let your child commute actively to school?

3. Results and Discussion

3.1. Exploratory Analysis

This section describes the work conducted and the results obtained. First, an exploratory analysis of the reviewed documents was conducted, examining the number of documents and citations per year, country, publisher, journal, author, and type of document. Second, a bibliometric analysis was performed. This section also addresses and discusses the research questions outlined in the introduction of this review.

A total of 1,479 unique records were identified from the three databases, with additional manual searches performed (Figure 1). More than 1,427 records were excluded because they did not meet one or more of the inclusion criteria. After examining the full text of 52 papers, 25 were excluded due to not being empirically based, not meeting the age criteria for children, or lacking a correlation between walking, walkability, or parents' perceptions. The final analysis included 27 papers that met all the inclusion criteria.

Table 3, below, outlines selected information and main findings from the 27 peer-reviewed journals. These studies span various disciplines: health (n = 18, 67%), geography (n = 4, 15%), transportation (n = 3, 11%), and urban planning (n = 2, 7%). The studies were conducted in 19 different countries, including Canada (n = 4, 13.3%), Spain (n = 4, 13.3%), the U.K. (n = 3, 10%), Australia (n = 2, 6.7%), China (n = 2, 6.7%), New Zealand (n = 2, 6.7%), the U.S. (n = 2, 6.7%), Denmark (n = 1), Chile (n = 1), Croatia (n = 1), Ecuador (n = 1), Iran (n = 1), Israel (n = 1), Italy (n = 1), Japan (n = 1), the Netherlands (n = 1), Poland (n = 1), Portugal (n = 1), and Turkey (n = 1).

Regarding the settings of the studies, the majority (n = 24, 89%) were conducted in urban areas, with two studies including participants from both rural and urban areas, and one study undertaken in a suburban area. The sample sizes varied from 96 to 1,802, and all studies were exploratory, rather than hypothesis-driven. Most of the studies used quantitative approaches (n = 18, 67%); (n = 9, 33%) employed a mixed-method approach (quantitative and qualitative data), and none used a purely qualitative approach.

To collect data, most studies either used a questionnaire (n = 22, 81%), from that eleven only used a questionnaire (37%), six combined a questionnaire with GIS tools (22%; most tools were from existing literature, such as Neighbourhood Environment Walkability Scale [NEWS], Walk Score, TREK, GIS-WI, and LWI), four (15%) combined questionnaire with travel diaries or interviews and GIS. Additionally, one study used a focus group followed by a questionnaire. Other studies used various combinations (n = 5, 19%), two used GIS tools, one included a study travel diary with interviews and GIS, one conducted a mapping activity and GIS and, finally, one used interview combined with GIS tools (Figure 2).

Finally, most studies use the term Active Commuting to School (ACS) or Active School Travel (AST) to refer to activities such as walking or cycling. In more than half of the reviewed studies, children were found to actively commute to school (n = 16, > 50%). However, we observed varying levels of ACS within the same countries, indicating that children's commuting patterns should be further explored in different contexts. Additionally, some studies reveal differences in travel patterns based on age, distinguishing between children and adolescents.

The reviewed studies varied in terms of the main indicators studied. Almost all of them examined the relationship between ACS and the built environment (n = 26, 96% although five of these only considered distance/proximity). Twenty studies explored safety indicators (74%), 19 examined social environments (70%), and eight controlled for children's age and gender (30%). Fifteen studies investigated comfort indicators (56%), 12 looked at contextual indicators (44%), and one study explored ACS in relation to micro-scale features such as green areas and safety and children's characteristics.

For further details, please refer to Table 5 in the Supplementary File, which summarises the outcomes presented in this review. The table is structured by study and year of publication, location, average ACS levels, sample size, main findings, methods used (quantitative [Q] and qualitative [L]), and the indicators that influence children's travel behaviour to school.

3.2. Primary Finding Review Studies

The literature review clearly indicates that both the built environment and social norms, particularly safety perceptions and attitudinal factors, significantly influence children's travel behaviour to school (Curtis et al., 2015; Rothman et al., 2015). Multiple determinants contribute to whether a child actively travels to school. Table 3 summarises the main findings from the literature review.

A growing body of literature indicates that children's ACS is influenced by built environment characteristics (macro-level indicators) such as distance, density, street connectivity, and land use diversity. Moreover, the relationship between the built environment and children compared to adolescents differs (Molina-García et al., 2020).

Distance is one of the most frequently studied built environment indicators in the reviewed literature (Aranda-Balboa et al., 2020; Macdonald et al., 2019). Children living farther from school are less likely to actively commute (McDonald, 2008; Mitra et al., 2016). Curtis et al. (2015) argues that distance is related to factors like density, school availability, or the quality of the school (for example, the range of activities offered). For policymakers, understanding these multi-scale influences is crucial, as the impact of distance cannot be separated from factors like school location, density, land use mix, and street connectivity. Distance is a key determinant, and studies report varying measures of what is a walkable distance for children (including 10 minutes, 800 m, and 1.5 km). According to Bejleri et al. (2011), most studies use simplified proxies for distance, such as linear distance, block length or size, and street or intersection density. While these measures provide a good indication of the overall characteristics of a neighbourhood's street network, they do not always accurately reflect the specific conditions pedestrians face on their daily journeys.

Some studies suggest that a well-designed pathway may have a greater impact on promoting ACS than distance alone. In this context, distance can be measured more accurately when studies also consider attractive factors and perceived barriers. Attractive, or comfort, factors include walking paths and/or shortcuts, tree density, safe crossing routes, urban equipment, signage, and appropriate design for speed reduction. Christiansen et al. (2014) found that pedestrian paths, safe crossings, route safety, low to moderate traffic flows, and low-speed traffic influence perceived safety and ACS.

Table 3. Main determinants that influence children's ACS.

Key indicators (other indicators studied)	Support literature
Built environment (macro-level) Distance (Density, street connectivity, use, and school location)	(Carver et al., 2019; Christiansen et al., 2014; Curtis et al., 2015; Hino et al., 2021; Huertas-Delgado et al., 2017, 2018; Ikeda et al., 2020; Kunaratnam et al., 2022; J. Lee, 2020; S. Lee et al., 2020; Lopes et al., 2014; Macdonald et al., 2019; Mah et al., 2017; Masoumi et al., 2020; Michail et al., 2021; Molina-García et al., 2020; Moran et al., 2017; Noonan et al., 2017; Ozbil et al., 2021; Race et al., 2017; Rodríguez-Rodríguez et al., 2021; Rothman et al., 2015; Rybarczyk et al., 2023; Shaaban & Abdur-Rouf, 2019; Smith et al., 2024; Terrón-Pérez et al., 2018; X. Wang et al., 2022; Yang et al., 2020; Zavareh et al., 2023)
Comfort (micro-level) Pedestrian and cycling pathways and shortcuts, and ability to avoid major road crossings (Tree density, parks, squares, and urban furniture)	(Carver et al., 2019; Christiansen et al., 2014; J. Lee, 2020; S. Lee et al., 2020; Masoumi et al., 2020; Molina-García et al., 2020; Zavareh et al., 2023)
Safety and Perceived Safety, traffic speed, dangerous crossings and intersections, and crime-related concerns	(Christiansen et al., 2014; Hino et al., 2021; Huertas-Delgado et al., 2017, 2018; Masoumi et al., 2020; Michail et al., 2021; Molina-García et al., 2020; Ozbil et al., 2021; Race et al., 2017; Rothman et al., 2015)
Social Environment Children's characteristics: age, gender, origin, and social behaviour (Parents' travel behaviours, social support, time constraints, schedules, level of convenience, income, and education)	(Curtis et al., 2015; Ikeda et al., 2020; Kunaratnam et al., 2022; Lopes et al., 2014; Macdonald et al., 2019; Mah et al., 2017; Masoumi et al., 2020; Ozbil et al., 2021; Race et al., 2017; Rodríguez-Rodríguez et al., 2021; Smith et al., 2024; Terrón-Pérez et al., 2018; X. Wang et al., 2022; Zavareh et al., 2023)
Contextual School policy and community, government and municipal programs and interventions	(Hino et al., 2021; Huertas-Delgado et al., 2018; Ikeda et al., 2020; Lopes et al., 2014; Love et al., 2020; Macdonald et al., 2019; Michail et al., 2021; Molina-García et al., 2020; Noonan et al., 2017; Smith et al., 2024)

Parental perceived safety factors and barriers can include hazardous walking conditions, such as long distances between crosswalks and fences (Bejleri et al., 2011; Christiansen et al., 2014). A growing body of literature has begun to explore safety concerns, often reporting issues like: crash and crime rates, traffic exposure, and traffic speed. Additional barriers identified in the literature include time-consuming traffic signals for pedestrians at crosswalks, poor road safety perceptions, unavailable or unsafe pavements, and general insecurity. Conversely, attractive factors that enhance comfort and pleasure during the commute include the presence of pedestrian paths and shortcuts, low traffic volume roads, and green areas.

Several studies have examined both the parental barriers and the attractive factors which promote ACS (Huertas-Delgado et al., 2018). Other studies have explored the associations between parental perceptions and travel behaviour across various contexts, including the U.S. (J. Lee, 2020; S. Lee et al., 2020), Denmark (Christiansen et al., 2014), Latin America (Huertas-Delgado et al., 2018), and Spain (Huertas-Delgado et al., 2017). Rothman et al. (2015) found that parents' concerns regarding traffic along the school route, rather than at the school, affected the choice of school transportation mode. Therefore, identifying and addressing

AUTHORS	YEAR (area)	METHODS	INDICATORS				
			A	B	C	D	E
Carver et al.	2019 (health)	Q Questionaire (TREK)	•	n	•	©	•
Christiansen et al.	2014 (geography)	Q&L Questionaire Travek diary (TREK)	•	n	•	•	•
Curtis et al.	2015 (Urban Planning)	Q Questionaire	•	n	•	•	n
Hino et al.	2021 (health)	Q Questionaire (NEWS-Y)	•	•	•	©	•
Huertas-Delgado et al.	2018 (health)	Q Questionaire – PACO project	*	•	•	©	•
Huertas-Delgado et al.	2017 (health)	Q Questionaire – PACO project	*	n	•	•	n
Ikeda et al.	2020 (society)	Q&L Questionnaire, Semi-structured interview (TREK)	•	•	•	•	•
Kunaratnam et al.	2022 (transportation)	Q Observers (Walk Score®)	•	n	n	•	n
Lee	2020 (Urban Planning)	Q&L Questionaire, Travek diary & devices (GPS)	•	n	n	•	n
Lee et al.	2020 (health)	Q GIS-based school Walkability Index (WI)	•	•	•	©	•
Lopes et al.	2014 (geography)	Q Questionnaire 6 (CIM) Sense of community	•	•	•	©	•
Macdonald et al.	2019 (OA)	Q&L. (GPS) Observational study (SPACE) & 8 interviews	•	n	n	©	•
Mah et al.	2017 (health)	Q Questionnaire (NEW-Y)	*	n	•	•	n
Masoumi et al.	2020 (health)	Q Questionnaire	•	•	•	•	n
Michail et al.	2021 (health)	Q Questionnaire	•	n	n	•	•
Molina-García et al.	2020 (health)	Q Questionnaire	•	•	•	•	n
Moran et al.	2017 (health)	Q&L Mapping activity (GIS WI)	•	•	•	©	n
Noonan et al.	2017 (health)	Q Questionnaire (NEW-Y)	•	n	•	•	n
Ozbil et al.	2021 (health)	Q Questionnaire (*GIS Space-syntax*)	•	•	•	•	n
Race et al.	2017 (health)	Q&L Questionnaire, focus groups (Walk Score®)	•	•	•	•	n
Rodríguez-Rodríguez et al.	2021 (health)	Q Questionnaire – PACO project	*	n	n	•	n
Rothman et al.	2015 (health)	Q Questionnaire	•	•	•	•	n
Smith et al.	2024 (health)	Q Questionnaire Longitudinal (at 6 years and 8 years)	*	n	n	•	•
Terró-Pérez et al.	2018 (health)	Q&L Focus groups followed by Questionnaire	•	•	•	©	•
Wang et al.	2022 (geography)	Q&L Questionnaire, 24-h Travel diary & GIS – street view images	•	•	•	•	n
Yang et al.	2020 (geography)	Q&L Interviews & (GIS)	n	•	n	•	n
Zavareh et al.	2023 (transportation)	Q Questionnaire (ROC)	•	•	•	•	n

LEGEND: LOCATION: US United States. UK United Kingdom. FINDINGS: (P&W) Parental safety perception and Built environment/walkability (P) Parental safety perception; (W) Built environment/ walkability. METHODS: Q quantitative studies; L qualitative studies; Q&L mix-methods with qualitative and quantitative data analysis. INDICATORS: A Built environment (distance, density, street connectivity, mix-used); B Comfort (trees density and green areas, pedestrian and cycling paths, urban furniture – seats, wcs); C Safety (Traffic speed, crime-related safety, dangerous behaviours of drivers – park near or on the cross-zebra and sidewalks); D Social Environment (social support, time constrains, schedules or convenience); E Contextual (School policy and teaching and Municipal programmes). *Only considered distance. © only control children's characteristics: age, gender.

Figure 2. Reviewed studies (n = 27).

the specific road design issues along school routes which cause parents' perceptions of traffic danger may have a significant impact on increasing the number of children walking to school (Rothman et al., 2015).

Lopes et al. (2014) evaluated the impact of urbanisation on children's independent mobility in Portugal, revealing that parents' fear of traffic is the most frequent concern for children's safety outdoors. Masoumi et al. (2020) found significant differences in the level of independent school mobility between Poland and the Netherlands. In a study conducted in Ecuador, where ACS rates were low, the main barriers reported were crime and traffic speed (Huertas-Delgado et al., 2018). Aranda-Balboa et al. (2020) and Rodríguez-Rodríguez et al. (2021) claim that parental fear of traffic may vary across different contexts and cultures.

Factors such as age, gender, and parental attitudes play a crucial role in children's travel behaviour to and from school. Household dynamics, including the negotiation of travel permissions between parents and children, as well as social norms and values, also influence these behaviours. Curtis et al. (2015) found that boys often have more freedom to travel to school independently than girls. Studies applying ecological models to explore multiple levels of influence—policy, community, organisational, social, and individual—underscore the importance of human-environment interactions in understanding and changing travel behaviours.

In Denmark, high levels of ACS have been attributed to the persistent efforts of the Danish government and municipalities to promote safe route programs and awareness campaigns (Christiansen et al., 2014). As noted by Moran et al. (2017), children who walk to school are able to mentally map their route home, while those transported by car may not develop the same spatial understanding of their surroundings. Fusco et al. (2012) highlight that listening to children's perspectives offers valuable insights for research and policymaking aimed at promoting active travel behaviours. The social capital of the school and community, along with the influence of school culture, had the most significant impact on the effectiveness of interventions, as reported by Ikeda et al. (2018, 2019, 2020) and Love et al. (2020).

Over the years, numerous methodologies have been developed to measure built environment features (both macro and micro), particularly to measure walkability. These methods have predominantly focused on quantitative approaches using spatial data, such as that gathered from GPS devices, GIS-based tools, and space syntax, and socio-economic data gathered from surveys and questionnaires. In addition, various tools and techniques, such as auditing tools, travel diaries, checklists, inventories, level-of-service scales, group mapping workshops, and walk-along interviews have been introduced. Our review emphasises the importance of incorporating qualitative methods, which capture perceived walkability, as well, particularly in the context of school walkability that involves parents' decision-making processes.

3.3. Walkability Tools

Our scoping review found that most of the studies reviewed rely on existing walkability tool. The next section will synthesise some of these studies, as presented in Table 4. There is a substantial body of academic literature on walkability and, over the past decades, several indexes have been extensively studied to quantify and evaluate the walkability of neighbourhoods and communities. Environmental factors' impact on walkability have been measured using tools such as Walk Score, the Walkability Index, and TREK. However, there is evidence to indicate a weaker connection between Walk Score and walking habits in children than adults (Kunaratnam et al., 2022; Molina-García et al., 2020).

One of the most widely used self-reporting measures of walkability is the NEWS. Despite its popularity, some researchers argue that it is not easily or objectively measured, and that GIS provide a more objective alternative (Hinckson et al., 2017; R. Wang et al., 2022). On the other hand, some authors contend that GIS-based measurements often overlook micro-scale factors, such as street safety, noise, and comfort (Gorrini et al., 2023). To address these challenges and gain a comprehensive understanding of how streets' physical characteristics and design affect walkability, researchers have begun using auditing tools, or a combination of them. More recently, approaches have used tools like Google Street View and artificial intelligence to support the measurement and evaluation of walking environments (De Vos et al., 2023).

Table 4. Walkability index tools used in the school walkability studies.

Tool	Author	Tool objective	Indicators used
NEWS	Saelens et al. (2003)	To analyse the influence of built environmental attributes on walkability.	Pedestrian infrastructure, residential density, land use mix, access, street connectivity, traffic safety, security from crime, aesthetics.
NEWS-Y	Rosenberg et al. (2009)	To explore associations between the Walkability Scale-Youth (NEWS-Y) and context-specific and overall physical activity among youth.	Land use mix-diversity, recreation availability, pedestrian/automobile traffic safety, crime safety, aesthetics, walking/cycling facilities, street connectivity, land use mix-access, residential density.
NEWS-CC	He et al. (2021)	To adapt the NEWS-Y for Chinese children, adding nine new items capturing specific environmental attributes.	67 items covering: land use mix-diversity (20), recreational facilities (14), residential density (6), aesthetics (5), land use mix-access (2), street connectivity (2), walking facilities (4), crime safety (6), traffic safety (4), pollution (4). Also, 27 items in the subscales of aesthetics, land use mix-access, street connectivity, walking facilities, crime safety, traffic safety, and pollution.
GIS-WI (WI)	Frank et al. (2005)	To measure land use mix, street connectivity, and residential density.	Residential density, street connectivity, and land use mix within a 1 km buffer area, combined to create a walkability index.
TREK	Giles-Corti et al. (2011)	To examine road connectivity and vehicular traffic exposure within 2 km of public primary schools, and its impact on children's walking habits.	Connected street networks, street design, school siting, vehicular traffic exposure.
Walk Score	Chudyk et al. (2017)	To objectively measure walkability based on proximity to facilities using a 10-point scale.	Combines: (1) shortest distance to preselected destinations, (2) block length, (3) intersection density.

3.4. Results From the In-Depth Interviews

In this section, we present the main results from the series of in-depth interviews that were conducted to establish a stable set of indicators tailored to the Portuguese context.

In Portugal, the distance between children's homes and schools can exceed 4 km. As the School Director noted (Int. 7), parents can choose between the school nearest to their home or their workplace. The schools' extracurricular offerings, and the proximity of the one school to the workplace are key factors in the decision-making. These findings suggest that future studies should explore the primary factors that influence parents' school selection to better understand the reasons for this distance between school and home.

Despite various initiatives, programmes, and strategies in Portugal, children's outdoor play and independence are declining. Road traffic accidents are one of the leading causes of death for children aged 0–19 (APSI, 2022), with many of these incidents occurring near schools. Portugal has the highest rate of pedestrian deaths

in Western Europe. The ASRN's report for 2022 recorded 32,788 accidents (ASRN, 2023), and Portugal has the lowest percentage of children (age 6–9) walking to school—18% compared to Denmark's 34%, Poland's 37%, France's 40%, and Croatia's 42% (Steward, 2022). Traffic speed is considered the primary indicator of perceived safety and is directly linked to accidents, road size, and noise.

According to parents' interviews (Int. 5, 6, and 8), pedestrian infrastructure and crossings are often unsafe. It is common for parents to stop their cars on pavements to drop off their children, particularly near the main entrances of schools and kindergartens at the beginning and end of the school day. Combined with the fact that scooters use pedestrian spaces at high speeds, this means that these areas are considered unsafe. As pointed out by two directors and an urban planning expert (Int. 3, 4, and 7), these behaviours violate the law, yet they are widely tolerated, effectively making them an accepted practice in the community. These problematic behaviours impact parents' perceptions of safety and heighten their fear of traffic. Many parents are concerned about their children crossing hazardous areas, even if the distance to school is short. In an interview (Int. 8), parents revealed that, despite living close to the school, they do not allow their child to walk alone because it is comfortable for them to drive the child to school on their way to work.

The decision-making process is complex and often influenced by parents' backgrounds, social norms, and travel behaviours. For instance, in one interview (Int. 6), a couple explained their preferences for taking their child to school. The father drives the child to school and then continues to work, while the mother prefers using public transport. The mother mentioned that she dislikes driving due to the stress of traffic and that the travel time is similar. She also noted that she has been a frequent user of public transport since she was young, and in their city, it is free and better than where she grew up. During another interview (Int. 5), a mother explained that she prefers to walk her daughter to school due to the convenience of a bus stop located directly in front of the school, which provides a direct route to the city centre location where she works. She also mentioned that the difficulty of finding parking in the city centre is a major factor in her decision. The design of the city and the school zone directly impacts the daily lives of residents, including their school choices (Giles-Corti et al., 2011). According to the expert (Int. 3), political decision-makers should consider public transport accessibility, neighbourhood conditions, and walkability when selecting locations for new schools.

According to the pedagogical director, children need to learn about the dangers of being independent, and how to behave when walking alone or in groups. Mobility education is an effective way to promote autonomy for children at school as it teaches them "how to cross streets, travel in groups, respect traffic signs, and avoid dangerous areas" (Int. 4). The urban planner also emphasised the importance of children getting to know their city and surroundings, not only for their natural development and sense of community—a point also noted by the geographer—but also for emergencies such as pandemics, climate disasters, or wars. Finally, as the pedagogical director stated, walking to school can be an opportunity for parents and children to spend quality time together.

4. A Conceptual Framework for Future Research

The scoping review underscores the importance of the urban environment in shaping children's travel behaviours to and from school. The findings suggest that distance is the most widely accepted indicator, although some authors argue that perceived distance may be more significant. This means that the presence of safe routes with pedestrian paths, major roads, and unsafe crosswalks can significantly impact parents'

decisions and their fear of traffic. In Portugal, this is a pressing issue that needs to be addressed. The high rates of pedestrian injuries and the dominant car-centric culture suggest that these indicators may play a critical role in influencing children's travel behaviours to school and should be further explored.

Consequently, the government and several municipalities are progressively investing in policy measures to encourage children to walk. However, there are still relatively few studies in this area. Additionally, the current "backseat generation" and car-dependent mobility patterns present challenges, including time constraints and the lack of coordination needed to identify appropriate policy measures that influence targeted travel behaviours. Figure 3 presents the theoretical framework for exploring the main determinants of children's daily transportation behaviours to school. Following this, we will outline our perspective on the most important groups of indicators to include in research that examines factors influencing children's walking or biking to and from school.

Figure 3 presents the conceptual framework, based on insights from interviews, existing school walkability studies, and the systematic review, which will serve to guide future studies tailored to the Portuguese context:

> Built Environment: Urban areas should be planned with appropriate levels of density, street connectivity, and land-use mix to ensure children have access to essential services within a walkable distance from home. New school locations should consider pedestrian infrastructure and public transport accessibility and ensure strategic placement within the urban landscape (Vincent et al., 2017).
>
> Comfort: Standard quality criteria for walking paths, including shade from trees, protection from cars, and continuous pavements, must be met. Comfort elements for children, such as urban furniture, shelters, and access to public restrooms, should also be provided to make walking more enjoyable.

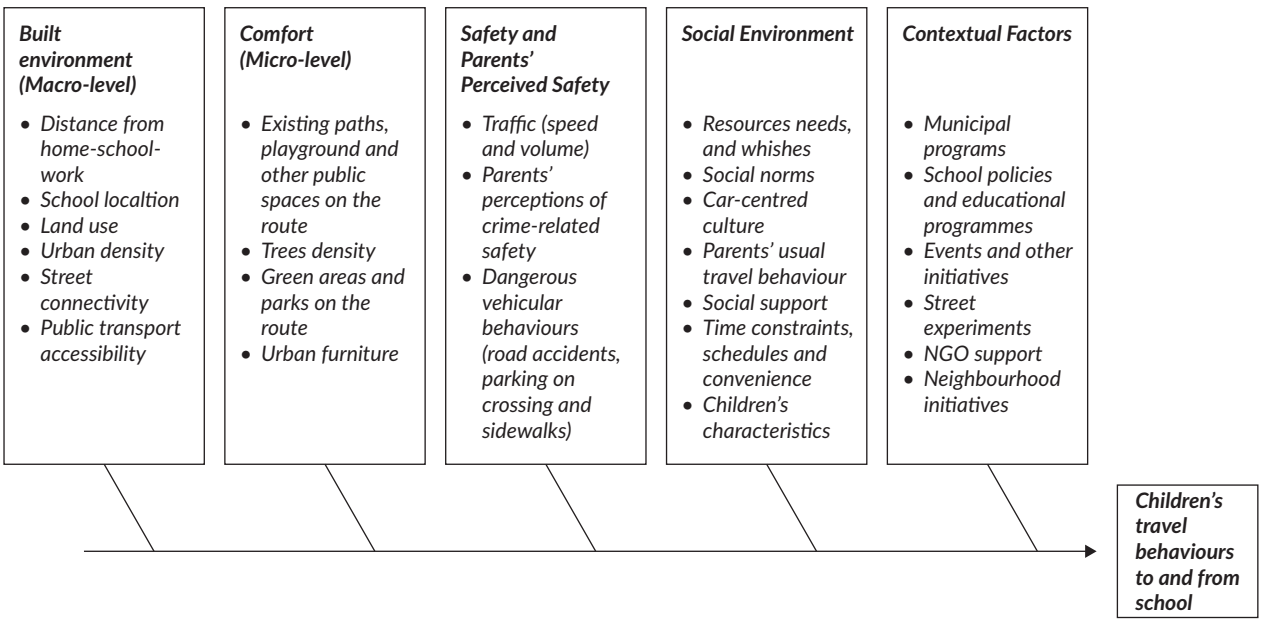

Figure 3. Conceptual framework of children's daily travel behaviours to school as a function of built environment characteristics (macro and micro), parental safety perceptions, social norms, and contextual factors.

Safety: Controlling traffic speed, reducing road size, installing clear signage for children, ensuring safe crossings, and providing adequate lighting at junctions for visibility are critical safety factors. Addressing parental fear of traffic is crucial, as it heavily influences their choice of travel mode for their children.

Social Environment: Factors such as parents' fears, the convenience of taking the child to school, time constraints, and social norms all influence the choice of school and mode of travel.

Contextual Factors: Local programs, school policies, and government strategies play an important role. Schools can serve as facilitators of ACS interventions by providing safe and supportive environments and reinforcing ACS habits and values.

Future research, particularly in the Portuguese context, should dive deep into parents' perceptions and backgrounds. Focus groups and walk-along interviews are excellent methods to engage parents and children in discussions about transitioning to healthier travel behaviours. Research suggests these approaches provide opportunities to raise awareness and advocate for social and political rights (Christiansen et al., 2014; Moran et al., 2017).

Our case study revealed that addressing unsafe practices near schools—such as exceeding speed limits, parking on pavements, or stopping next to pedestrian crossings—can have positive impacts on children's personal and social development. Urban planning practices should adopt these findings and explore innovative ways to involve children and their families in active travel when designing new policy instruments, regulations, and other interventions.

5. Conclusion

This study provides a scoping review and updated information on existing evidence regarding school walkability and the barriers parents face in promoting active travel to school among children. It offers a comprehensive overview of various studies, and highlights the key differences between them, to establish a conceptual framework. This framework, based on a specific case study, aims to inform future research to support more objective, effective, and expansive strategies, policies, and interventions related to children's ACS. Guided by previous literature, a series of interviews were conducted. The interviewed parents expressed concerns about allowing their children to walk alone, citing bad driver behaviour as a significant issue, despite the pedestrian infrastructure being rated as fairly adequate. These findings suggest that studies focusing solely on physical attributes may produce misleading results. Therefore, it is crucial to include parental perceptions, travel behaviour and backgrounds in research. Additionally, the importance of contextual factors—such as legislation, local programs, and school strategies—should not be overlooked. Finally, we hope that this study supports and encourages future research into school walkability and active travel interventions for children.

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Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

Supplementary material for this review is available online in the format provided by the authors (unedited).

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ARTICLE

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New House, New Furniture, New Room: Children's Pandemic Landscapes of Care in Chile

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Abstract

Standing at the intersection between geographies of care and children's geographies, we present three ethnographic stories (emerging from three ethnographic studies) through which we argue that, as a result of pandemic confinement in Chile, children's places within their landscapes of care shifted in a twofold sense: First, given the de-mobilisation and spatial concentration of spaces of care at home, children's place became closer to adults,' suspending the usual spatial segregation that separates them. And second, in tandem with this new proximity that we refer to as in-person family relationships, new possibilities for the involvement of children in family care practices emerged. This rearrangement of children's places within landscapes of care brings to the fore two interrelated aspects of family care from children's perspective. First, the kind and amount of in-person family time spent in a shared space in "normal" times was not enough from the perspective of children's needs and interests. And second, even though children are usually seen as subjects of care, they are people who care for others and who are able to take on more caring responsibilities than the ones that they usually are expected to.

Keywords

children's geographies; COVID-19; geographies of care; Global South; landscapes of care; mobilities

1. Introduction

As COVID-19 expanded across the globe and a pandemic was declared in March 2020, governments around the world established emergency measures that varied in kind, severity, and length, reflecting on diverse

cultural, economic, geographical, and political contexts. In most countries, schools shut down for significant amounts of time, and teleworking and varied forms of social distancing were encouraged, either requesting or mandating that people "stay at home." Altogether, this resulted in drastic changes to children and families' everyday routines, spatialities, and caringscapes (Bowlby, 2012), given the concentration of most daily activities at home and the resulting downscaling of mobility scopes or *de-mobilisation* of everyday family life.

Research on the impacts of COVID-19 on children has focused on the realm of mental health (Andrades et al., 2023; Mac-Ginty et al., 2021; Zhen et al., 2022). While this is a key aspect of the crisis, wider impacts on children's everyday lives have been under-studied (with exceptions such as Andres et al., 2023; Cameron et al., 2023; Chamberlain et al., 2021; Garthwaite et al., 2022; Potter et al., 2024a, 2024b; Rojas-Navarro et al., 2021, 2022), and little attention has been paid to how the spaces and mobilities that sustain family life and shape their caringscapes were disarticulated, re-articulated, and re-signified in the process of staying at home. Therefore, this article aims to deepen our understanding of how children and families experienced and were impacted by the pandemic in diverse specific geographical, cultural, political, and economic contexts around the world (Cameron et al., 2023; Cortés-Morales et al., 2022; Suleman et al., 2021), not only in compartmentalised spheres such as education and mental health but also in the wider context of everyday life and family care, where all dimensions are weaved together in time-space and through mobilities (Jirón et al., 2022). We approach this aim with a focus on children's perspectives and positions within care relationships, seeking to contribute to a conceptualisation of care as multidirectional in which children are not seen exclusively as subjects of care, but as people who can care for others too (Ergler et al., 2022; Kallio & Bartos, 2016; Kullman, 2014; Vergara del Solar et al., 2024).

In "normal" pre-pandemic times, children's geographies have shown how children's lives are articulated through various forms of movement that connect them to people, places, services, and resources that are key for sustaining their lives, wellbeing, and care (Murray & Cortés-Morales, 2019). In contexts such as Chilean cities, care infrastructures are usually precarious and rely on individual resources, informal labour, family and social ties, as well as the different places that constitute families' caringscapes and carescapes (Bowlby, 2012), which are geographically scattered and need to be articulated through individuals' movements. In this context, everyday mobility is understood as fundamental for accessing and articulating family care (Jirón et al., 2022). Therefore, and bearing in mind the inequalities that shape families' carescapes, corporeal mobility is also problematised by geographies of care, particularly in relation to childcare, in terms of the time, energy, and physical and economic costs that they involve for families and societies: children getting to a school that is not necessarily near home; parents going from school to work in a sometimes completely different direction; children being picked up and looked after by grandparents, aunts, neighbours, or childminders after school; doing the shopping, and so on. All these things happen in dispersed places that families need to put together again and again as an intricate puzzle of everyday care, based on changing needs and available material resources and social networks.

In Chile, the pandemic was lived in the context of the aftermath of the social unrest of October 2019, when everyday mobilities and spatialities had already been interrupted, and where the pandemic constituted an excuse for continuing some of these repressive measures, as we explain later. The pandemic measures instilled in Chile forced a complete rearticulation of their landscapes of care. During this time, care, education, work, entertainment, leisure, physical and emotional development, and social interaction were all (supposed to be) concentrated within the boundaries of children's homes. It is in this out-of-the-ordinary context that this

article reflects upon three ethnographic stories that have emerged from three research projects in which the authors have been involved, conducted between 2020 and 2024 in different cities of Chile, which we will describe in more detail later.

Based on these stories, we argue that, because of severe and long confinement in Chile, children's places within their landscapes of care shifted in a twofold sense: first, given the de-mobilisation of everyday life imposed by pandemic measures in Chile, and the concentration of spaces of care and all kinds of activities at home, the usual spatial segregation of children from adults in their everyday activities was temporarily suspended. This required families to rearrange the home space to accommodate their different needs and activities according to their material and social possibilities (Rojas-Navarro et al., 2022). And second, in tandem with this new proximity that we refer to as in-person family relationships, new possibilities for the involvement of children in family care practices emerged, challenging assumptions about what children should or should not do in terms of caring for others and for themselves. This shifted children's place in the sense of their position within care relationships.

At the same time, this rearticulation of children's places within landscapes of care unveiled two simple but significant aspects of family care from the perspective of children. First, the kind and amount of in-person family time spent in a shared space in "normal" times was not enough from the perspective of children's needs and interests. And second, even though children are usually seen as subjects of care—those who need to be cared for usually by mothers—they are people who care for others and who can take on more caring responsibilities than the ones they usually are expected to have.

Our discussion is empirically situated in the context of the Global South, Latin America, and particularly Chile, and stands at the intersection between geographies of care and geographies of children, youth, and families. From this interdisciplinary intersection and this geographical and cultural context, we aim to contribute to wider global discussions around the impacts of COVID-19 on children and families' everyday lives from a geographical perspective, and around care from a spatial, mobile, and geographical point of view, emphasising the place and perspectives of children in care relationships. Within this framework, our article highlights the significant and interdependent relations between family care, space, and mobilities. In this sense, we argue that, at the same time that the pandemic aggravated the so-called care crisis, it also alleviated families from the demanding need for mobility that care involves in normal times. In doing so, it also made families aware of what other scholars have called the im-possibilities of care (Rojas-Navarro et al., 2022).

In Section 2, we discuss some of the main conceptualisations of care from a spatial and geographical view and how these may apply to understanding children's places within landscapes of care. Section 3 presents some of the most relevant empirical observations around children and families' pandemic experiences at a global scale, briefly situating our discussion in the Chilean pandemic context, to then give way to the projects and stories that underpin our reflections in Section 4. After presenting three stories from three children and families in different Chilean cities, Section 5 unfolds lines of reflection on where to approach these stories. We conclude by discussing the main points that we identify in relation to the rearticulation of children's places in pandemic and post-pandemic landscapes of care.

2. Children's Places Within Landscapes of Care

Geographies of care have focused on how care is continuously made and re-made possible across different spatial relations (Middleton & Samanani, 2021, p. 31). The concepts of caringsacapes/carescapes (Bowlby, 2012), landscapes of care (Milligan & Wiles, 2010), and care ecologies (Bowlby & McKie, 2019) aim at problematising the manifold spaces in which care takes place, considering the different aspects or stages of care (Tronto, 2015). These concepts emphasise diverse dimensions of care, such as the informal and formal character of care practices signalled by the corresponding differentiation between caringscape, the spaces of informal care, and carescape, the spaces of formal care (Bowlby, 2011, 2012); the need to understand these diverse dimensions as relational and interdependent, as in the notion of care ecologies (Bowlby & McKie, 2019); or argue for a relational, multi-directional and multi-layered understanding of care, as in landscapes of care (Milligan & Wiles, 2010). Multi-directionality refers to a focus on the interdependent and reciprocal nature of care, in which a network of actors become involved in "multidirectional flows and connections" (Milligan & Wiles, 2010, pp. 737–738). The multi-layered character of care, in turn, refers to the diverse and overlapping dimensions that shape care relationships, in addition to spatiality: care practices are then articulated with norms, values, and human and spatial relationships, giving rise to landscapes of care. These are defined as the spatial expressions that result from the interaction between sociostructural processes and structures, shaping the experiences and practices that constitute care (Milligan & Wiles, 2010, p. 739).

The notion of landscapes of care also highlights the relevance of temporality in terms of past experiences, future expectations, everyday rhythms and routines, and life course, as well as the social, political, technological, and economic cycles that shape them (Milligan & Wiles, 2010, p. 740). However, the temporal dimension of care has scarcely been considered in articulation with space, even in geographical approaches (Bowlby, 2012). An exception in this regard has been the geographies of childcare, which have shown the circular relation between gender inequalities, spatial patterns, and paid-work structure in Western households and childcare (Bowlby, 2012). This temporal-spatial approach unveils the fact that, from a spatial approach, care practices occur in diverse places; there is a need to move between these, and that movement takes time. Therefore, what allows and, at the same time, hinders care are the mobilities that articulate specific landscapes of care.

The mobile nature of care also refers to change over time in terms of the material, social, practical, and emotional changes that constantly transform intergenerational care (Middleton & Samanani, 2021, p. 31; Plyushteva & Schwanen, 2018). This mobile and temporal dimension encompasses the timescales of everyday routines and rhythms, the individual lifecourse and intergenerational exchanges, collective memories, and social change (Bowlby, 2012). A temporal-spatial approach to care contributes to a more complex understanding of intergenerational and interdependent care relations. On the one hand, a focus on space highlights the spatial distribution and segregation of generational or age groups when observed from an everyday scale, so that children, adults, and the elderly occupy differentiated places, both physically and in terms of positions. On the other hand, a temporal approach reveals forms of reciprocity that occur across the life-course between generations, both on the individual and everyday scale and in the collective, social realms. While the intergenerational character of care is acknowledged from a life-course perspective, children are usually defined as people who need to be cared about and cared for by others, and very rarely as people who care about and for others in their present too. This is linked to a specific—Western, white,

and upper class—definition of childhood in which a careless childhood is a good childhood. Therefore, discussions around care tend to position children as subjects of care (in need of being cared for), problematised in relation to women as caregivers, as in the case of geographies of childcare. The stories presented here aim to question this passive positioning of children, arguing for an understanding of care relations as fluid, distributed, and multidirectional, in which children care for and about others in diverse forms. And not only when economic and family circumstances require them to become "carers," but also as children who care for and about their families, friends, pets, and territories on an everyday basis (Ergler et al., 2022; Kallio & Bartos, 2016; Kullman, 2014). As pointed out by Kallio and Bartos (2016), adults need to take notice of the ways in which children engage in caring practices and politics so that we can deconstruct presumptions that prevent their caring agencies from being realised. In this regard, a geographical approach to children's caring agencies should emphasise their place within landscapes of care not only in terms of the physical places where they become engaged in caring practices but also in the sense of their positionalities. Here, we highlight Evans' notion of "sibling caringscapes," which suggests a need to consider "the feelings and subjective positions of different actors involved in caring pathways" in addition to (and in relation to) caring activities and routines (Evans, 2012, p. 830).

Within scholarship around landscapes of care, therefore, we identify the need to think about care from a mobilities perspective and incorporate children's perspectives in our understanding of care from a geographical point of view.

3. Children and Families Pandemic Landscapes of Care

Between March 16th 2020 and April 30th 2022, the global average for school closures was 142 days fully closed and 151 days partially closed (Andres et al., 2023). For school-aged children, this meant an important restriction of their social worlds beyond the household (Cameron et al., 2023, p. 1109)—except for its virtual spatialities (Galpin et al., 2023)—and their sense of place (Webber et al., 2024). This had especially challenging consequences for children living in already constrained spatial and economic circumstances (Andres et al., 2023). Lockdowns were a universal phenomenon experienced in particular ways. In some countries, children were completely "incarcerated" during the first weeks of the pandemic (Play England, 2022) so the home-built environment was determinant of children's lockdown experiences in terms of how compromised their agencies and wellbeing were (Cameron et al., 2023).

Research has shown the manifold and dramatic challenges that lockdown and general pandemic measures involved for families, especially for women with children who saw their already unequal care workload increase after their usual care networks vanished (Rojas-Navarro et al., 2021, 2022). While not ignoring this problematic and more visible side of pandemic life, scholarship has also shown that families also perceived certain benefits from lockdown, unveiling a "brighter side" of COVID-19 (Errázuriz & Greene, 2020). On the one hand, in some cases, cities and homes were inhabited in unusual and fun ways (Freeman et al., 2022; McDuie-Ra, 2023; Potter et al., 2024b), as well as spaces being repurposed to accommodate multiple activities that used to be performed outside the home (Errázuriz & Greene, 2020). On the other, for those families in which parents were able to work from home, this also meant having more time to be together, which was appreciated by many children and parents (Cameron et al., 2023; Chamberlain et al., 2021). In some cases, this was viewed as an opportunity to do more things together and strengthen family bonds (Cameron et al., 2023). This ambiguous experience of lockdowns as both restricting and enabling coincides with Bowlby's (2012) discussion of the

connotations of confinement as both unwanted restraint and limitation, and as a feeling of "safety within the confines of one's own home" (Bowlby, 2012, p. 2108).

In Chile, pandemic measures lasted long enough for people to become used to this way of living, so for some people, going "back" to business as usual was even more difficult than confinement itself. This needs to be understood in the context of the aftermath of the October 2019 Chilean social unrest. This political, spontaneous movement—started by secondary students—was the result of decades of structural inequalities established by the dictatorship (1973–1989). The social unrest had already interrupted children and families' mobilities and spatialities because of the massive protests and the violent police repression and governmental authoritarian measures that followed (Anigstein et al., 2021; Cortés-Morales & Morales, 2022a, 2022b). In March 2020, children living in this country were just beginning a new school year (which runs from March till December), after the spatial and mobile restrictions as well as temporary school closures experienced in October–November 2019, followed by three months of summer holidays.

In this context, the right-wing government of the time established authoritarian measures to combat the pandemic, giving continuity to some of the previously established repressive measures. For example, the nocturnal curfew was extended from October 2019 until May 2021, and lockdowns were extreme compared to other countries in Latin America and elsewhere. Children were not supposed to go out at all. It was only in August 2020 that a permit was created for children to go out twice a week. Most parks and natural areas, however, remained closed for much longer, and schools remained closed for 10 to 18 months depending on each school's ability to comply with health regulations. The likelihood of children staying at home during lockdowns, however, varied according to families' ability to work from home and socioeconomic status in an acutely unequal country (Rojas-Navarro et al., 2021), which adds up to the fact that families with children all over the world were economically more dramatically affected by the pandemic than those without (Collard et al., 2021).

4. Bringing Pandemic Stories Into Presence

Our reflections emerge from three different research projects conducted in Chile, in which the authors have been involved, working together in some of them. While the three studies are independent of each other, they share some themes and methodologies, as well as the context and special time when they were conducted. Particularly, we reflect upon the stories of three children and their families—each of them a participant in one of the projects—whose ways of rearticulating their caringscapes were significantly different according to the cities where they lived, their economic and material resources, family and social networks, and their positions within wider carescapes (Bowlby, 2012). At the same time, the three stories make visible the shared challenges, strategies, and meanings encountered and deployed by families. In this sense, this article does not intend to report on the empirical analysis of these different projects, which have been published elsewhere (Henríquez et al., 2024; Jirón Martínez et al., 2020; Leyton et al., 2023; Pinilla et al., 2023; Vergara del Solar et al., 2024), but to illuminate a wider discussion around children's shifting places within landscapes of care in pandemic and post-pandemic times and territories, in Chile and elsewhere.

María's story emerges from "The involvement of Children in the circulation of family care. A case study in three Chilean cities," an ongoing project (2022–2025) that has conducted in-person ethnographic research with 21 children (10–13 years old) and their families from different socioeconomic backgrounds in Santiago,

Valparaíso, and Concepción. Mateo's story is part of "An interdependence, social networks, gender approach to understand daily activity-travel and mobility of care in Chilean cities," conducted between 2020 and 2023 in Santiago and Concepción, focusing on the everyday mobilities of adults who cared for others, through virtual, remote and in-person ethnographic methods with 23 participants—Mateo's mother among them. Fernando's story emerged from "Families in times of COVID-19: families' experiences, challenges and replies in social inequality contexts," conducted in 2020–2021 in different Chilean territories using Indeemo and virtual interviews with children and adults from 38 families, aiming at recording and analysing how they were experiencing these times. Each project had ethical approval from its main researcher's academic institution.

4.1. María

María was eight years old in 2020 and living in a city on the central coast of Chile with her parents, brother, and dog. Her maternal grandmother lived nearby and was also present in her everyday life. María's mum was a doctor who worked at a hospital and her private practice. Her dad worked from his home office for a multinational company. Both parents worked full-time and had high incomes. María and her brother attended a private school located a 5-minute walk from home. At the time of the study (2022), María was still walking to and from school with her dad and dog, but she was planning to do it on her own or with her brother the following year.

In 2019, María and her family had just returned to Chile after living abroad for a year while her mother was conducting postgraduate studies. To finance this, her parents had sold the house where they lived. On their return, they bought a two-bedroom flat near the sea. Even though the flat was considered small, María and her brother were younger, too. They shared a bedroom and had plenty of outdoor places to play nearby. Before the social outbreak and the pandemic, the family used to go out cycling, visiting friends, to the beach, to the park, or to eat out. In 2020, when the pandemic began, the flat suddenly became a very small space in which the children felt limited. In María's words: "We had to move into my grandma's house so that we had more space for walking. When it was summer [in the flat], we could only watch TV and that kind of thing because my imagination was blocked."

The family's need for a greater and outdoor space led them to leave the flat and stay with María's grandmother, initially for a couple of weeks, but in the end, they stayed a whole year. María talks about this change with joy; she draws her grandma's house on a map and explains the intricate spaces within the house and the different levels of the garden full of plants and fruit trees, where she was able to walk and play on her own or with someone else. Moving to her grandmother's house was a relief for the whole family. In addition to the spatial aspect, María was very happy living with her grandmother, who actively cared for the children and the whole family while the parents worked. It was also a relief for María's parents, who were used to counting on the work of a maid who had previously cleaned the house, cooked, and looked after the children Monday to Friday since they were babies. With the pandemic restrictions in place, she could not work with them anymore, and María's grandmother being there allowed them to keep working as they usually did.

After living at grandma's for a year, the family bought and moved into the house where they have lived until the present, located in an upper-class neighbourhood in the same city. Living in the new house during the second year of the pandemic, when some restrictions were lifted and it was possible to go out at certain times and days, the family started going out on cycle rides and walks together whenever they could. María

expresses nostalgia about that time when her parents were more at home and they made time for going out, playing board games, and so on. María and her parents had the impression that when they went back to "normal," going to school and working in person, life became busier than ever, and they were not able to maintain pandemic routines that they enjoyed, such as daily walks and weekly cycle rides. At the time of the study, María expressed concern about her dad, who worked too much, never went out to do exercise, and was never able to sit with them for dinner without looking at his phone, mirroring the worries that her parents had about her and her brother during lockdown. Things that were key for her family during the confinement seemed to dissolve once they returned to in-person school and work.

4.2. Mateo

The second story is that of Mateo and his mum Katherine, a middle-income single-parent family who lived in a city in the South of Chile. His father and extended family (maternal grandparents, aunt, and cousins) lived in the same city and were all involved in his everyday care arrangements in different ways. Mateo was five years old at the time of the study and when the pandemic began. Katherine worked as a social worker in an organisation outside of the city, which meant she travelled about an hour to get there. They lived in a two-bedroom flat in the city centre and had already experienced mobile and spatial disruptions to their daily routines with the social outbreak, as the park nearby was the epicentre of the local protests.

With lockdown, both Mateo and Katherine's activities became virtual. He had just started kindergarten, which, in the Chilean school system, prepares children to learn to read, write, and perform basic mathematical operations. This meant that children as young as Mateo had to adjust to online lessons and do homework during the confinement. At the beginning, Katherine had to share her laptop with her son. Both worked and studied at the dining table, which they had to clear for mealtimes. This arrangement had its challenges. Beyond the problem of sharing the computer, the laptop on the table was too high for Mateo, who was barely visible on the screen for his teacher to see him. First, they put a tower of cushions on his chair, so he was a bit higher, but this was not comfortable enough, considering the long time he spent there every day. At the same time, Katherine struggled to work without her computer during the mornings. After a while, they had to rearrange their space and resources: Katherine bought a tablet for Mateo. They also got a desk and chairs, which they placed in the dining room. This way, Katherine worked on her laptop on the new desk, and Mateo sat on a new adjustable chair at the table with his tablet.

Katherine had to distribute her attention between her work and Mateo's online schooling, being tuned into his lessons and reacting fast whenever he needed help—with materials, sharpening pencils, replying to questions, connecting to Zoom, participating in class, and so on. In turn, this period required Mateo to learn to do things by himself, things that used to be done for him by others, such as getting a glass of water or snacks, turning on the TV or tablet, and finding things to do when he was bored once school was over. Despite the complexities of spending the whole day together in this limited space, Katherine appreciated the proximity that this time allowed them:

> This is a new thing, being with them, and I think that, despite the tiredness that this double presence, being there but not being, generates in us, mothers, I am grateful, because I had never spent so much time with Mateo.

This unique situation came to an end in 2021, when Katherine had to go back to in-person work, while Mateo's school remained in virtual mode. At the beginning, his grandparents supported them, as they were still doing online work. His grandfather would pick him up every morning and take him to their house, where Mateo connected to classes while they worked, as his mother had done previously. In the evening, they would take him home, coinciding with Katherine's return. However, after a while, they also had to go back to in-person work. This meant that his everyday life and care arrangements were a puzzle that they had to sort out every day in a different way, according to who was available to be with Mateo: some days he would go to his aunt's house, where a nanny looked after his cousins too; other days he would be with his dad, who was unemployed at the time; and when there was no other option, he would go to work with his mum.

4.3. Fernando

The third and last story, from a low-income family, is that of Fernando. He was 15 years old when the pandemic began and lived in Santiago with his parents, Marcela and Alberto. They had migrated there from Venezuela two years earlier, as many other families had, because of the political and economic crisis in that country. Having gone through many different jobs, Marcela and Alonso were working as inspectors for the public transport system, but they became unemployed as soon as the pandemic began.

Before the pandemic, they lived in a shared accommodation with 70 rooms, each of them occupied by a person or family group, all the inhabitants sharing only a couple of bathrooms. They were grateful they managed to move out just before COVID, as many people had died there during the first months. At the time of the study, they lived in a shared house with five rooms and two bathrooms, the three of them sharing one room. During the first weeks of the pandemic, they tried to stay at home, following regulations and Fernando's grandmothers' worried advice from Venezuela. They got food boxes and clothes from their protestant church and Fernando's school. However, they needed to pay rent, and the landlady was unwilling to accept any late payments. This forced them to find a way of getting an income despite the risk of contagion. They decided to make and sell *tequeños*, a Venezuelan snack, in the streets of Santiago.

The routine they created during this time implied a series of daily spatial rearrangements within their room, as it was the same space in which they slept, studied, and cooked/worked. In the mornings, they put away their beds so that Fernando had space to connect to online lessons on the family's laptop. Meanwhile, Marcela would clean the room and Alonso started cooking. After school was over, they would have lunch and go out together to sell *tequeños* at a metro station. All their activities were performed together in that room (except for buying ingredients and selling food), transforming the space once and again between a bedroom and a place for studying and cooking. While they all acknowledged the precarity of their circumstances, they also expressed feeling grateful for being together all day long, having spent their whole days apart before the pandemic, when Marcela and Alberto would leave the house before Fernando woke up for school, and come together in the evenings only for a bit before going to sleep.

5. Lines of Reflection

Based upon the previous stories and broader discussions that emerged from the three studies that underpin this article, we suggest three interwoven lines of reflection for thinking about how landscapes of care and children's positions within them have shifted as a result of pandemic confinement: the blurring of

divides; a move from in-person work/school to in-person family relations; and re-signifying mobilities and care.

The first line suggested refers to the blurring of diverse, well-established divides, such as family/work, productive/reproductive activities, public/private realms, and adult-child activities and spaces. This blurring resulted from the dramatic reduction of the places in which everyday life occurs and the condensed spatiality of home as the hosting place for the everyday activities of all family members. In Chile, restrictions lasted long enough for these circumstances to become a new normal that families got used to, even those who found themselves in very difficult positions. Under these circumstances, activities and intergenerational family members had to find ways to share the home-scape, giving way to their re-positioning within landscapes of care.

The condensation of time, space, care, work, education, and leisure at home had the effect of family members spending more time together than they had ever done. While we acknowledge the challenges and trauma brought up by these circumstances, especially for people who have a heavy care workload, we focus our reflection on the tension between this conflict and the nostalgia and gratefulness expressed by some people in relation to what this time allowed. This involves both emotional and practical dimensions around care: There was a feeling of being emotionally closer to each other associated with the physical proximity triggered by lockdowns. At the same time, there was a practical relief given by the temporal suspension of spatially extended and scattered landscapes of care; as all forms of care concentrated mostly within the home, there was no need for parents to navigate the usually bumpy paths of childcare. We have called this shift a move from in-person work/school towards in-person family relationships. John Urry (2007) argued that the need for in-person relationships that required corporeal mobilities was something to be empirically investigated rather than taken for granted. In this sense, while it is widely acknowledged that in-person work and learning dynamics are usually the ideal, less has been discussed about the need for in-person family relationships, not in relation to distant family members but within nuclear family homes. The stories emerging from our three studies suggest that the pre-pandemic normal in-person amount and quality of family interaction were not enough for children, and they appreciated spending more time together.

Children being spatially positioned in proximity to adults at home acquired different roles. For example, observing their parents' work demands led them to identify emotional and self-care needs in their parents; new home articulations meant that new actors were present bringing with them new care needs and capabilities; also, children getting involved in everyday caregiving activities, such as cooking, cleaning, feeding pets, or other work. This observation also coincides with the findings of Rojas-Navarro et al. (2022), in which most people living with children under 12 reported that children had increased their participation in household chores and direct care activities during lockdown. At the same time, this children-adult proximity meant that less corporeal mobilities were needed to articulate their everyday landscapes of care.

The relief experienced by some families in practical and emotional terms because of the reduction and de-mobilisation of their landscapes of care evidences the tight relationship between care and mobilities. As previously discussed, time and space are articulated around care through mobilities, and the de-mobilisation of most care relations during lockdown meant that there was more time to spend *caring for* other family members. At the same time, this new configuration of care de-normalised the need to be away from home and apart from each other every day, most of the day, to comply with work and education

commitments. Consequently, and ambiguously, the demobilisation of everyday life and landscapes of care questioned and re-valued the need for corporeal everyday mobilities at the same time. It also meant that families—children and adults alike—became aware of what Rojas-Navarro et al. (2021) refer to as the im-possibilities of care.

6. Conclusions

The stories we have shared here illuminate some of the ways in which pandemic spatial reconfigurations impacted the rearticulations of landscapes of care and children's places within them. While all stories share the fact that material and spatial reconfigurations were needed to accommodate pandemic carescapes and caringscapes, possibilities for spatial reconfigurations mirrored the inequalities that characterise Chilean society. In this sense, while one family was able to move into a relative's bigger house and later buy their own house, another family had to accommodate all their needs within the space of one room, rearranging its distribution for day and night use. This is probably the most significant problem that emergency policies should prioritise in any future crises of this kind. But looking beyond these dramatic material differences, in the three stories, we observed the blurring of the usual divides that differentiate public/private, productive/reproductive, and children's from adult's spaces. This blurring came in tandem with children positioning differently in their care relations, which allowed them to spend more in-person time with their families. They became aware of a lack of in-person family interactions in pre-pandemic and post-pandemic times, at the same time that allowed them to perform more caring for activities in relation to themselves or others, observing and/or participating more in parents' re/productive spaces.

The demobilisation of everyday life and landscapes of care was experienced in ambiguous ways by children and families. While challenging in terms of making space and time for concentrating all activities at home (Clery & Dewar, 2022), it was also appreciated in terms of providing more in-person family time. The observation that children in Chile now miss certain aspects of lockdown is consistent with studies conducted elsewhere (Chamberlain et al., 2021). The shifting carescape of the pandemic in which spatial confinement was presented as tantamount to caring for ourselves and our families allowed for more time for domestic chores and spending time with family. This unveiled the possibility of living differently, denaturalising the everyday segregation between work and family, children and adults, and its associated mobilities and costs. Salin et al. (2020) have discussed how families' pandemic coping strategies operated at different levels: macroenvironmental, relationship, and individual. However, these categories do not refer to spatial strategies like those observed in the three stories presented here. Altering spatial conditions constitutes a kind of coping strategy that moves between these three levels, given that families' spatial circumstances are to a significant extent shaped by macrosocial factors, constituted through and at the base of family/social relationships, and they greatly influence individual possibilities for actions, attitudes, and decision-making.

Better understanding how children experienced confinement during the pandemic and how their places within landscapes of care have shifted as a result of those experiences is key for their wellbeing in post-pandemic cities in at least two ways: On the one hand, their pandemic spatial experiences are shaping how they inhabit and signify their territories—for many children "going back to normal" means that they are just starting to know the cities where they live after the pandemic. On the other hand, we need to learn as much as we can from this phenomenon so that we can better plan and react to future events of this kind, alleviating their negative

impact on children and families. The reflections in this article refer not only to times of global crisis but also contain relevant questions about care and everyday life for children in "normal" times. Demobilising children's lives and families' landscapes of care led them to explicitly value corporeal movement, but also to wonder whether we were moving too much. In this regard, geographies of care and children's geographies need to come together to inquire about how children are being re-positioned in their landscapes of care. This means investigating how they experience and signify going back from the (not always) protected space of home, and from the virtual relational space, to moving about in cities and territories they inhabit but that they are only just beginning to recognise, in territories that have never been planned and designed with their needs and interests as a priority.

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Conflict of Interests

The authors declare no conflict of interests.

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Challenging Child-Friendly Urban Design: Towards Inclusive Multigenerational Spaces

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Abstract

The ongoing Covid-19 pandemic has not only presented novel challenges but has also brought to light previously unaddressed issues, such as children's rights, their interdependence on adults, and the vulnerability of children concerning their mental well-being. The pandemic has served to accentuate the distinction between those spaces that have traditionally been designated for children or adults, and the manner in which they coexist. Some researchers posit that this phenomenon can be attributed to the emphasis placed on so-called child-friendly spaces. This article presents a critical examination of and challenge to the concept of child-friendly places, advocating for a shift towards multigenerational places. This critique draws on data from an observational study conducted in a community playground in Brno, Czechia. The concept of territorial production was employed as a tool to unveil the intricate assemblage of ever-changing control over territories and power dynamics within the playground among its visitors. The findings offer valuable insights into the practices through which children assert temporary control over spaces that are considered to be communal. Teenagers employ loud music or personal belongings to mark their territory, while younger children utilise movement to establish control. Territorial production coexists with those of the adults who also frequent the site. This highlights the necessity to create environments that are conducive to the needs of both children and adults, discouraging the design of exclusive spaces for children. The promotion of a multigenerational city can foster inclusivity, whereby the diverse needs and behaviours of different age groups within shared spaces are recognised and accommodated.

Keywords

behaviour mapping; community playground; power dynamics; territorial production; territorial stabilization

1. Introduction

The pandemic has played a significant role in the everyday life of children and adolescents as they have experienced a reduction in their autonomy and leisure time, albeit in the context of limited mobility (Holt & Murray, 2022). Furthermore, research indicates that the risk of developing obesity-related illnesses has increased due to a lack of physical activity (Kourti et al., 2021). Consequently, the pandemic has served to reinforce an unwelcome trend that has been observed over time, namely a lack of exercise and insufficient time spent outdoors. It is thus imperative to encourage children to spend time outdoors, to promote their physical but also their mental health (Bozkurt, 2021). The post-Covid period may therefore be an opportunity to rethink playground design and equipment with a view to promoting physical activity, inclusivity, and a sense of belonging to a place and to a people, which could lead to an improvement in overall well-being.

There is a growing recognition of children and adolescents as active participants in society. This recognition has led to an increased understanding of children's capacity to shape their lives while also being influenced by their surroundings (Elsley, 2004): "Children possess a distinct existence independent of adults, with their own activities, schedules, and spaces" (Qvortrup, 1994, p. 4). As Matthews (1995, p. 457) notes, there is a risk that confining children's play to playgrounds and school grounds may result in the creation of childhood ghettos, where children are excluded from the majority of urban areas. It is therefore imperative to investigate the experiences and perspectives of children and young people regarding public spaces.

Matthews et al. (2000) have already examined the ways in which children may challenge the dominance of adults in public spaces, as this is an important aspect of their socialisation, allowing them to experience independence or freedom. As Pitsikali and Parnell (2020) argue, although these areas are designed with the intention of being child-friendly, they should not be physically or culturally separated from the outside world. In light of the aforementioned arguments, the community playground was selected as the site of investigation, which can be characterised as a multigenerational space (Herrington, 1999). Such spaces may be perceived as an incursion of the adult world into the domain of children, or vice versa, or as a domain offering diverse opportunities for individuals from a range of backgrounds. This distinctive type of playground presents new challenges, such as how to integrate various age groups and activities to create interconnected relationships, thereby fostering inclusion and bringing different generations together in public spaces (Mueller & Dooling, 2011). There is a scarcity of geographical papers that consider children's territorial behaviour in the multigenerational playground. The few that do exist focus on school playgrounds, where territorialisation, utilisation, and control over territory are constrained by formal and informal rules of the institution (Thomson, 2005; Tranter & Malone, 2004).

Territoriality and territories can be assessed in a number of ways by geographers (Brighenti & Kärrholm, 2020). The focus of the present research was children's behaviour; therefore, the concept of territorial production proposed by Kärrholm (2007) was employed in order to describe the collective effort of both human and non-human actors to gain control over space. The concept of territorial production can be described as the interaction with materiality and use, which collectively determines how space is controlled. The concept enables an understanding of power dynamics and space negotiations, whether verbal or non-verbal, in both the short and long term.

As this article aims to explore the complex power relationship between adults and children and how it manifests in territoriality, the following research question has been formulated: "What is children's territorial production in the multigenerational space of a community playground?"

2. Territorial Production

Territory is not defined by space; rather, it defines spaces through patterns of relations (Brighenti, 2010, p. 57). In essence, territories are acts, events, and expressive and boundary-producing power relations. They can be stable and enduring, or immediate and ephemeral. Features of public space could be seen as a complex, sensitive, and transformative ecological system of territorial productions. Children can also produce their own territory in the same way as adults, but their territorial production is limited, not allowed, or prohibited by (not only) adult supervision. This represents a further challenge to the representation of children as less competent or uncontrollable creatures.

Kärrholm's (2005, 2007, 2017) four categories of territorial production were utilized in this article (Table 1), i.e., territorial strategy, territorial tactics, territorial association, and territorial appropriation, to describe a way of establishing a connection to a place and control over a place: "Territorial strategies and tactics are intentional attempts to mark or delimit a territory. In other words, territorial control is directed explicitly toward the ordering of a certain area" (Kärrholm, 2007, p. 441). And while strategies are established by the institution before entering the space itself, for example by organizing events or playground closing hours, tactics come into play only in the territory itself; they could be situational and spontaneously produced territories, i.e., unofficial, or informal tactics (Kärrholm, 2017). An almost perfect example could be placing a towel on a sun lounger by the sea to get a better spot: "Territorial associations and appropriations represent productions that are not planned or intentionally established but are consequences of established and regular practices" (Kärrholm, 2007, p. 441). Territorial appropriations occur through direct repeated use of space but are unintentional; for example, a gang that converges on a particular street corner every Friday night. Associations exist without the presence of people in each place, but the place evokes the idea of a particular place or territory, e.g., a skatepark or pétanque field. It could be a symbolic association such as a public gathering place or commercial place. Associations could go hand in hand with strategies, appropriations, or tactics (Kärrholm, 2017). For example, a football pitch is strategically planned for playing football, but it is also associated with other sport games, as visitors can appropriate the pitch that way by playing those games there. While tactics and appropriation are primarily initiated by the individual or group (personal), strategies and associations are influenced by the set of rules and the appearance of the place (impersonal).

These forms of territorial production may occur simultaneously in the same place and with the same object. The different forms of territorial production are not based on who is in charge or who dominates the place.

Table 1. Forms of territorial production.

	Impersonal control	Personal control
Intended production	Territorial strategy	Territorial tactics
Production through use	Territorial association	Territorial appropriation

Source: Kärrholm (2007, p. 441).

Instead, they represent a way of describing the occurrence of different territorial productions operating at the same place, but at different times (or different aspects of that place at the same time; Kärrholm, 2005).

An essential aspect of urban everyday life and power relations is the territorialisation of different time-spaces which is produced. For instance, it could be through parking regulations, opening hours, the schedules of public transport, working hours, and temporary appropriations (Brighenti & Kärrholm, 2020). In essence, territorial power is the consequence of intricate interrelations between humans and non-humans. The built environment is a co-producer of the territorial productions of the urban landscape, with walls, lines, markers, and doors playing a pivotal role in shaping and stabilising territorial power. The possession of territorial power is the result of various actors, rather than the end product. Territorial rules and limits, whether formal or informal, are an integral part of everyday life, often without our conscious awareness (Kärrholm, 2007). Children are often presented as agents of disruption to these established norms, challenging the established order.

The concept of territory serves as an abstract yet powerful framework for social relationships, transcending its purely functional role as a background. It plays a pivotal role in the structuring of social relations (Brighenti, 2010). A territorial practice of power can be described in terms of network stabilisations, whereby connections between a set of actors or actants (e.g., rules and regulations, borders, walls, locks, pavements, behaviours) become increasingly stable and predictable. As Kärrholm (2007) suggests, this approach offers a potential avenue for examining the significance of materiality and artefacts within diverse territorial networks, where certain functions may remain consistent while others evolve. Furthermore, the concept of territorial stabilisations may be employed to elucidate the nature of territorial conflicts that emerge across disparate territorial productions. The process of stabilisation may manifest as a network or body, comprising both human and non-human elements, when boundaries, norms, or behaviours are established within a given territory. The processes of stabilisation and destabilisation are similarly ongoing and, according to Kärrholm (2007), cannot be fitted into pre-given scenarios. Conversely, for a location to be considered stable, all actors (human or non-human) must demonstrate a capacity for adaptation or assertion of their interests. Overall, territorial production can facilitate an examination of public space that transcends the limitations of the dichotomy between adults and children, inclusion and exclusion in the urban context.

3. Methods

Both quantitative and qualitative frameworks have been used to describe and analyse the territorialisation of space. The method of behavioural mapping, as described by Cox et al. (2018), lies to some extent on the border of this duality, depending on how the researcher handles the actual mapping process and whether the researcher actually captures all observed phenomena in a map, if that is the aim. Here, behavioural mapping was approached in a more qualitative way, as the researcher could not reliably capture interaction with playground. In addition, the maps were used primarily to capture trends of territorial production.

The method of behavioural mapping was originally developed by environmental psychologists to "relate various aspects of behaviour to the physical spaces in which they are observed" (Ittelson et al., 1970, p. 658). It was developed to study environmental influences on behaviour and to recognise the reciprocity between the environment and in situ behaviour. Behaviour mapping is one of the few tools that allows researchers to examine and document both behaviour and its social and environmental context. It is based on direct observation of behaviour, coupled with a map of geographical space on which the behaviour is recorded,

analysed, and displayed. Data are then collected in relation to the behaviour observed in that location and can include participant demographics, behaviour, social interactions, and environmental conditions. Finally, the data are displayed and analysed in an iterative manner.

When studying territories in this way, the focus is on the traceable behaviours, activities, rhythms, and materialities that brought about territorial effects (Kärrholm, 2017). This method was useful for tracing these ever-changing relationships and interactions in each place. As Ng (2016) states, this method "allows researchers to relate different post-pattern behaviours to specific locations (i.e., where the activity occurs), physical characteristics of the environment (i.e., what features are used), types of users (e.g., children), period of using (e.g., per week)" (p. 30). Behavioural maps can therefore be used to assess whether the space has been designed effectively for the groups in question.

3.1. Study Area

The study site is located on the outskirts of the city of Brno, specifically in a residential area that has undergone turbulent demographic change as young people and families have moved in due to its favourable distance from the city centre and transport hubs. The residential area has a mixed population in terms of class and income. The housing in the area is also diverse, with prefabricated houses, villas, apartment blocks, semi-detached houses, and multigenerational houses. The playground in question is accessible by public transport and blends in with the surrounding area.

Higher quality of public space, where residents and users of the site are already involved in the planning process, is becoming a priority of local administration (Derr & Tarantini, 2016). This could include the addition of amenities such as toilets, refreshments, shaded areas, tables, or spaces for physical activity. One outcome of these efforts is a playground that reflects the needs of at least the majority of all age groups. This is the case of a selected playground in Brno—a community playground. This type of playground does not yet have a clear definition. These playgrounds tend to be larger and functionally separated so that there is no overlap of activities where one group might endanger another. Before the recent revitalisation of the playground, there were elements and spaces that were used by a part of the population, mainly teenagers and active adults (Figure 1).

For further illustration, a quote from the local government's website outlines the expected vision, use, and demographics of the site in addition to the characteristics of the area:

> The ideal location is on a patch of the former football pitch near the clinic. Currently, there are already several opportunities for children and young people to enjoy themselves, but it's not until they are older—a skatepark, a workout area, a climbing wall, and recently, a slide. The project will add play elements for younger children, toilets, and facilities for parents—a café….The café could offer the hire of various outdoor games such as pétanque, etc. The café will be mainly seasonal, and the facilities will be adapted to this; no indoor seating is planned, but outdoor seating (including a covered area) on benches at tables is. (Brno City Council, 2021)

The site is and has been popular and visitors mention the variety of the space and its size as the main advantages of the space. Many lifestyle local blogs and leisure websites recommend this place for families highlighting the

Figure 1. Individual places or features within the community playground.

variety of spaces and activities. These qualities are also why the site is used for various community events such as a children's day, a traditional witch burning (welcoming spring), or a quidditch tournament.

3.2. Data Collection

During data collection, I focused on the territorial production that took place on site and was a direct result of visitors' interactions with the playground. An extension to other actors would also imply an extension of

the methodological framework. The observation focused on the situations in which each form of territorial production occurs, when the use and control of the space changes, and the moments when individual activities collide. These interactions were colour-coded and recorded in a drawing of the whole space. Data were entered into the GIS database (age group, interactions with the environment, interactions with others) to provide results in other dimensions. Vocal notes were recorded to complement the spatial data. Spatial data were collected throughout the day between 8 AM and 10 PM in 30-minute intervals for one year (summer 2022–summer 2023). The study area was visited 28 times, considering public holidays, different weather conditions, and events taking place at the site.

Although this research attempts to adhere to ethical principles based on the Convention on the Rights of the Child, there were some limitations associated with the chosen research method in this regard. As much as an attempt was made to emphasise the position of children as equal actors in territorial processes, children as participants do not actively participate in the research (Dockett et al., 2013). Only to a certain extent, therefore, was Article 12 (the obligation to take children's perspectives into account) fulfilled, as children and their behaviours were integral part of this research and their interaction was the focal point of the observation. Furthermore, the nature of the research was inspired by Articles 31 (right to rest, leisure, and play) and 27 (right to an adequate standard of living; United Nations, 1989).

In terms of research ethics, images were only taken without directly capturing the visitors or even their faces. To overcome this problem, their faces or bodies were blurred to make them indistinguishable. Visitors were informed about the research through the local administration media. Most of my observations were undercover. As ethically problematic as this research is, mainly because of the target group or segment of the target group (children), it is research in a public space where this type of research is still ethically relevant. Spicker (2011) has addressed these issues associated with covert observation, arguing that with consideration of crucial recommendations such as privacy and autonomy, covert observation can be as valid as any other method. This is because it is likely that visitors would behave differently if they knew they were being observed for research purposes (Clark et al., 2009). As this was a non-invasive research method, no significant interactions with visitors were anticipated. All information was recorded on paper, dictaphone, or tablet and was completely anonymous. The university's ethics committee approved this research project.

3.3. Data Analysis

According to Cox et al. (2018), the behaviour mapping protocol requires the following five core components: (a) a base map of the observation site; (b) selection of data collection tools; (c) establishment of a systematic protocol for collecting data; (d) a set of observable data variables; (e) a strategy for data analysis. The last point suggests establishing a strategy for thematic analysis. The textual data were coded and assigned to different themes using an open and later selective coding technique. There were several rounds of coding that included groups such as activity, number of participants, and estimated age. What mattered was whether the moment was one of the manifestations of territorial appropriation, tactics, strategy, or associations, and the way these final codes of territorial production were applied in the place. From the notes, situations where group or individual human territories collided, and situations where territory was expanded or reduced by external or internal activities, were mainly selected. Inspired by Thomson (2005) or Sack (1986), the playground was divided into territorial subunits that increased the intensity of the playground's territorial production. These subunits were distinguished by their primary function and characteristic surface and later they were used to

structure the results section of this article. Themes were then distributed according to the places where they took place (see Figure 2). For the purposes of this article, the focus was on an outdoor gym, a skatepark, and a refreshment area combining a football pitch and an outdoor lounge. Other areas, such as the climbing wall or the transition area, were not included as they were not heavily used.

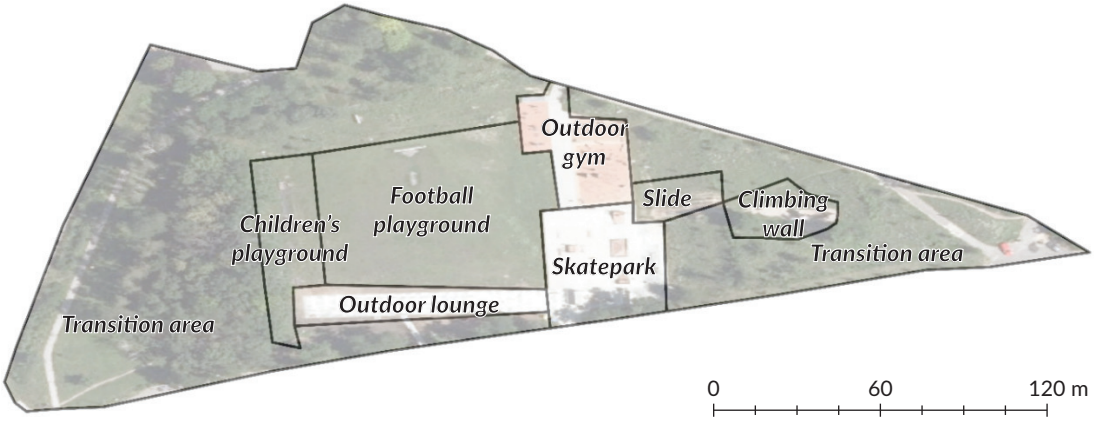

Figure 2. Map of the community playground and its functional division.

Children were still the main focus of this research, but the influence of adults, not just parents, could not be overlooked in the data collection and subsequent analysis. Further categorization of visitors into adults, teenagers, adolescents, and children was done. The physical appearance of each (secondary sexual characteristics), their vocal expression, and other behaviours were used to differentiate between the categories. Based on this division, data points were indicated on a map, where each dot represented a considerable amount of time spent in that place. Notes on the movement and passage of visitors who did not check any place for a long time were also an essential part of the analysis and interpretation.

4. Results

During the entire observation period, the age of the child visitors increased, and therefore the overall age mix changed, with diverse groups of children and adults unintentionally meeting at the site, especially in the afternoon (Figure 3; see also Mu et al., 2021).

The mixture of visitors and the attendance itself varied during the day, which corresponded to the overall rhythm of the outskirts of the city. Similarly, the territorial production of each group varied. There were no places, apart from the playground (number 1 in Figure 3), that were not regularly territorialized by one of the groups. The observation revealed temporal territorial activities, notably the consistent presence of adults, particularly parents, engaging in various activities such as exercising, relaxing, or supervising children. Adults, whether alone or in groups, prominently influenced events in their vicinity. Adolescents and teenagers dominated the skatepark or outdoor gym, leveraging both numbers and dynamic movements to claim significant territory. Occasionally, they extended their presence to the bar or football field for refreshments or ball games. Children, on the other hand, explored various features of the area, disrupting established territories.

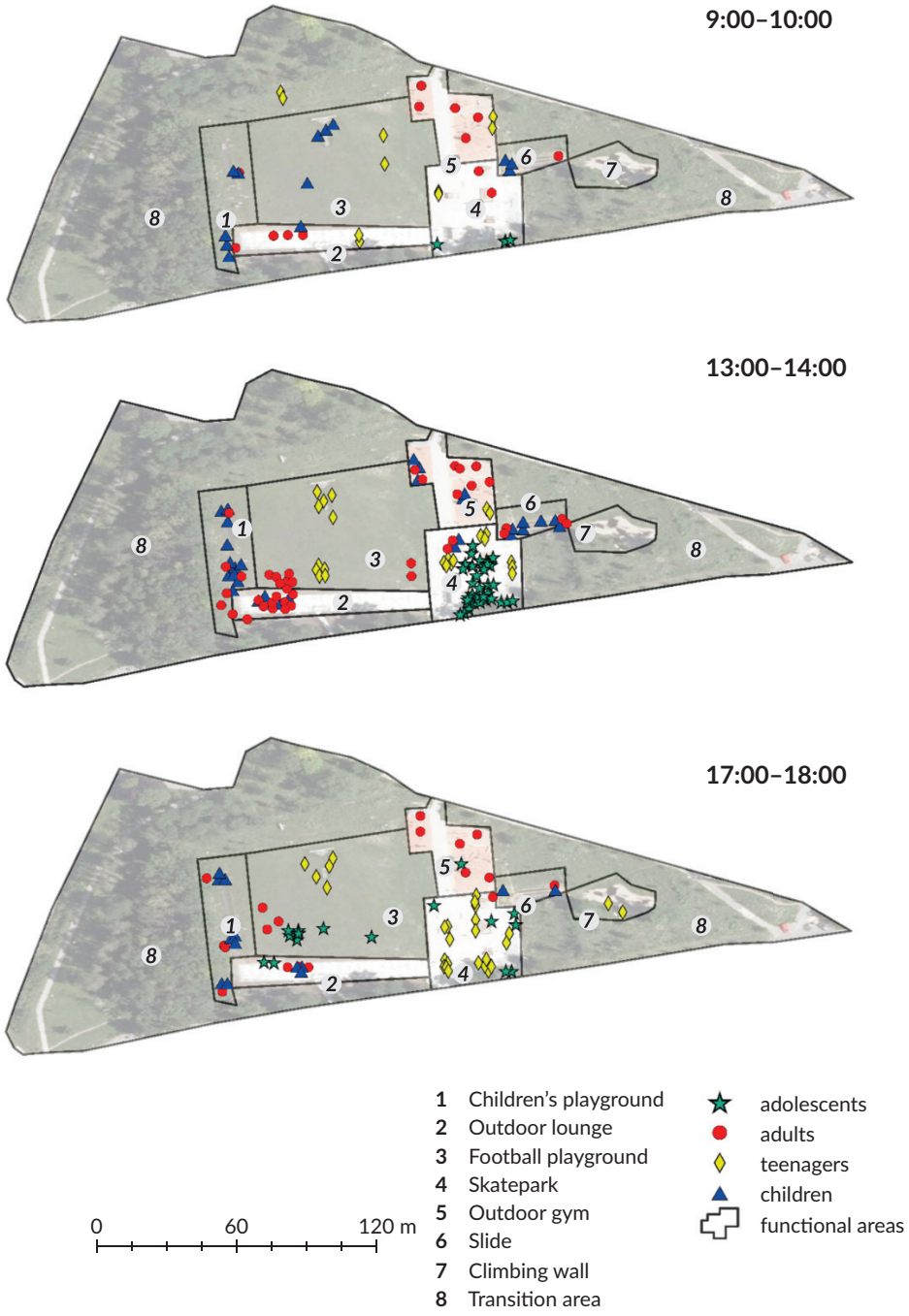

Figure 3. Spatial distribution of the visitors in the community playground on Saturday, 19 August 2023 (9:00–10:00; 13:00–14:00; 17:00–18:00).

Before we get to the results of the territorial production of children and adolescents, there is a need to pause on the interactions between them and adults. When analysing these interactions, it is essential to distinguish whether they are persons in some kind of kinship or friendship relationship or whether they are relative strangers. A specific case may be some institutional relationship (teacher–pupil or manager–subordinate), but such interactions did not occur. Adults had an undeniable influence on modes of territorial production. When playing or performing an activity, they even became a means of extending the territory. Parents undoubtedly acted as a strong factor in negotiating a certain place, for example, by deciding who would ride

the slide or the cable car and when. But at the same time, they also had to subordinate their behaviour to the children, especially if they were complete strangers. Adults often had to give way to a dynamic ball game or other group activity of a larger number. Their bargaining power was often constrained by certain social norms, although on one occasion a verbal warning was recorded about inappropriate movement.

4.1. Outdoor Gym

In the outdoor gym, people were less likely to influence each other with their activities; they did not push each other out. For adults, the purpose and use of the outdoor gym were clear: to exercise. The exception was when they were playing with children or babysitting them:

> There is no one in the outdoor gym—only two kids hiding away from the sun under the concrete walls and a mother playing tag between steel poles for exercising. (4.5.2022, researcher's field notes)

The tactics and appropriations of children or teenagers were more dependent on the individual elements of the gym, which they used as a place to relax or hang out. If there was a group of people—usually an organised leisure activity—who exercise together, then change occurred, and they gradually occupied the individual exercise facilities, pushing solitary individuals out of place to the periphery or out of the outdoor gym space. Similarly, an individual could enlarge his body through the manipulation of various tools.

The outdoor gym area was used for relaxation and doing nothing, with visitors across age groups using the surrounding benches as individual elements to sit or as shelter from the sun. By blocking off the exercise elements, they then restricted other visitors from exercising when they had to regulate their movements. Children, particularly the younger ones, were drawn to the gym due to the numerous opportunities (affordances) for movement and hiding it offered. However, their attention spans were short, and they did not linger for lengthy periods.

The parkour section necessitates space for dynamic movement, and individuals there created territorial borders as they exercised. These territorial boundaries were not fixed but usually followed a rhythmic pattern as they engaged with the space. The way of territorial production by those moving in short and dynamic sequences and using the parkour section unintentionally discourages smaller children and other visitors from crossing through, and so they must move around that place, making the area almost impermeable:

> "No! You cannot go there. People are working out there, can you see?" or "Let's move around so we do not disturb them." (14.4.2022, researcher's field notes)

4.2. Refreshment Area

The area around the small bar was complemented by a small indoor sandpit, close to the toddlers' play equipment, and a large grassy area that served as a playground or resting area, depending on who was using the space. It was a place where several territories could often meet and overlap at the same time. It is the only place that offers a paid service—refreshments—and at the same time provides a place to sit, go to the toilet, look after the children, and ride a bike or another vehicle, especially in the morning when the bar is closed.

Visitors, especially adults, enjoyed sitting on the portable benches, chairs, and tables. With these movable objects, they created their own private territory. Sometimes groups of adults and children would set up several benches and tables and gather around them to enjoy a picnic, play board games, or relax. Similarly, visitors to the site would use portable deck chairs and place them in different locations, far away from others, de facto extending the recreation area into places where dogs are usually let off the leash or football is played (Figure 4).

Figure 4. Benches and decks scattered around the place to territorialise the playground.

The grassy area was a popular place for ball and other team sports such as football, frisbee, and rugby, but also for relaxing when there were no sports activities occurring. Whether it was an individual or a larger group, they constantly changed the order of the place and its territory with their movements and activities. Even though the grassy area was large, there were only two goals, which eventually led to various situations where one group was pushed out by another or joined together to play ball games together, even dividing the space to play only on one goal or creating a goal with sticks and pieces of clothing. The strategy of avoiding the pitch thus became a tactic when negotiating with others.

4.3. Skatepark

Over the course of the day, young children accompanied by adults, teenagers, and adults themselves took turns to use the skatepark. There was no clear chronological order to the visits. These groups gradually intermingled, but each group only occupied a certain part of the skatepark and gradually grew larger or

smaller as the number of members changed. These groups gradually gained control of the place, always on the edges in narrow lines, and gradually the group pushed its way into the centre of the skatepark if it had enough members.

The way in which territorial production took place in the corner of the skatepark (Figure 5) was through the tactical placement of belongings, especially for visitors using the U-ramp. The area was regularly littered with food and drink waste. The appearance of the area did not encourage other visitors to stay because of the litter, although it was not visually cut off from the surrounding area. By temporarily adapting the appearance of the corner, the adolescents stabilised the territory. The latter process of territorial production (strategy) came about when the local authority cleaned the whole playground, which happened on a relatively regular basis, removing the rubbish with which the children had inadvertently demarcated the ground. This allowed the whole process of territorial production (in the place) to start again.

The territorial production in and around the skatepark occurred through the material remains of the visitors' presence, whether they were permanent (bottles, road signs) or temporary (backpacks, equipment, and valuables; Figure 6). These places represented a kind of base for the users of the skatepark, and it meant that others had to choose another place to put their belongings. These benches were left without the presence of a single person, yet they were still occupied, suggesting little fear of things being stolen and relying on the public gaze of other visitors.

Within this ongoing territorialization, children intruded into these processes by creating their own momentary territories as they ran into the skatepark, the football game, or the gym area with almost no caution, and the whole rhythm of the place suddenly changed. Other residents tried to adapt their activities to the movement of these children. They stopped exercising, went for a ride, or left the place for a while. As in previous situations, parents, if present, naturally tried to regulate in some way the movements and behaviour of their own and other children. Through this intervention, these young children did not take control of the territory per se,

Figure 5. Annex in the skatepark littered by visitors, mostly teenagers and adolescents.

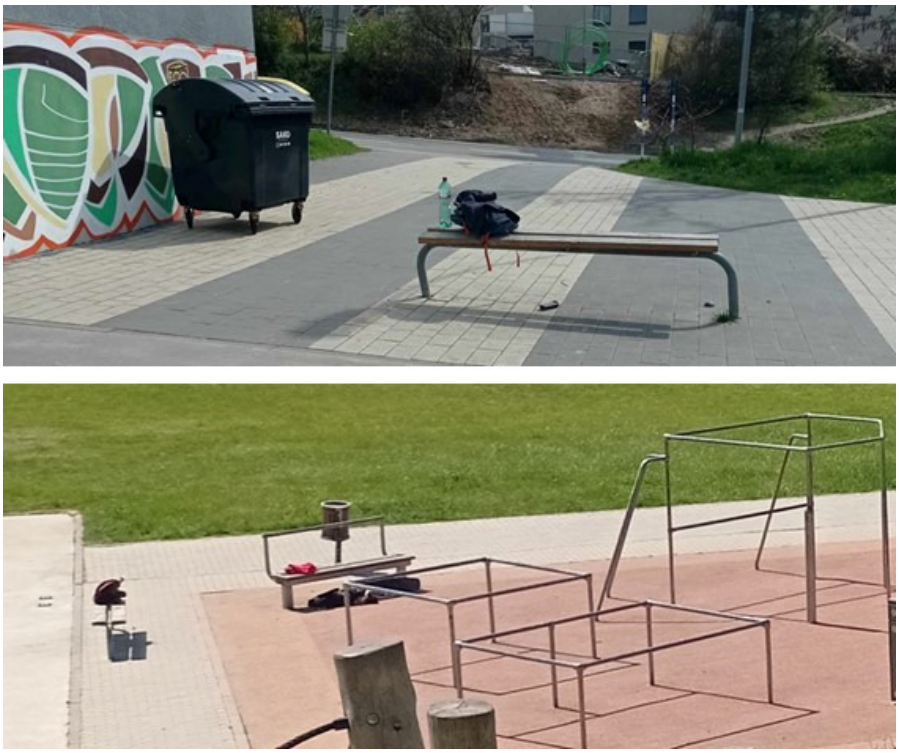

Figure 6. Belongings on the benches demarcating territory of owners.

nor did they create a stabilised territory, but they certainly temporarily altered the balance of control over the particular place—the skate park—when it became more crowded at times. Disruptions could and did occur where an individual or group took advantage of the ensuing chaos to occupy an overcrowded territory at the expense of another person. The same could be said about dogs running free in the playground, which also violates the formal and informal rules of the space.

5. Discussion

Society experienced a major shock during the pandemic. This period revealed several shortcomings in terms of resilience and social well-being, by limiting physical contact with others outdoors or indoors. Public spaces (should) serve to bring different people together and (should) promote broader social connections. The community playground provides such an environment and provides an alternative and blueprint for the creation of public space rather than spaces created for a specific group (Pitsikali et al., 2020). These urban places are designed to accommodate more than one age group, with their ever-changing, coexisting territories. This might suggest that territorial production undermines this ideal of universality. In this process, one group benefits while another is disadvantaged by appropriating part of the space for their exclusive use (Kärrholm, 2017), whether in the short or long term.

Examining children's territoriality in the public realm allows for an investigation of how their interactions with others influence relationships, decisions, and the operation of prevailing social norms and constraints. Furthermore, concerns about children's and young people's agency within the constraints of social structures play an important role in defining their status as a minority group. The lack of recognition of children's autonomy by the adult world not only reinforces their minority status, but also shapes their self-perception

and consequently perpetuates their relative powerlessness (Mayall, 2002). There is constant questioning of children's right to space in the city, creating a narrative that children cannot possess control of any place other than the place made for them—the playground. Outside of the physical demeanour of children or adults, there are other ways to territorialize the places, such as belongings, movement, or noise. This may be due to the social environment, public gaze, or the presence of a larger group of friends who are not concerned about their belongings. By acts like cycling, throwing a ball, exercising, resting, or even placing their belongings, adolescents/children produce their own dynamic territories that change depending on time but also on other visitors or other environmental conditions. Therefore, territories can be formed by passive (non-)presence alone, and, through it, adolescents/children control the place and the immediate environment.

While adults and adolescents tend to stay in one territory, children, especially the younger ones, constantly change their location, thus disrupting the ongoing territorial production. Moreover, young children's nature and sense of adventure may lead them to choose these dangerous routes. Caretakers were wary of these movements and watched their children closely, if not holding them by the hand (Tucker & Matthews, 2001). No physical collisions were recorded, which might suggest that children or adolescents can be respectful of their environment and the people in it (Derr & Tarantini, 2016). The relationship between children, adolescents, and adults here can be described with a word such as "tolerance" (Sack, 1986); at least so it appears from observation, at the same time that there were no significant interactions between strangers. This may be a consequence of the ample space, and it is questionable whether similar positive situations would arise in a small or crowded place. Some caretakers might refer to increasing safety by demarcating areas with physical boundaries, thus separating spaces from other potentially dangerous ones (Valentine, 1996), as it is the boundaries, material or non-material, that provide a kind of security for adults in the perception of the playground (Pitsikali & Parnell, 2019). However, a boundary-less playground could enhance the sense of place as young children in particular explore the playground and its surroundings due to its porous boundaries (Tranter & Malone, 2004). In a similar way that Thomson (2005) found privileged spaces, equivalent places could be found here. There are exclusive places such as the U-ramp and the space on top of it, the long slide, and the mini rope, and there are also objects that make these places privileged, such as portable deckchairs.

Waksler's (1991) argument that children are powerless to make and enforce rules in an adult world does not apply here. Children, like other visitors, have come to the playground with a goal and a strategy (play football, hang out, exercise), but when they arrive the goal has to be tactically changed (or the time of the visit changed). They create their own territories and do not need to be constrained by the status of the child—they control the place they occupy, and they set its rules. The territorial production of (mostly young) children is characterised by the introduction of destabilisation into stable or stabilising territories, and by ephemeral territories. However, this does not necessarily have a negative impact on life in a place; on the contrary, it can contribute to changing the territorial structure of a place (Frazer, 2022).

Although it is difficult to generalise the results of my observations with the work done before the pandemic, I will take the opportunity to outline some phenomena that are slightly different. In any case, it is always necessary to consider the elements of the playground and its possibilities, as well as the socio-cultural context of the neighbourhood. For example, the teenagers were active and used the playground, albeit a limited part of it, quite a lot. This is a solution to bringing into the public space a demographic group that has been rather absent (Hayward et al., 1974). In terms of rules, Borman (2009) found that children were less likely to follow

informal rules set by peers or adults. In this case, however, situations where playground visitors did not follow spoken rules about territory were not recorded, but young children did not follow unspoken norms.

Territorial production and affordances are relatively close in their relationship to interactions with the environment (Heft, 2010). One could even go so far as to call territorial productions "situated affordances," since it was not only through physical affordances, but also through social or sound affordances that adolescents dominated their immediate environment and created their territories. The place provided affordances and the young visitors perceived many of them. The nature of the affordances, like the mode of territorial production, varied significantly with respect to the physical characteristics of the person or if the person was part of a group, i.e., family or friends (Kaplan, 2021). In the case of the territorial appropriation of the outdoor gym, the discrepancy between the users' intentions and actual use is again materialised and can be captured by affordances (Kesner, 2009). Finally, the skatepark offered unique affordances, as there are not many skateparks that are so embedded in other playground elements, the location is close to refreshments, it has the coveted nooks and crannies (Heft, 2010), and it offers the opportunity to play sports as well as chill and hang out (Taylor & Khan, 2011). It is therefore a well-placed element (as is the playground as a whole) in the fabric of the city, where all relationships function without conflict with other areas and activities.

Unlike school playgrounds, this playground is less supervised by the authorities, although this does not mean that it is not supervised at all. It therefore allows for free adventurous movement as the boundaries of rules are less fixed and impenetrable (Thomson, 2005). On the other hand, the adults here acted as the subject of enabling affordances and being affordances at the same time, willingly and unwillingly providing opportunities for the territorialisation of place. The multigenerational playground also had the potential to push the boundaries of fear of interacting with strangers, something that had previously been seen as a scarcity (Stanton-Chapman & Schmidt, 2021), as there were more frequent interactions with strangers, not only adults, which would not have happened much in a playground/place designed primarily for children (child-friendly).

6. Conclusion

This article has highlighted the ways in which children and young people can deliberately produce territories for longer or shorter periods of time, even when they encounter adults in them. The younger visitors established their own temporary rules and norms through their movements and behaviours. Similarly, the youngest children can disrupt stabilisation processes through their dynamic and unpredictable behaviour, which may include rushing headlong into crowded places. In conclusion, the case for multigenerational playgrounds rests on the twin pillars of inclusivity and intergenerational interaction. The former involves fostering environments where children and adults interact on a regular basis, allowing children to practice a range of skills, including negotiation, conflict resolution, and communication with strangers or adults. These skills can then be applied outside the playground. It is therefore important to note that the implementation of such a playground, when located in an appropriate urban context, has the potential to foster a sense of belonging or place attachment as well as a sense of community.

During the pandemic, people were confined to their homes and limited to socialising with their family or small groups of friends. This could have had a significant impact on their socialisation and interaction with

each other. The creation of such spaces allows for healthy, unrestricted interactions between individuals and groups of different ages, sizes, and social statuses. Furthermore, concerns about children's power and rights in the city are still valid in today's world. However, there are also exceptions that create a consensus that children do not have sufficient opportunities to actively participate in the processes that shape the city, whether administratively or informally. It is evident that children, whether intentionally or unintentionally, are able to appropriate and strategically control a space that, by its nature, is intended to serve and does serve all ages. This demonstrates that children are able to engage with and influence the rules and norms of a space in an informal way. However, this article only addresses this from a day-to-day perspective rather than a long-term perspective. The concept of territorial production and its associated forms can provide a useful lens through which to examine the complex relationships between the various groups involved. It is essential that children have access to urban spaces where they can interact with people of other ages; these are intergenerational rather than child-friendly places. This should present a new challenge to urban planners and architects.

Although other actors' territorial productions were present, such as schools, cultural or sporting events, local government territorial strategies, or associations, they were not included in this research. Furthermore, it is important to note that similar research would not be possible in any playground, but only in a playground of this type, where the activities of different age groups converge. Finally, it is important to consider the limitations associated with the methodology used in this study (for more details, see Ng, 2016). Further research is also needed in relation to gender and the intentions of territorial production within a hierarchical structural framework.

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Conflict of Interests

The author declares no conflict of interests.

Data Availability

The data that support the findings of this study are available from the author, Daniel Kaplan, d.kaplan@mail.muni.cz, upon reasonable request.

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About the Author

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ARTICLE

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Exploring Elementary School Children's Interaction at the School Threshold: Evidence From Athens, Greece

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Abstract

The school entrance is one of the most important places in the everyday lives of children. As an intersection between school and public realm of the city, it is characterized by gradations of porous and rigid boundaries. Depending on its function, it can serve as a threshold or as a boundary. Additionally, it is a spatial condition that facilitates a dialogue between the school and the city and draws content from both. School thresholds are important in supporting the role of the school as an important node in the city and a bridge between children's various everyday life dynamics by demonstrating meaning as a place that is open to the community as well as to possibilities and physical interaction. In this research, we examine the role of the "realm of the in-between" between school and city through the architecture workshops for children at an Elementary School in the heart of Athens, in which we explore children's perceptions, wishes, and ideas related to their familiar everyday places of transition from school to city and vice versa. The aim of the research is to find out: (a) What is the role of school entry today? (b) What is the children's perception of the entrance of the school? (c) What are children's wishes in relation to the spatial transition from city to school to better meet their needs and desires? (d) What are the specific qualities of a school entry that render it an ideal space for the interaction between children and with the space around them? and (e) How does the synergy of cinematic-architectural tools feed, enrich, and open up new possibilities in understanding and representing spatial and social phenomena?

Keywords

narratives; play; school boundary; school experience; spatial threshold

1. Introduction

This article delves into the significance of the often-overlooked school threshold, a space typically underutilized yet brimming with potential. Despite its dormancy, the school threshold holds promise as a

focal point for social interaction, facilitating connections among children, parents, the broader school community, and potentially extending to the neighborhood. Research underscores that such spatial configurations play a pivotal role in shaping social dynamics and community cohesion within educational settings (Alexander et al., 1977; Moore, 1986).

Recent research in Athens and broader Greece has extensively explored multidimensional aspects of child well-being, particularly studies by Leriou (2022, 2023) in Attica. These studies emphasize comprehensive assessments covering social, educational, and environmental dimensions, highlighting factors like access to educational resources, social support networks, and environmental quality, which significantly influence children's overall quality of life and psychosocial development (Leriou, 2019). Within educational contexts, the research accentuates the crucial role of school environments in fostering children's well-being, emphasizing the positive impact of environments conducive to social interaction and supportive relationships on emotional resilience and academic engagement. Furthermore, engaging children and other school community members in actively shaping their environment, enhances their sense of agency and belonging, critical factors linked to positive well-being outcomes (Hart, 1997; Mitra, 2004). This body of literature provides insights into how optimizing school environments can promote holistic child well-being in urban settings like Athens.

Utilizing a pedagogical research methodology, this study integrates cinematic and architectural tools alongside other expressive methods to explore the multifaceted dimensions of the school threshold. By engaging directly with elementary school children, the research aims to uncover their perceptions, ideas, and aspirations regarding this pivotal space. Literature highlights the transformative potential of involving children in participatory research, emphasizing their role as active agents in shaping their environments and narratives (Hart, 1997; Mitra, 2004).

2. Thresholds and Boundaries

School thresholds represent the school gate, creating space and possibilities around it. This study emphasizes social interaction, recognizing that space cannot exist in isolation from its social contexts; rather, it serves as a centrifugal force that molds interpersonal connections. Lefebvre's "The Production of Space" (1991) views space as a dynamic construct produced through social interactions, aligning with Massey's "For Space" (2005), which sees space as relational and constructed through social relations and power dynamics. Soja's "Thirdspace" (1996) and de Certeau's "The Practice of Everyday Life" (1980/1984) further emphasize space as an intersection of the physical, mental, and social, shaped by everyday practices. Within this framework, school threshold is both a product of social parameters and actions and a catalyst for events and actions. It is the place which visibly represents the idea of a welcome, the point where family and school life meet and overlap, encompassing the full spectrum of emotions, gestures, feelings, and thoughts. The smooth relationship between these two key worlds of most children, which shape their identity to a large extent, holds great importance for their emotional development and personality construction. Research, such as that conducted by Juvonen and Wentzel (1996), has illuminated a link between the establishment of educational confidence during formative school years and later academic self-esteem and performance. This highlights the pivotal role of the school threshold as a primary gateway shaping the educational experiences of children that have regular access to it.

This acknowledgment aligns with Zumthor's (2006) insight that our understanding of architecture is deeply rooted in our childhood and youth experiences. Childhood memories often revolve around vivid descriptions of the places that shaped them, playing a crucial role in the formation of individual identity and narrative consciousness. As Bachelard observes in his work "The Poetics of Space" (1994), childhood places act as paths for imagination and memory, shaping the personal and spiritual map of the individual.

The concept of the school threshold inherently sparks a dialogue and prompts contemplation about what lies "beyond," emphasizing the imperative for porous rather than rigid structures. This recognition underscores the notion that the school threshold symbolizes more than just a physical boundary; Serving as the interface between the school environment and its surroundings, the school threshold encompasses a spectrum of forms: ranging from distinct physical barriers to fluid, permeable transitions. It serves as a symbolic gateway inviting exploration and interaction between the school environment and its external context. Indeed, the essence of space transcends its physical attributes, as Bakema (Bakema, 1960–1961, as cited in Wood, 2019) contends, emphasizing the primacy of relational dynamics over materiality. De Carlo's (2004) assertion further elucidates this concept, framing the school threshold as a manifestation of transient structures shaped by human interactions.

The openness and porous nature of the threshold facilitate movement and flow between school and home, public spaces, and all other areas within the city that children regularly use, creating a sense of proportionality not based on strict equality, but rather on the recognition that both places constitute fundamental pillars of children's lives. Thresholds may vary significantly between different educational phases and spatial contexts, reflecting distinct developmental needs and environmental interactions at each stage. This approach also allows for the acknowledgment and accommodation of differences. Hardt and Negri (2005, as cited in Stavrides, 2018, p. 69) insist on the importance of constructing the crowd as a process that embraces differences while forging common ground for singularities. Massey's definition of threshold (2005) is also about its derivation from the interplay between people, with diversity as its cornerstone.

Consequently, the boundaries delineating school and home are not static but rather fluid and dynamic. This dynamic nature enables a comprehensive educational approach wherein students are viewed as integral components of a broader network of individuals. Such an approach spotlights the significance of interpersonal relationships in shaping learning and development, while also emphasizing the contextual factors influencing education, including the surrounding environment, cultural milieu, and community dynamics. In this perspective, both home and school serve as transient structural configurations rather than fixed entities. The threshold space, as Stavrides elucidates (2010), embodies a state of perpetual becoming, an unfolding canvas of spatial potentiality rather than a static, predetermined entity. This inherent characteristic defines its essence, facilitating an environment conducive to the fluid exchange and intersection of ideas. Functioning as a dynamic process, it inherently embraces the unpredictability of human interactions and the dialectic of contradictory forces, thereby embracing a full spectrum of possibilities.

Lynch (1971) further draws attention to the openness of thresholds, characterizing it as a behavioral attribute wherein a space is considered open if it facilitates unrestricted action. Openness transcends mere physical attributes and encompasses factors such as accessibility, ownership, management, and regulatory frameworks governing activities within the space. An open environment facilitates adaptability to users' preferences, needs,

and emotions, nurturing creativity, exploration, and experimentation, while remaining flexible and responsive to evolving circumstances.

Within this context, thresholds evolve into instruments for cultivating shared habits, daily rhythms, and regulatory frameworks, all subject to ongoing negotiation and adaptation. This dynamic characterization, as articulated by Massey and further contextualized by Lynch's conceptualization of openness, makes the multifaceted nature of thresholds clear. Moreover, the fluidity and adaptability inherent in thresholds allow for continual renegotiation of these norms, ensuring that they remain responsive to the evolving needs and aspirations of the individuals and communities they serve.

The school threshold embodies a pivotal role akin to a "landmark" within the educational landscape, echoing Lynch's concept in "The Image of the City" (1960/2008). Just as Proust's depiction of the bell tower (1913/2011) encapsulates the essence of landmarks, the school threshold signifies the ingress and egress from the educational domain. This attribute aligns with Lynch's notion of "imageability" in urban spaces, offering residents' whenever possible a sense of place, recognition and belonging, thereby enhancing the overall perception and acceptance of the educational environment.

Recalling Lefebvre's insights in "The Production of Space" (1991), the school threshold emerges as more than a mere physical or symbolic boundary; it embodies the intricate interplay between freedom and constraint, autonomy and surveillance. As roads intersect with this threshold, they shape the spatial experiences and ethical quandaries encountered by pedestrians. To further probe this intersectionality, we turn to Bourdieu's theories of habitus and social capital (1984) which offer perspective on how roads reflect and perpetuate social inequalities within educational settings. Sociology further elucidates how the school's threshold, as a locus of socialization and demarcation, mirrors broader social norms and power dynamics, with streets serving as both natural paths and symbolic representations of social order.

Indeed, the symbiotic relationship between a school's threshold and its urban context is profoundly shaped by diverse cultural characteristics inherent to each region of the world. As a result, the efforts to cultivating the advancement of a dialogue between the internal school environment and its external surroundings exhibit considerable variations. However, the inherent essence of the threshold concept lies in its evocative quality, summoning forth the notion of a pivotal point of convergence. As Hertzberger says (2011), the threshold is as important to social interaction as thick walls are to privacy. At the threshold, architecture's ability to form relationships in space multiplies. And yet, the school's threshold is in Greek reality a generally strict and impersonal boundary to and from the city, rather than a porous place of interaction. Down the line, the school environment will often tend to become shell-like, or as children frequently describe it in the words of a proponent of Freinet Pedagogy Babis Baltas, it can feel like a prison (Baltas, 2012).

Strict boundaries and fences are common for children growing up in Greece. In people's consciousness, boundaries are linked to security issues. Fenced, or at least clearly located play areas, make up the vast majority of places for children in the city. It is a practice that began in the early 20th century and became the norm in the planning of cities after the war, for reasons more regulatory than educational and this is quite symbolic of the contradiction in the place of children in the adult world (Katsavounidou, 2012). A similar dynamic is at play when considering school thresholds. Despite their intended purpose of providing a "safe" environment for children, these spaces often inadvertently reinforce prevailing power structures inherent in

broader society. While appearing to offer a sense of security, they may, in fact, sustain the very systems of oppression prevalent beyond their boundaries. Consequently, rather than serving as platforms for social change, they frequently serve to uphold existing social hierarchies.

Despite the postmodern emphasis on diversity and serendipity within urban planning, children's play and school environments often remain marginalized, relegated to isolated and enclosed spaces within the urban landscape. This compartmentalization starkly contrasts with the spontaneous nature of play, which thrives on unpredictability and exploration, unhindered by spatial boundaries (Katsavounidou, 2012). In essence, this segregation removes a vital component from the essence of play, depriving it of its intrinsic qualities. As Gadamer poignantly questioned, "Isn't it an illusion to think that we can separate play from the seriousness and allow it only in isolated areas peripheral to real life?" (Gadamer, 2013, as cited in Katsavounidou, 2012, p. 164).

In view of this, the threshold is essential for upgrading the lives of children living in cities and upgrading the city itself: An architecture of the threshold connects the school to the community and to life outside it. The school is no longer an isolated area amid the vastness of urban space but is rather linked to the city. It opens up; its activity becomes socially relevant and its cultural output is to be experienced by the community to which it belongs. In terms of a child's experience, this opening up of the school environment turns the city itself into a "big school" (Wood, 2019). Pupils become familiar with public space and connect with it on a personal level reclaiming a common ground that is freely shared among peers by means of their own spatial narratives. In thresholds, cracks emerge as disruptions to the established norms and organizational structures. These interstices, as delineated by de Certeau (1980/1984), signify the domains that elude the confines of rationalistic frameworks, posing a creative challenge to the ordered fabric of the urban landscape while engendering narratives, myths, and stories. Katsavounidou (2012) elaborates on this notion, identifying such spaces as Spielraum—realms that afford "room" for play, enabling maneuverability within the rigid technostructure of the city, which endeavors to dictate functions and behaviors to its inhabitants. de Certeau (1980/1984) characterizes the act of "disobedience" inherent in a crack as a process of "transcription," wherein the original symbolic and physical elements are transformed into something novel and unrestricted. Viewing the school threshold through the lens of Spielraum reveals its indispensable role in nurturing dynamism and vitality within the urban milieu. It serves as a crucible for experimentation, inviting exploration of diverse possibilities and advancing routes for creativity. Moreover, it offers a place for social connection, bringing forth the interconnectedness that imbues space with significance.

3. Research Inquiries and Methodology

The intrinsic characteristics of the spatial threshold have prompted a scholarly impetus for deeper investigation, with the aim of enhancing our comprehension and acknowledgment of its importance and potential. Below, I outline the key inquiries that I endeavor to address within the scope of my research, along with a brief overview of the methodology guiding the investigation. The aim of the research is to find out: (a) What is the role of school threshold today?; (b) What is the children's perception of the entrance-limit/threshold of the school?; (c) What do children want as they transition from urban space into that of the school?; (d) What are the specific qualities of a school entry that render it an ideal space for the interaction between children and with the space around them?; and (e) How does the synergy of cinematic-architectural tools feed, enrich, and open up new possibilities in understanding and representing spatial and social phenomena?

Through a comprehensive framework of research inquiries, one focal point revolves around the methodologies employed. A pedagogical approach, honed over an extensive period of eight years, has undergone iterative refinement to achieve a balance between robustness and adaptability. The methodology aims to provide a framework of comprehending children's requirements, inclinations, and aspirations concerning their surroundings. This framework offers utility to architects engaged in children's space design and also to educators seeking deeper insights into spatial cognition among children.

My approach forms a comprehensive framework that bridges various research fields, drawing inspiration from practices such as pedagogical documentation as implemented in the Reggio Emilia province of Italy (Clark, 2005) and Freinet pedagogy. These methodologies have extensively explored children's unique relationship with space and its role as a learning environment. Additionally, our research is influenced by the phenomenology of the body, as articulated by Merleau-Ponty (1962), which focuses on children's embodied interactions with their surroundings. Furthermore, we integrate insights from the Geography of Children that examines spatial concepts within their broader social, political, and cultural contexts.

Central to this approach is the creation of environmental conditions that enable children to feel safe in expressing their concerns (Lefevre, 2010). By treating children as experts in their own lives, many constraints on adults' efforts to comprehend children's experiences are lifted. This shift in perspective encourages mutual respect and understanding, promoting more meaningful engagement between adults and children in exploring their lived environments.

The age range under consideration in this study encompasses what is commonly referred to as "middle childhood." This demographic selection stems from a multitude of factors. It represents a transitional phase characterized by burgeoning cognitive and expressive capabilities, as children have acquired foundational literacy skills while retaining a degree of unfiltered spontaneity and imaginative fervor. Furthermore, this developmental stage aligns with a flourishing sense of autonomy and exploration, particularly notable among pre-adolescents and middle-school-aged individuals, who exhibit a heightened psychological attachment to their surroundings owing to their expanding mobility and independence (Katsavounidou, 2012).

Ninety third graders (aged 8-9) from an Elementary School located in central Athens constitute the focus of this research, conducted over a precise two-year period. This school was selected based on my prior engagement in conducting architecture workshops there. However, while this specific school serves as the initial setting, the research aims to extend beyond its confines and address broader issues within the context of urban Greece. Ethical guidelines were meticulously followed throughout the study, with ethical permission obtained from the school administration, the children and their parents or caregivers. The children were keen to participate in a project centered on their school, appreciating that their voices were valued.

One of the central concerns of the investigation was to allow the children to come to the fore, to make the most of their views and ideas, to "make them visible" as Baltas would say, never losing sight of a very important principle: namely that only if the city changes so as to conform to the needs of children will it be able to accommodate everyone's needs, a concept that so many thinkers tend to agree on. Malaguzzi (1993, p. 10) seems to provide ample defense in this when he insists that "our image of the child is rich in potential, strong, powerful, competent, and most of all, connected to adults and other children." Of course, it is not enough to observe children in order to understand how they engage with architecture, as they have a very

special way of experiencing their relationship with space. That is why we offer them the opportunity to express themselves using a variety of different media (the methodology incorporating multiple media was co-developed with Anastasia Noukaki, who is also a co-founder of our Athens Superscript team [Athens, 2015–2022]). As Goodman (1976, as cited in Bazaiou & Noukaki, 2017, 2018, 2019) has said, the world exists in as many ways as it can be described. The limits of our representational language also delineate those of the world of our ideas. Hence, the more means we can use to describe that world, the more information it will provide us. It is a game on the limits and limitations of each possibly independent method, in the course of which the experience of the children is constantly reflected upon and reevaluated.

The research process encompasses the following steps: Initially, the spatial experiences of children at the school gate, both at the beginning and end of the school day, are documented through a film directed by Anna Chrysanthakopoulou, Documentary Director and Archaeologist. Then, the children are shown the Observational Documentary and they are encouraged to express their thoughts and feedback by means of photovoice workshops, voting, answering questionnaires, creating architecture models. Rather than being based on a rigidly formulated working hypothesis, this particular approach creates a broad enough context wherein every child can find ways of expressing themselves adopting different angles and perspectives. Each approach provides a distinct route for participants to articulate their sentiments, preferences, and insights regarding the school threshold, deepening their involvement in the investigative process. By entailing a multiplicity of expressive modalities, the interaction between subject and representation is enriched, yielding subtleties of data and uncovering dimensions that might otherwise remain unexplored. Through these varied channels of expression, akin to what Eisenstein (1949/1994) described as “visual counterpoints” in cinematic imagery, participants uncover subtler nuances in their relationship with the school threshold. The spatial experience of the threshold intertwines with its representation as an image, creating a connection characterized by complementarity rather than rivalry. This dynamic entails an exploration of the boundaries and constraints inherent in each method, with a continual process of reflection and reassessment informed by the children’s experiences. Cinema in this research is present in four different ways:

1. The creation of children’s observation film;
2. The processing of film with tools other than the film language;
3. The processing of film with tools within the filmic language;
4. The completion of the film with a selection of data from the entire research.

Within our research, the cinematic image serves as a powerful educational instrument for comprehending space and its utilization by individuals. By combining visual imagery with sound, we create a rich multisensory experience, particularly impactful for children as it captivates their interest and facilitates learning. In a counterpoint to Debord’s cinematic language (1967/1995), which often emphasizes the construction of visual and narrative elements to critique modern society, the audiovisual urban landscape (school threshold) serves as a starting point for children to observe the spatial experience of the threshold. This approach enables us to observe children’s behavior in their environment in a manner that is more natural and spontaneous than traditional observation methods allow. Utilizing cinematic tools, we can analyze various facets of children’s interaction with space, including their mobility, interactions with their surroundings, engagement with peers and adults, and preferences for different areas and objects within their environment.

Cinema can capture subtle qualities and make dynamic use of symbolism. And while images alone do not contain all meanings, montage editing creates synthesis and meaning. Cinematic tools provide children with the means to engage in a two-dimensional editing process, allowing them to craft their own narratives. Photovoice exercises are an easy way of utilizing the cinematic image, without requiring special technical means and skills (Wang & Burris, 1997). At the same time, they encourage participants to pay attention to details that otherwise may have gone unnoticed. Children get their hands on frames of our documentary "On the school threshold" in the form of printed photographs and are asked to edit them in an order of their choice, creating the narratives they wish to happen on their school's doorstep, adding script and sounds to the individual video frames that they would ideally like to hear. These narratives allow participants to weave stories that provide context and emotional depth to their experiences, working on variations of the observed reality. They are an approachable way to utilize the cinematic image-reminiscent of Barthes' (1977) exploration of narrative structures, which enables us to present and comment on our subject (the threshold) without requiring special technical means and skills.

Children also complete Likert scale questionnaires and participate in polls to gather both quantitative and qualitative statistical data regarding their preferences and sentiments concerning the threshold (Likert, 1932, as cited in Spector, 1992). Likert questionnaires delve into how kids feel and what they think about these spaces. With a structured scale for sharing preferences and feelings, we can gather information for analysis that help us understand better how school thresholds affect kids' happiness and well-being.

Furthermore, voting exercises are administered using various photographs depicting school thresholds from different regions globally. Participants are asked to indicate their preferences regarding the activities conducted within these spaces, such as play, socializing with friends, interactions with parents/caregivers, engagement with natural elements, interaction with art objects (sculptures), and exhibition of school work, as well as their aesthetic preferences.

Regarding the construction of the architecture model, participants are provided with a diverse array of materials, including cardboard, pieces of old toys, wire, thread, wood, and branches, for the construction of architectural models. They are given instructions that allow for significant freedom of movement and choice during the construction process. These architectural models help children to translate their perceptions into tangible forms (Piaget, 1952). They facilitate the communication of ideas in a spontaneous manner, enabling participants to visualize their designs and assess the feasibility of their proposals. The emphasis is placed on flexibility, freedom, and convenience and on the expression of ideas rather than on achieving construction perfection.

The spatial experience of the threshold intersects with its portrayal as an image. By engaging children's tactile senses and allowing freedom in expression through storytelling and reshaping film narratives, this approach mitigates the risk of data being biased or predetermined, as observed by Katsavounidou (2012) in discussions on childhood. It also avoids establishing a dominant relationship between the researcher and the participants, as commonly seen in interview-based or observational research methods. Furthermore, this method diminishes the possibility of children's participation devolving into a competition for realistic depictions, as might occur in drawing or painting exercises. It is also a fact that each representational medium has its inherent limitations. In spite of that, critics may argue that the mediation of representational media in research introduces subjective interpretations of reality, thereby questioning the objectivity of the

findings. However, the utilization of diverse modes of representation has become increasingly prevalent in contemporary research practices. Scholars like van Leeuwen and Kress (2006) have emphasized how different modes of research offer distinct semantic sources, enabling researchers to interpret and convey meanings in varied ways. The simultaneous and systematic integration of various optical and acoustic media operates on the principle of leveraging the unique capabilities of each medium and harmoniously combining them based on complementarity rather than competitiveness. This approach necessitates a shift in perspective, moving fluidly between experiencing space and representing it. The process facilitates the translation of spatial experiences into narrative forms and vice versa. The process involves experiencing space first-hand and then translating that experience into narrative forms, thereby facilitating a deeper understanding of spatial phenomena.

Through multidimensional analysis, space and its boundaries are investigated across three dimensions, reminiscent of Rohmer's exploration in his book "The Organization of Space in Murnau's Faust" (Rohmer, 2000) of different spatial constructs within cinema:

> Architectural Space: This encompasses the physical and social dimensions of space, including its built environment and urban landscape. Additionally, it considers the interactions between individuals and their environment, as well as the experiences and social dynamics shaped by architectural design.
>
> Cinematographic Space: Referring to the spatial composition within cinematic images, this dimension focuses on elements such as shot size, depth of field, and the arrangement of objects within the frame. It explores how visual elements are structured to convey spatial relationships and evoke particular moods or atmospheres.
>
> Narrative Space: This dimension pertains to the mental space constructed through storytelling, whether conveyed orally, in written form, or through design and construction. It involves the creation of imaginary or conceptual spaces within narratives, shaping the audience's perception and understanding of spatial contexts.

Research conducted within the realms of narrative media interpretation may not always occur within a strictly controlled or objective environment, unlike studies conducted in laboratory settings. However, it offers the advantage of encompassing a broad spectrum of disciplines and fields. Engaging children in various modes of representation and expression, prompts them to explore different aspects of their experiences and encourages reflection on multiple levels, thereby deepening their engagement with the research process. In essence, this approach transcends mere data collection; by analyzing space through these dimensions, we gain a comprehensive understanding of spatial phenomena, considering both physical and conceptual aspects across different mediums and contexts.

All collected data are analyzed to identify recurring themes, patterns, and emotions that emerge throughout the research process. The analysis of children's responses revealed several recurring motives, summarized as follows:

1. Children perceive cars as integral to their environment and envision playing on the road only in the presence of vehicles. One child mentioned: "I like it when we play near the street because we can see the cars passing by. It makes our games more exciting."

2. They express a desire for natural elements, particularly trees, within their surroundings. A girl noted, "I wish we had more trees around our school. It would be so cool to have a treehouse or just sit under the shade."
3. The specific form of the threshold is of little concern to them, as long as it facilitates free play and social interaction with peers.
4. Children exhibit a desire for novel and adventurous ways to navigate the threshold, such as climbing, floating, or creeping. "We should all enter school by jumping from the outside using a trampoline and entering from the top of the door," a girl suggested.
5. Many of the games they invent involve imaginative methods of entering the school, such as passing through rollers or solving puzzles.
6. Interacting with members of the neighborhood community is valued, and children express interest in showcasing their work through exhibitions on the threshold.
7. Meeting friends at the entrance holds significance for children, resembling familial interactions, enhancing the sense of intimacy.

While these seven themes were identified, not all of them were equally emphasized by the children. Themes such as the desire for natural elements and imaginative games for entering school were more frequently mentioned, indicating their higher importance in the children's spatial experiences. The emphasis on green spaces aligns with the increasing recognition of nature's role in child development, as discussed by Louv (2008). Additionally, the creative suggestions for navigating the threshold reflect the significance of play, supporting the findings of Ginsburg (2007), Pellegrini and Smith (1998), Frost et al. (2001), as well as earlier contributions by Gadamer (1960/2004), Piaget (1962), Vygotsky (1978), and Bruner (1976) on the crucial role of play in healthy child development.

The final stage of representation in the research involves synthesizing elements from the workshops, projects, and children's wishes and incorporating them into a film as a complex array of sounds, static and moving images, depicting the entire four-year research process. The diverse interpretations from each student, expressed through various means, along with reflective analyses, reveal both structural consistencies and inconsistencies. The depiction of the school entrance aims to serve as a focal point for words, actions, thoughts, and interpretations, weaving them into a cohesive narrative. Through montage editing, the film composition manipulates, enhances, and juxtaposes elements to create rhythm and coherence. The research methodology thus encompasses aspects of play, navigating between scientific discourse and subjective representations, and employing tools from both architecture and film. The experience and its representation alternate with a movement reminiscent of rhythm, which could be likened to the "back and forth" movement that, according to Gadamer (1960/2004), is playing's constituent "mode of being."

These approaches have been informed by various strands of literature and were shaped through extensive trial and error over eight years of conducting architecture workshops with children of this age. The methodological framework draws on insights from scholars such as Lefebvre (1991) in his exploration of the social production of space, van Leeuwen and Kress (2006) in their work on multimodal discourse analysis, Rohmer (2000) in his study of cinematic space, and Bordwell and Thompson (2013) in their analysis of film art and narration. The coding of the collected data was conducted by me, meticulously analyzing the children's responses, workshop outcomes, and creative outputs. The thematic analysis was informed by

Braun and Clarke's (2006) guidelines, which emphasize the importance of a systematic approach to identifying, analyzing, and reporting patterns within data.

4. Conclusions

Through the research, we observed the children, gave them opportunities to express themselves through the combination of cinematic and architectural tools and clarify their perception and desires in relation to the school entrance. Workshops activate the imagination, operating on the belief that the world can change from the bottom up through the synergy of myth-making and realism.

Through the study, a reflection is proposed on the concept of the school threshold as a condition that helps the school to claim its openness, the relationship with the urban space. In order to maintain a lasting connection between school and community-society, the threshold is an important place to disseminate children's activities to and from the city. The interaction with the threshold opens up opportunities for exploration, randomness, adventure, street stories, that all contribute to building a more integrated relationship with the elements surrounding us. The threshold can provide conditions for free, unplanned play with peers, the revival of the streets and the right to the street as a "playing field," the space in which children look for each other for play, observation, socialization. On this social basis, school becomes an essential place of active social life and not just a place where the child "learns things," opens up to the outside and possibly to the inside. The expanded school environment becomes a place of cooperation, communication, interaction and teamwork, comes out of isolation and ensures an organic relationship with social life.

When comparing the experiences of adults and children as creators, it becomes evident that children possess a unique ability to engage with space unencumbered by the complexities and responsibilities that often weigh on adults. Freed from emotional and mental burdens, children approach the exploration of space with a sense of curiosity and openness, expanding the possibilities for creative interaction. While engaging with children may lead to uncertainty, embracing this uncertainty can catalyze a transformative process for architects, fostering a fresh perspective on evaluating spatial environments and contributing to their professional development. As Hart (1997) suggests, in societies where adults struggle to effect significant change, young people have the potential to instigate profound shifts. Similarly, Rodari (1973/1996) emphasizes the importance of not underestimating children's capabilities, highlighting their innate sensitivity and authenticity in their approach to thinking about space. Children prioritize elements such as storytelling, play, interaction, and well-being when considering space, thereby honing in on the fundamental essence of architecture, which resonates with the essence of human existence.

Children's innate ability to engage with space through play is a recurring theme in our research, echoing Michel de Certeau's (1980/1984) notion of spatial narratives woven through everyday practices. By engaging in spatial play, children reshape the urban landscape to suit their perspectives, transforming perceived boundaries into negotiable zones of exploration. They gravitate towards informal, undefined spaces that afford them the freedom to shape their play experiences—an embodiment of Maria Montessori's concept of "spontaneous self-development" (Montessori, 1949/1966).

The research findings accentuate the dynamic nature of spatial experience, emphasizing its emergence through human interaction and collective bricolage rather than predetermined form. The threshold, in this

context, serves as a locus of creativity and boundary-challenging, generating new narratives and responses that challenge established norms and boundaries. Those changes do not have to be big or radical. Small cracks to the edifice of urban normality will do the job, as long as they are capable of creating nuclei of spatial freedom which gradually put children on an equal, if not a higher, footing with adults as users of urban space. It is a step in the direction of turning schools from centers where society is reproduced—as Dewey would say (Benson, 2017)—into the hotbeds of its transformation.

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Conflict of Interests

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About the Author

Natalia Bazaiou has over 20 years of professional experience and specializes in understanding children's interactions with the urban environment. As a co-founder of Athens Superscript, she designs and implements tools for interpreting and transforming public spaces to create child-friendly urban networks. Her research projects, carried out through participatory workshops, focus on converting cities into inclusive learning environments. Additionally, she provides training for primary school teachers in architecture and pedagogy. Her methodologies have been featured at international conferences and published in academic journals.

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ARTICLE

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Young Latinas/os' Environmental Commitments: The Case of Waste

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Abstract

This participatory research project aimed to identify young people's perceptions of the natural and built environment in their neighborhoods, including how social inequities shape those environments, and how their community and governments can improve them. The study took place with 25 young Latinas/os, ages 14 to 18, many of whom lived in a formerly unincorporated neighborhood (known as *colonia*) in Pharr, Texas, located in the state's Rio Grande Valley region. Through a walkalong, photovoice, and focus groups, participants identified waste management as a resounding priority. Their reflections highlighted their motivations behind and actions toward addressing this problem. This study makes two empirical contributions to scholarly and applied discussions on young people's outdoor experiences. First, young people's prioritization of waste highlights the role that trash—often in the form of scattered objects, small and large—has in shaping young people's outdoor experiences. Second, young people are committed to improving waste conditions through individual and group actions, and they identified needed structural changes. Pharr youths' environmental commitments call for investment in waste management and set the stage for more generative ways of experiencing the natural environment.

Keywords

environmental justice; infrastructure; Latinas/os; participatory research; urban planning; waste; young people

1. Introduction

1.1. Waste and Communities

Environmental justice researchers have examined how waste negatively and disproportionately affects Black and Latino communities, focusing primarily on the siting of disposal facilities, including incinerators and recycling facilities (Pellow, 2004; Saha & Mohai, 2005; Schwarz et al., 2015). White communities generate this outcome by "exporting" waste to historically marginalized communities (Marbury, 1995). Pellow (2004) famously coined the phrase "garbage wars" to refer to Black and Latino communities' battles against this environmental racism. In addition to the increased likelihood of having a waste facility in their neighborhoods, many historically marginalized communities also must deal with the problem of scattered waste in public spaces. Because conventional waste management systems are typically expensive and publicly funded, unincorporated communities and jurisdictions with high levels of poverty often have inadequate management systems.

Communities, real estate developers, and municipalities can have different narratives about waste; simply cleaning up a site can undermine communities' views of the problem (Dillon, 2014). Waste can be perceived positively or negatively, as something that can or cannot be controlled, and in terms of how groups see themselves as accountable; these diverging perceptions shape underlying interests and waste management strategies (Moore, 2012). Similarly, recycling has been critiqued for its inaccessibility and perceived as a symbol of social status. Household recycling implicates individual consumers as responsible for waste and has been promoted by petrochemical companies to reframe waste discourse away from producer responsibility (Allen et al., 2024; Müller & Schönbauer, 2020). Recycling is also expensive and technologically limited: most plastics marked as "recyclable" cannot be recycled, and less than 14% of processed material finds its way into new plastic products (Uekert et al., 2023). These limitations led Balwan et al. (2022) to argue against municipalities' present hyperfocus on recycling in favor of an integrated circular economy approach to waste management. Structural waste management strategies that address land use, education, and racial justice can lead to more equitable waste management (Khalsa, 2021).

The present study explores young people's perceptions of waste in their neighborhoods, the social roots of this problem, and the environmental improvement actions they expect from their communities and governments. These perceptions have implications for local public agencies that seek to be more responsive to community priorities in their environmental stewardship and planning efforts.

2. Literature Review

2.1. Youth Participatory Action Research

Despite being greatly affected by inequities in their natural and built environment, young people have been historically underrepresented in urban planning and community development efforts (Gurstein et al., 2003; Knowles-Yánez, 2005; Osborne et al., 2016; Passon et al., 2008). When participation does take place, local governments tend to view young people as a demographic to inform rather than to include in decision-making processes (Palmy David & Buchanan, 2019). Numerous studies have demonstrated that young people are cognizant of inequality, some detailing how children note social class differences and others emphasizing

how teenagers identify structural and institutional issues influencing economic disparities (Diaz et al., 2022; Dickinson et al., 2023; Flanagan et al., 2014; Ramsey, 1991; Rauscher et al., 2017). Young people of color, in particular, understand inequities through their personal experiences with marginalization (Roy et al., 2019). Their experiences and insights have prompted scholars to call for the inclusion of young people in planning processes as important stakeholders in their communities (Frank, 2006; Knowles-Yánez, 2005; Osborne et al., 2016; Passon et al., 2008).

Youth Participatory Action Research (YPAR) is a methodological approach that emphasizes the production of knowledge by young people. Rooted in the ideas of critical consciousness and liberatory education, YPAR conceptualizes young and adult participants as collaborators in knowledge production via critical reflection and dialogue about systems of oppression (Freire, 1970). YPAR challenges traditional power dynamics by highlighting partnerships between adults and young people to conceptualize problems, gather and analyze data, and address community concerns (Anyon et al., 2018; Kennedy et al., 2019).

Systematic reviews on YPAR have demonstrated that the approach generates positive outcomes for communities (Anyon et al., 2018; Shamrova & Cummings, 2017), including an increased sense of agency and leadership among young people, structural changes that allow more opportunities for young people to participate, policy changes, and infrastructure improvements (Anyon et al., 2018; Shamrova & Cummings, 2017). While YPAR has been mainly used in the fields of education, public health, and community psychology, there is an emerging body of literature that also uses the approach to investigate local environmental justice concerns (Brickle & Evans-Agnew, 2017; Curiel et al., 2022; Nolan et al., 2021). This literature has highlighted how place-based YPAR leads young people to connect theories of social justice to their own experiences with built and natural environments (Delia & Krasny, 2018).

Place-based YPAR can bring new and creative perspectives from young people to address environmental issues while also equipping young people with skills to research and advocate for environmental justice (Ozer et al., 2020). For example, YPAR studies on local built and natural environments have revealed links between systemic environmental racism and spatial pollution disparities (Johnston et al., 2020) and between spatial segregation and the reinforcement of social stratification in public school design (Solis et al., 2022). The present study utilizes YPAR to document young people's perspectives about scattered waste, how this situation has come to be, and the actions necessary to address this problem.

One specific methodology commonly used under place-based YPAR, and in this study, is photovoice, in which participants express community concerns, priorities, and ideas through visual and narrative storytelling. Through photovoice, people reflect on and photograph their community's strengths and problems, discuss the meaning of photographs to co-produce knowledge about their communities, and reach policymakers (Wang & Burris, 1997). Like YPAR, the goals of photovoice are influenced by Freire's concept of critical consciousness as it promotes non-hierarchal dialogue to collectively analyze power structures and systems of oppression affecting communities and everyday issues (Shimshock, 2008; Wang & Burris, 1997). Communities that are often underrepresented in research, urban planning, and policymaking can use photovoice to highlight everyday experiences (Sprague et al., 2021).

Photovoice has been used to capture the problem of waste and necessary responses to the problem. Young people in five studies specifically emphasized the environmental and health effects of waste (Cubilla-Batista

et al., 2016; Kovacic et al., 2014; Madrigal et al., 2014; Mmari et al., 2014; Sprague et al., 2023), as well as detriments to the aesthetic appeal of local parks (Madrigal et al., 2014). In response, some participants called for individual ways to address these concerns, such as raising awareness about the effects of littering and picking up trash (Kovacic et al., 2014; Sprague et al., 2023), while others noted structural action steps like communicating with the trash management commission (Cubilla-Batista et al., 2016).

2.2. Critical Consciousness as a Framework for Understanding Environmental Justice Commitments

The diversity of individual and structural actions proposed to address waste injustices reflects the diverse constructions of waste among individuals and communities, as well as a complex interplay of social, political, and economic realities. Critical consciousness has been used as a framework in social and environmental justice scholarship to unpack how these complex intersections of epistemologies, experiences, and political contexts co-inform action. First introduced by Brazilian popular educator and critical theorist Freire (1973), critical consciousness refers to an individual's ability to analyze structural injustices and participate in actions contesting them. One model proposed by Watts et al. (2011) articulated three dimensions of critical consciousness: (1) critical reflection, or the ability to recognize and analyze injustice; (2) political efficacy, or belief in one's ability to effect change through action; and (3) critical action, or the actual actions taken by individuals or groups to address injustice. These three dimensions reflect the multiplicity of factors that co-inform environmental justice commitments. In the case of waste, photovoice highlighted how young people's critical consciousness shapes their environmental commitments; in some cases, the research process also strengthened these commitments. When prompted to view and capture their natural spaces through a critical lens, they observed impediments to comfort in those spaces and their root causes, while proposing ways forward.

2.3. Purpose of Study

The purpose of the present study was to explore young people's perceptions of their natural environment, predominantly local parks, by using photovoice and YPAR methodology. Supplemented by a walkalong at a park located in a neighborhood consisting of former *colonias* in Pharr, Texas, and subsequent focus groups with youth co-researchers, a theme that emerged was scattered waste. We asked: (a) How is waste perceived to affect young people's experience of the natural environment?; (b) What social and structural factors are perceived to contribute to waste in the natural environment?; and (c) What actions, and by whom, are necessary to address the problem of waste? By adopting a critical consciousness framework, the study suggests how an environmental justice issue can be proactively dealt with at the individual, community, and government levels. It also highlights young people's experiences, which have traditionally been understudied, and who, by virtue of their high participation in outdoor space, have the greatest stake in directing environmental stewardship and planning efforts.

3. Context and Methods

3.1. Setting

This project is grounded on partnerships between researchers at The University of Texas at Austin, Texas Children in Nature Network (TCiNN), and community-based and civic organizations in Pharr, Texas, to form

the Coalition for Youth, Health, and the Environment (Coalition). The Coalition's mission is to understand young people and families' environmental justice priorities for the Rio Grande Valley (RGV). Although the current article focuses on waste, as it emerged as a resounding theme from photovoice, young people also engaged in participatory mapping and co-designing of nature spaces in their community, including heat mitigation (discussed elsewhere).

The Coalition specifically chose Pharr as a setting to organize a photovoice project because of TCiNN's strong network with local community organizations and the City of Pharr's goal to expand greenspace access (Ab Shama et al., 2024). Pharr is a city of 80,179 residents (95% Latina/o) in Hidalgo County and abuts the US-Mexico border (United States Census Bureau, 2024). The median household income of $45,016 is lower than that reported for Texas and the United States, but is, on average, higher than many communities in the RGV (United States Census Bureau, 2024).

Pharr is adjacent to several *colonias*, or unincorporated subdivisions that lack basic infrastructure and municipal services such as paved roads, streetlights, and trash pickup, concentrated alongside the US/Mexico border. The rise of *colonias* dates back to the 1950s and 1960s when low-income migrant farmworkers from the *Bracero* program settled on urban fringes due to limited affordable housing (Rivera, 2023). Rural landowners subdivided their lands and sold them to migrant farmworkers and their families, often with no house or infrastructure (Nevárez Martínez et al., 2019; Rivera, 2023). Infrastructure and municipal service problems persisted because of areas not being incorporated by cities at the time. Starting in the 1980s, many *colonias* gained media attention, political recognition, and annexations as residents advocated for better infrastructure, services, and housing conditions (Rivera, 2023). Despite these efforts, substandard living and infrastructure conditions persist due to jurisdictional fragmentation, limited municipal funding, and selective municipal underbounding in annexing *colonias* (Nevárez Martínez et al., 2019).

Most of the youth co-researchers in this study live in and contributed data depicting the neighborhood of Las Milpas in south Pharr. Las Milpas consists of several *colonias* that were annexed by the City of Pharr in 1987 (Garza, 1995). Geographically distant from downtown Pharr, Las Milpas still has substandard infrastructure and a poverty rate of 62.1% as of 2016, far higher than the rest of Pharr (United States Census Bureau, 2024). The City of Pharr does not offer bulk pickup services, and while the City operates a recycling shed, this single facility is located in downtown Pharr, 8 miles or more than a 20-minute drive from Las Milpas (City of Pharr, n.d.-a, n.d.-b). These deficiencies in waste disposal infrastructure and the absence of trash and recycling bins in some parks and public spaces have resulted in illegal dumping in Las Milpas. Many households do not have feasible alternatives to dumping their waste in public spaces, which can lead to misconceptions that underserved communities like Las Milpas neglect their public spaces and allow dumping to go unchecked. This narrative of community neglect can negatively impact regional and national perceptions of these communities, ultimately driving further state and federal disinvestment in their infrastructure. As a way of pre-empting this cycle of disinvestment, community organizations such as ARISE Adelante (A Resource In Serving Equality *moving forward*) and LUPE (*La Unión Del Pueblo Entero*) have played a critical role in mobilizing for expanded and improved municipal and county services in Pharr and *colonias*, in so doing putting forward a critical counter-construction of waste in which communities are not to blame for systemic infrastructure deficits (LUPE, n.d.).

3.2. Recruitment

TCiNN recruited youth co-researchers through the Pharr-San Juan-Alamo Independent School District. Interested young people completed an online form with their contact information. Researchers proceeded to contact young people to ensure inclusion criteria were met and to arrange for a time to administer informed consent to parents/guardians. Youth co-researchers were recruited based on the following criteria: (a) between the ages of 13–18; (b) lived in the RGV area; and (c) fluent in English and/or Spanish. Written informed assent and parental consent (for minors) were obtained for 25 young Latinas/os aged 14–18.

3.3. Photovoice Process

The photovoice process consisted of three workshops in April 2023. Workshops were facilitated in English and Spanish. The first workshop introduced the overall project to the youth co-researchers and discussed environmental justice and its context in Pharr. At the end of this workshop, the youth co-researchers were asked to take pictures of (1) the intersection closest to their homes, (2) something in their neighborhood that made them feel safe, and (3) something in their neighborhood that made them feel unsafe. All youth co-researchers owned cellular phones with cameras, which they used to take photos for this study.

The second session started with workshops on photography techniques and ethics, followed by a walkalong in Jones Box Park in Las Milpas. The 25 youth co-researchers formed four groups, each focusing on one of the following assigned themes at the park: recreational possibilities, accessibility, comfort, and safety. Additionally, while taking photographs, the groups explored their themes through the questions: (1) What is working? and (2) What could be better? After the walkalong, the youth co-researchers were introduced to the SHOWeD Method, a way to communicate the meaning behind photos (Shimshock, 2008; Wang & Burris, 1997). The SHOWeD method consists of the following questions to analyze a photo: (1) What do you *See* here?; (2) What is really *Happening* here?; (3) How does this relate to *Our* lives?; (4) *Why* does this condition *Exist*?; (5) What can we *Do* about it? Afterward, the youth co-researchers selected photos about which to write narratives in small groups using the SHOWeD method, discussing their communities, why they took their photos, and interconnecting issues between their photos to identify strategies to address local concerns.

At the third workshop, the youth co-researchers finished writing their narratives and participated in focus groups where they reflected on their experiences with photovoice. Youth co-researchers discussed what they liked and disliked about the photovoice project, what they learned about themselves and their communities, and how they can use what they learned to build their leadership skills and take action. Focus groups were audio-recorded and later transcribed verbatim.

The Coalition organized an exhibition in Pharr in November 2023 and at The University of Texas at Austin in February 2024 to showcase the youth co-researchers' work to local leaders and the greater community. At the exhibition openings, the youth co-researchers discussed their experiences and what they learned during the photovoice project, highlighting the theme of young people's knowledge and providing solutions on how to tackle community issues. Additionally, the research team wrote a report with the goal of reaching policymakers, synthesizing the youth co-researchers' work, and identifying initial priority areas for Pharr's natural and built environment (Ab Shama et al., 2024).

3.4. Data Analysis and Interpretation

For this article, we focused on photovoice and focus group data related to waste. Because of YPAR's and photovoice's roots in critical consciousness theory and because further developing young people's environmental critical consciousness was among the goals of the photovoice project, we used a critical consciousness framework to deductively and inductively analyze youth co-researchers' reflections on waste. We utilized Watts et al.'s (2011) three dimensions of critical consciousness—critical reflection, political efficacy, and critical action—as a framework to identify the ways in which individual and collective understandings, individual motivations, and sociopolitical realities co-inform young people's environmental commitments and actions.

The photovoice narratives and focus group transcripts were read repeatedly to identify all mentions of waste, landfills, trash, recycling, cleaning up spaces, and other related words. These mentions were then coded and categorized according to the three dimensions of critical consciousness: critical reflection, political efficacy, and critical action, following Watts et al. (2011).

4. Findings

Analysis of the photovoice and focus group data yielded three major themes: (1) disparities and disinvestment, (2) under-representation and self-perception, and (3) existing and future commitments to environmental action. These themes show how youth co-researchers engaged in the three dimensions of critical consciousness as they confronted waste injustices in their communities. Youth co-researchers provided structural analyses of the waste management problem by contextualizing it in larger socio-economic disparities and provided ideas on how to respond to the problem.

4.1. Disparities and Disinvestment

Youth co-researchers highlighted that waste is a problem in their community, especially parks, that this problem does not exist in wealthier communities, and attributed disparities to structural conditions such as the lack of proper waste disposal facilities and systems. Youth co-researchers took several photos depicting small and large waste that littered Jones Box Park, and in their accompanying narratives, expressed that the presence of scattered waste made them feel embarrassed, demoralized, scared, and angry. "The [flooded fields] reek of garbage….It's embarrassing when friends and family visit," one pointed out. Another effect youth co-researchers highlighted was that the presence of trash encourages more littering, with one person stating: "Being a kids' playground, kids will think it's okay to litter, and it's demoralizing to make an effort to clean up, when others aren't even trying" (Figure 1).

In contrast, youth co-researchers expressed how cleanliness and nature's vibrancy bring them comfort, as it shows people care about the environment. In a photovoice narrative, a youth co-researcher showcased flowers in Jones Box Park, stating, "these blooming flowers…makes me feel comfort. Blooming is only possible in the right season and when there is care for the environment" (Figure 2).

Figure 1. Trash in front of the Jones Box Park playground.

Figure 2. Flowers in Jones Box Park.

Similarly, another youth co-researcher detailed how she felt more comfortable using a space when it was well-kept:

> I took this picture [Figure 3] because how bad this place has gotten. It used to be well-kept and beautiful. But more recently, it has been overtaken by trash….It makes me feel sad because this used to be a beautiful place to admire the sunset.

Figure 3. A once well-kept place to view the sunset.

Youth co-researchers also presented social-spatial analyses that identified waste as a problem of inequality, and they linked the waste issue to structural inequities: none of the issues of waste management, abandonment, and lack of safety seem to occur, at least visibly, in wealthier neighborhoods. Young people saw that "in those [wealthier] places, it is better developed, it is cleaner, in other communities…and this speaks to how most of the higher ups, people who are in control, shouldn't pick and choose where to prioritize." Another youth co-researcher explained that a local open space she uses was going to be turned into a park, but because the process has been taking longer, people have been throwing trash in the meantime (Figure 4). She added:

> Seeing big piles of trash everywhere [in the open space] makes me feel angry. Why do people dump their trash and unwanted furniture everywhere? The proper system for disposing big garbage items is clearly not working, otherwise we wouldn't see so much trash here in this space and all over everyone's sidewalks….This [dumping problem] doesn't seem to happen in neighborhoods that are not poor.

Figure 4. A potential park space unfortunately turning into a dumping site.

These disparities and injustices, youth co-researchers noted, reflect and reproduce the stigmas and stereotypes that people hold about their community.

> When I think about these big problems and [wonder] why are some communities, like, struggling, keeping up [with] their trash and why some are not, I think it's a…snowball [effect]. People look at them and they're like, "You're dirty." So, I internalize and I'm like, "Why bother?" Nobody cares anyway. They already see us like people who don't matter.

Youth co-researchers acknowledged that their neighbors are not dumping trash in undesignated waste management areas because they want to do so, but because proper disposal is an involved process, one that takes time, thought, and resources. They indicated that it is difficult to get rid of trash without proper waste disposal facilities. Youth co-researchers highlighted problems in waste management systems and identified specific infrastructural needs, including garbage and recycling bins in public places, bulk pickup services that come to neighborhoods regularly, and waste management teams that deploy when trash builds up in the neighborhood.

4.2. Underrepresentation and Self-Perception

Youth co-researchers emphasized how underrepresentation in planning processes affects their own sense of individual and collective identity and confidence to make change. They shared that many social and political systems in place are not designed to serve their needs or give them a voice in decision-making. They also acknowledged that obstacles to representation were associated with their various identities: as young people, as Latinas/os, and as residents of lower-income communities. Many youth co-researchers voiced disappointments such as "we put our voices out there, but they don't really hear us" and "even if we say it, it doesn't mean they're going to count it." They also expressed frustration with stereotypes that often exclude them from decision-making circles: "[As Mexicans] we're known as *locos* [crazy], immigrant people that don't really care about the [dumping] problem….They labeled us in a way that they force us to act."

Accordingly, some youth co-researchers emphasized feeling discouraged from taking action. For example, one person stated:

> We see [pollution and litter] and we understand it, but we don't feel compelled to do anything about it. Because it's like, "It's always going to be there, so why try to change it?" No one really gives us the opportunity to change it.

However, they also described how the photovoice project changed their own perceptions of their ability to make a difference in their communities. In a focus group discussion, one person discussed his evolution of perceptions about himself and his community:

> I was really stunned actually in this project. It gave me a new perspective on myself and…how I've seen my community….I realized I live in very much a bubble…and it was very eye opening to actually have a reason to go outside and observe things about my community that I never would have cared about, because I felt kind of powerless….I found that [the project was] very empowering.

Similarly, another youth co-researcher in that same group explained how identifying littering problems in Jones Box Park made her realize her actions are important:

> It also made me realize how important it is for us to make a change….When we went to the park and we see all these things going on….We don't actually realize until we actually focus on them, like trash on the floor and all of this beauty of nature that surround us every day, but we don't appreciate it as we need to.

These comments led to another person highlighting the importance of her voice:

> We [young people] can make a change here….Our voice does matter, and that just because we're teenagers and we're not adults…it doesn't mean that our voice doesn't matter. We can actually all come together and change things for the better for our future.

Other youth co-researchers expressed similar sentiments, sharing that they originally felt discouraged because they felt excluded in planning processes, but that through carefully analyzing the issues in their neighborhoods, they realized they could contribute to change in different ways.

4.3. Existing and Future Commitments to Environmental Action

In the focus group discussions, several youth co-researchers shared steps they took or planned to take to alleviate the waste problems in their communities. Youth co-researchers' environmental commitments played out in individual and structured ways. At the individual level, raising awareness was a common theme among their action plans. For the youth co-researchers, raising awareness involved encouraging friends and family to form trash-cleaning groups, protesting to raise concerns to policymakers, creating videos that showcase local environmental inequities, sharing petitions to spread the word, and organizing city-wide conferences that give young people a platform to voice their ideas. Some youth co-researchers highlighted their generation's use of social media for awareness raising and political education:

> I think social media has a big impact, especially on younger people…reminding people the things that are happening around us….I follow this one account that constantly brings up issues that are happening with justice or nature, anything…so I think having that reminder will make people constantly be like "Oh my God, I keep seeing this, I keep seeing that."

Youth co-researchers also saw themselves as future agents of change. In considering future careers in political science, real estate, civil engineering, film production, and other fields, they noted their ability to effect change in the built environment as professionals. For example, one stated, "I want to be a civil engineer….I could be a change where trash is not left around, during or after construction." Another commented:

> For the future I'd like to do video production….[The photovoice project is] giving me some ideas on how I can put this kind of project into my future filming and how [I] can also help this type of community make movies, so people can be aware of [environmental injustices these communities experience].

Several youth co-researchers also discussed how their participation in school and community-based initiatives addresses littering and trash dumping. For example, one individual mentioned being part of a school club that involves picking up trash on their campus:

> I'm in a school club called Green Team….We [focus on] animals and flowers, taking care of the flower garden…but people don't care about it. They just keep throwing their trash. And then, we have to get clean it up every time…and it's what I like doing. It's what I love.

Youth co-researchers actively served as stewards of their natural environments through structured programs (Figure 5). They saw their environmental commitments as something that benefited their community.

Although some opportunities for civic involvement in Pharr currently exist, youth co-researchers expressed wanting more such opportunities. At the structural level, they suggested changes in school programming, municipal decision-making processes, and community partnerships. For instance, one youth co-researcher suggested partnerships between schools and parks so students can meet their volunteer requirements while also cleaning up their local environment:

> Even now, we are [high school] seniors….You want community hours, let's go to the park and clean something, or let's just help the community in that way….We need 40 hours, each student themselves needs to graduate….I think that if the schools talk with the parks to somehow make it, like if you go to the park and you pick up trash, let's say you do an hour, that's an hour to the school time, so it doesn't have to just be with the school, it can be outside as well.

While acknowledging the role of the City and other institutions in waste inadequacies, many youth co-researchers also highlighted that municipal-community partnerships have the potential to inspire governmental investment in infrastructure. One of them asserted that the community has the power to broadly transform civic culture, re-engage policymakers by disproving stigmas around community environmental neglect, and motivate the City to expand waste disposal services by demonstrating expanded community stewardship:

Figure 5. A community garden that a youth co-researcher visits on Fridays.

> We should get the community involved. We can organize a neighborhood cleanup day, working with the city to make it happen…to make it easier for people to throw their trash responsibly. [The City] could [also] provide blue recycling cans. These steps can help us come together as a community…and show the city that we care about improving our neighborhood.

5. Discussion

The insights of young Latina/o people in this study on waste disparities and their effects are consistent with what critical consciousness literature refers to as critical reflection (Watts et al., 2011). First, they articulated the various structural problems affecting waste conditions in their communities, such as inadequate systems for disposing of large garbage items, providing recycling bins in public spaces, picking up waste bins in neighborhoods regularly, and deploying waste management teams to address trash bulk pickup. These articulations are examples of how waste reflects social relations (Dillon, 2014; Moore, 2012; Weber et al., 2019). The history of disinvestment in Las Milpas extends to the issue of waste. Environmental justice is often viewed as a siting issue—for example, several studies have pointed out how waste management facilities themselves have negatively impacted communities–but the issue plays out in a wide range of ways (Harwood, 2003). Young people in Pharr pointed out the lack of basic waste management facilities, specifically those that help dispose of small and large items. More broadly, young people highlighted waste management as an ongoing basic need in a region that has long struggled with economic marginalization. State and federal agencies can play a critical role in enhancing waste management systems by facilitating financing or other resources. The early stages of new waste facilities planning are an opportunity to develop infrastructure that is equitably funded and designed (Weber et al., 2019).

Additionally, young people conceptualized environmental justice in Pharr as an issue of waste through their critical reflections on how scattered trash, small and large, affects their outdoor experiences. In their photovoice narratives, they associated maintenance and nature's beauty with comfort, and trash with feelings of frustration and embarrassment. These feelings affected young people's perceptions and use of outdoor spaces and are amplified when they internalize negative comments about their communities due to their physical conditions. Negative feelings resulting from the presence of trash can lead to young people using outdoor spaces less, as previous studies have shown that physical park attractiveness influences park use (Douglas et al., 2018; Knapp et al., 2018; McCormack et al., 2010). However, as young people emphasized, scattered waste does not appear to be a significant issue in wealthier communities. These disparities between communities noted by young people underscore that scattered waste is also an environmental justice issue, adding new perspectives to this literature which majorly discusses waste in the form of facilities and their pollution.

The evolution of some of the young people's beliefs in their abilities to effect change parallels political efficacy outcomes in other YPAR studies using photovoice (Bellino & Adams, 2017; Brickle & Evans-Agnew, 2017; Evans-Agnew et al., 2022). In this study, some young people expressed feeling discouraged to take action due to them noting their underrepresentation in planning and decision-making processes and the lack of institutional opportunities to be involved in effecting change, internalizing the belief that their voices do not matter because they are not adults. However, through the photovoice process, these co-researchers analyzed the social and political forces influencing waste issues and identified various ways to make their voices heard and help at individual and structural levels. After noting the significance of waste concerns, the effects of

scattered trash on their outdoor experiences, and the different ways they could help address the issue, they emphasized feeling more confident in their abilities to effect change. Young people's reflections on this topic highlight YPAR and photovoice's role in the development of political efficacy.

The photovoice activity and focus group discussions demonstrated the different angles from which young people in Pharr engage in critical action via individual ways and through suggesting structural action steps to address concerns, reflecting similar findings in other photovoice projects involving young people and the topic of waste (Cubilla-Batista et al., 2016; Kovacic et al., 2014; Sprague et al., 2023). Even though young people in this study pointed out that they are underrepresented in planning and decision-making processes, they still saw themselves as agents of change as they can individually help with solving waste problems via raising awareness, future career aspirations, and school and community-based initiatives. However, they recognized that more is needed and called for institutional changes that will help address waste concerns and give them opportunities to be more civically involved in their communities. Suggested institutional changes involve more municipal-community partnerships, young people's involvement in municipal decision-making processes, and increasing civic engagement opportunities in school programming. Young people's ideas to address local waste problems using their lived experiences and critical reflections on their surroundings reconfirm past studies' characterization of young people as knowledgeable community stakeholders who should be incorporated into planning and decision-making processes (Frank, 2006; Knowles-Yánez, 2005; Osborne et al., 2016; Passon et al., 2008).

Young people in this study also explored the contradictions of individual action. Despite evidence that recycling is far less effective than advertised at mitigating plastic waste and is expensive to implement (Allen et al., 2024), recycling still looms large in the environmental commitments of Pharr's young people. Similarly, even while highlighting how scattered waste in Pharr results from the systemic issue of insufficient waste disposal facilities, young people still feel compelled to address trash pickup through individual and collective community action while also advocating for systemic change. This contradiction highlights the complex social and political dynamics facing young people in Pharr who seek to effect change. For them, taking individual action to clean up waste is a political act in that it counters misconceptions that their community does not care about scattered waste; it demonstrates to decision-makers that the community is, in fact, invested in its parks and is worthy of government investment. Young people also feel compelled to clean up waste out of necessity in an environment where systems are not improving. Despite making a compelling case that inadequate systems are responsible for the proliferation of waste in Pharr, young people are motivated to work towards improving their communities.

6. Conclusion

Our participatory research project with young people in Pharr, Texas, adds to environmental photovoice literature by further expanding on how environmental injustices involving scattered waste affect outdoor experiences. Through a walkalong, a photovoice project, and focus groups, young people identified waste as a resounding priority. Their reflections highlighted their motivations behind and actions toward addressing this problem. These young people's insights make two empirical contributions to scholarly and applied discussions on young people's outdoor experiences. First, young people's prioritization of waste highlights its central role in shaping their park experiences. Second, young people are committed to improving waste conditions through individual and group actions and influencing systemic changes. Their environmental

commitments call for investment in waste management and set the stage for more generative ways of experiencing the natural environment. In simultaneously committing to individual and group waste mitigation actions and actions in pursuit of systems change and institutional investment, Pharr young Latinas/os evince a complex relationship with social and political power structures and with their natural and built environments.

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Conflict of Interests

The authors declare no conflict of interests.

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Understanding Well-Being Through Children's Eyes: Lessons for Shaping the Built Environment

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Abstract

The role of socio-spatial contexts in promoting children's well-being in urban planning and design is gaining attention. Nevertheless, the discourse on children's well-being has primarily been shaped by adults, often overlooking the unique needs and perspectives of younger populations. This interdisciplinary study located in Berlin, Germany, conducted by educational scientists, planners, and architects, challenges this by directly engaging with children through game-based data collection combined with ethnographic research to explore their well-being needs. From children's centers and schools to digital worlds, neighborhoods, and interactions with crime, children clearly articulate where, how, when, and with whom they create moments of well-being. The findings highlight the importance of children's centers as well-being hubs, offering insights into how well-being can be nurtured through both physical design and programmatic offerings tailored to children's needs. A key insight is the role of religious places and family practices, alongside micro-spaces and translocal references provided by neighborhood spaces, in shaping children's sense of identity and well-being. Additionally, the importance of having access to digital spaces is emphasized by the children. The study contributes to the discourse on child-friendly cities by advocating for multi-scalar planning and design approaches. The research calls for urban planners and designers to integrate children's perspectives to design spaces that accommodate the full spectrum of children's well-being needs, including micro-scale interventions and flexible, child-responsive interior designs.

Keywords

architecture; built environment; child-friendly city; children's center; digital mediatization; micro-spaces; multi-scalar; translocal; urban design; well-being

1. Introduction: How Can Children's Well-Being Be Promoted in Urban Spaces?

The concept of well-being, although not new in planning and design, gained importance following the pandemic, which significantly affected spaces for children's play and learning (Cortés-Morales et al., 2022; Million, 2021; Zougheibe et al., 2024). Since then, the planning and design professions have increasingly explored how to foster well-being (UIA International Union of Architects, n.d.). However, spatial planning and design is still predominantly adult-centric in its perspectives and actions (Castillo Ulloa et al., 2022), and often overlooks the unique needs and rights of children. There is little awareness of children's conceptualization of their well-being (Fattore et al., 2016), which gained traction in the early 2000s. The focus outlined here, especially when linked to child-friendly cities' (CFCs) initiatives, is not just about enriching children's present experiences but also about shaping cities that nurture their growth and development, taking their understanding of well-being as a starting point.

In an era where urban environments are a dominant living condition undergoing transformation (Million et al., 2021; Seasons, 2021), the objective of this article is to contribute to the scholarly understanding of how children construct their well-being in cities and to explore the implications of children's perspectives on urban planning, design, and architecture. This is undertaken through a still ongoing interdisciplinary research project called "Well-being in Socio-Spatial Contexts: Intersectional Perspectives on Children's Experiences at Non-School Learning Sites" (WIKK*I). Educational scientists, planners, and architects jointly research how children create well-being within socio-spatial contexts, how this well-being can be captured and described in a qualitative study, and how it can inform planning, design, and architectural practice. The research focuses on children in Berlin, conducted through participatory methods at a children's center. In this article, the case study setting is introduced and framed by a review of the evolution of the concept of children's well-being within the broader scope of CFCs and the focus on the built environment. After describing our qualitative research approach, we present findings from our case and then discuss their implications for planning, design, and architecture.

2. State of Research and Practice: From Well-Being to CFC and the Focus of Built Environment

2.1. Children's Perspectives on Well-Being

Child well-being is a concept that spans multiple disciplines and addresses children's living conditions and lifeworlds from a normative perspective of a good, just, or desirable childhood (Fegter & Fattore, 2024). Depending on the disciplinary background, child well-being is defined either as an objective, multifaceted construct that includes, for example, living conditions and access to education, as a subjective construct in terms of happiness and satisfaction, or as a cultural construct, depending on the norms and valued practices in a cultural community (Fattore et al., 2019). Important reference theories are the Capability Approach, the UN Convention on the Rights of the Child, and psychological need theories (Ben-Arieh et al., 2014). As mentioned before, the well-being concept is not new, it had already begun to attract attention across various fields even before the Covid-19 pandemic. It is prominently explored from social welfare and health perspectives (Bautista et al., 2023; Brown et al., 2019), often situated at the interface between research and policy and with an international comparative perspective (see Andresen & Neumann, 2018; Bradshaw & Rees, 2018; Casas et al., 2018; Hurrelmann & Andresen, 2013; OECD, 2009; UNICEF, 2013).

Traditionally dominated by quantitative and adult-centric studies, attention has recently shifted to children's perspectives. Ben-Arieh (2006, pp. 6–7) highlighted four key shifts toward recognizing children's views on well-being:

> (1) a shift from a focus on a child's mere survival to a focus on well-being and other attributes; (2) from a focus on negative aspects in children's lives to a focus on positive aspects; (3) from a focus on well-becoming (attaining eventual well-being in adulthood) to well-being (attaining well-being during childhood); and (4) from a focus on traditional to new domains of children's well-being (Ben-Arieh, 2005; Brown and Moore, 2001).

He and other scholars argued that if the Convention on the Rights of the Child adopted in 1989 is taken seriously, then these shifts are mere consequences, and how well-being is defined and researched needs to be reconsidered. Up to today, the number of studies researching children's perspectives on well-being has grown, discussing dimensions and indicators, methods, and ways to reconstruct it.

Most statistical studies now include both objective and subjective measures. For example, the OECD (2015) has produced a multidimensional monitoring report on child well-being that uses a combination of objective and subjective indicators, including measures of income, poverty, and literacy, but also self-reported health and subjective life satisfaction. Studies focusing only on children's subjective well-being have also become increasingly important, both internationally and nationally. There is, for example, the "International Survey of Children's Well-Being" (ISCIWeB), containing data sets of about 200,000 children between eight and 12 years old in more than 40 countries, while ISCIWeB provides predominantly empirical quantitative material. Another example is the "Multinational Children´s Understandings of Well-being—Global and Local Contexts" study. Teams from 25 countries in the Global South and Global North are currently involved in the project, using qualitative, participatory methods to explore children's own concepts and constructions of well-being and how these are embedded in social and cultural contexts (Fattore et al., 2019, 2021a). A cornerstone study conducted in Australia identified the now well-accepted categories of self (self-esteem), agency (power to act), and safety and security as central to children's understanding of well-being (Fattore et al., 2016). Nevertheless, the socio-spatial focus, as well as research contributions from the disciplines of urban planning, design, and architecture, are rare.

With the rising number of people migrating (UNICEF, 2021), current studies further highlight the importance of translocal family settings for children's experiences of well-being in the context of global migration as well as the impact of digital mediatization (Castillo Ulloa et al., 2022; Fattore et al., 2021b; Fegter & Mock, 2019; Zeitlyn, 2014). It demonstrates how globalization and mediatization are influencing children's well-being, calling for a greater emphasis on multi-scalar aspects of well-being. This includes the "possibility that children's concepts and experiences of well-being may not necessarily be an expression and element of the nation-state, but potentially a function of multiple processes that occur at different levels and scales, which could be conceived through other categories than the nation-state" (Fattore et al., 2019, p. 401). In line with the discussion on children's well-being, the research presented here builds on a child-centered concept of well-being, using the dimensions of agency, security, and self (Fattore et al., 2016) as sensitizing heuristic concepts. This analytical approach looks at the child's lifeworld, the child's subjective perspectives, and the socio-spatial context in terms of how it enables or limits the realization of children's well-being (Bagattini, 2019; Fegter & Fattore, 2024).

2.2. Linking CFCs and Well-Being With a Focus on the Built Environment

Alongside the depicted development of well-being research, the concept of the CFC emerged. In 1996, UNICEF launched the Child-Friendly City Initiative at the UN Habitat II Conference (Malone, 2006). This initiative has focused on fostering children's development, ensuring adherence to their fundamental rights. The aim of enhancing children's well-being was also said to be achieved by improving the quality of urban environments. A decade later and building upon an earlier report on "Ask the Children: Overview of Children's Understanding of Wellbeing" the social scientists Woolcock and Steele (2008) conducted a literature review to link child-friendly community initiatives and well-being by focusing on the aspect of the physical environment. They conclude that:

> The physical environment has not received the same attention as other issues around child-friendly communities such as children's participation, governance, agency, social capital, and community capacity building. In a practical sense, the physical (both built and natural) environment is a difficult concept to disentangle from other social and political factors within a community setting. (Woolcock & Steele, 2008, p. 27)

The authors highlighted studies, including the second edition of "Growing Up in Cities" (GUIC II), originally started by the urban planner Kevin Lynch (Lynch, 1977), which explored aspects of physical environments that children themselves deem important. GUIC II included children from Argentina, Australia, the United Kingdom, India, Norway, Poland, South Africa, and the USA (Chawla, 2002). It concludes with several priorities to foster child-oriented spaces, including the presence of green areas, the provision of basic services, and a variety of activity settings that allow for diverse experiences. The children also valued freedom from physical dangers and freedom of movement, which facilitate safer, more autonomous exploration. Essential to their lives are peer gathering places, reductions in traffic, minimal litter or trash, and improved geographic accessibility and connectivity.

In comparison, the list provided by Bartlett (2005, based on Bartlett, 1999) offers a more extensive and detailed account of children's recommendations and priorities for improving the physical environment of their community. Bartlett emphasizes the need for designated places and spaces for children, suggesting the identification of areas with insufficient recreational space relative to the population, and highlights the importance of providing resources that cater to both boys and girls. Moreover, she emphasizes the importance of children's participation, recommending that children be consulted about the location and development of community infrastructure like pedestrian crossings and be involved in identifying and securing spaces for play. In her later works, Bartlett also emphasizes that conflicts and violence involving children, as well as responses to them, should inherently include aspects of the physical design and maintenance of spaces (Bartlett, 2017).

Looking at the spatial research and design practice onwards, the focus on children's well-being within the sustainable development of cities has predominantly been in relation to health and education. Children's spatial needs are often viewed through the duality of play and independent mobility, such as roaming around, versus attending school and obtaining an education (Barton, 2009). In a CFC-themed issue of *Cities & Health*, the editors criticize this narrow viewpoint (Brown et al., 2019, p. 1). The editors highlight, regarding child-friendly practice, the already rich portfolio of implemented examples, yet they come also to the

conclusion that "children's rights-based approaches have had little strategic influence on the built form of cities to date" (Brown et al., 2019, p. 4).

A recent literature review by spatial researchers (Cordero-Vinueza et al., 2023) also addresses the creation of CFCs, this time identifying the link to socio-spatial urban planning and making reference to children's well-being as defined by Woolcock and Steele (2008). In conclusion, they also identify an implementation gap and a research gap regarding "why child-friendly city approaches are not yet influencing urban environments" (Cordero-Vinueza et al., 2023, p. 11). Moreover, based on the current state of knowledge and practice concerning subjective well-being in general—not specifically for children—Mouratidis develops potential pathways and strategies on how well-being could be explicitly improved through urban planning. He is among the few to mention the benefits of access to ICT for subjective well-being (Mouratidis, 2021).

Well-being as an overall concept gained more attention in parallel to the Covid-19 pandemic (Cellucci & Di Sivo, 2021; Mouratidis & Yiannakou, 2022; Pérez del Pulgar et al., 2020; Song et al., 2021). Despite this, Mouratidis (2021, p. 1), in his conceptual paper, concludes that "the links between the built environment and subjective well-being are not sufficiently understood." This article shall contribute to this.

3. Research Setting as a Starting Point for Children's Perspectives on Well-Being

In our research, we examined the concepts and experiences of well-being among children who visit a children's center in Berlin. We selected this center based on a previous cooperation that had established trust on both sides, as well as the vibrant urban neighborhood. Both the neighborhood setting and the children's center will be briefly introduced. To protect privacy, and because the presentation and discussion of findings do not require it, we have opted to pseudonymize and generalize locational and institutional information.

3.1. A Berliner District With Wealth and Poverty Juxtaposed

Our study is placed in a district with culturally diverse neighborhoods, featuring late 19th-century European city architecture alongside newly constructed social housing units dating back to the 1980s. During the division of Berlin (1961–1989), the district became home to many immigrants as well as a large youth and student population. The area features tree-lined streets, two large parks, and lively main streets with multicultural stores. A main plaza, a local landmark, hosts a vibrant street market and serves as a transportation hub. Despite having the two major parks that serve more than one district and can be reached within a 10 to 30-minute walk from the children's center, the provision of public green spaces within the neighborhoods is considered inadequate (Berlin.de, 2020).

The immediate neighborhoods around the children's center have approximately 20,000 residents (as of 2017) with an average age of 38.4 years, which is the average across Berlin. Within the district's population, 46% have a migrant background, with 35% originating from countries within Europe, with 22% specifically tracing their roots to Turkey (Berlin.de, 2020). The neighborhood exhibits socio-economic diversity, with wealth and poverty juxtaposed in close proximity, reflected in a mix of nicely renovated and repair-needing 19th-century housing stock, alongside social housing infill settlements. The social housing stock is of good design quality in terms of architecture and floor plans. This socio-economic diversity presents both challenges and opportunities for community cohesion. The disparity is evident in the distinct average

income levels, with a social welfare receipt rate of 46.25% and an unemployment rate of 4.96% (as of 31.12.2018) in social housing, contrasting with the middle-class demographic prevalent in the older building district (Senatsverwaltung für Stadtentwicklung und Wohnen Berlin, 2020). A specific area of street blocks within the district stands out as a social hotspot, characterized by poverty and crime and gaining notoriety in national newspapers due to organized crime structures. According to social workers, the image of these street blocks acts as an educational barrier for children, perpetuating a culture of silence and stigmatization, which further exacerbates issues of deviance labeling.

Overall, the neighborhood is well equipped with primary school facilities as well as with day-care facilities and secondary schools. Within the district, there is a severe undersupply of youth recreational facilities, with two out of three facilities located in the study area. The children's center, though open to all, primarily serves children from socially disadvantaged families, as confirmed by the social workers. From their input, we also infer that most visiting children live within walking distance. Children's and youth centers in Germany are mostly public institutions and funded by the municipality, here the respective districts of Berlin. As institutions, they aim to provide children and youth with a safe and meaningful place to spend their free time, offering educational opportunities that are tailored to their needs alongside school (Reutlinger et al., 2021).

3.2. The Walk-In Children's Center and Their Children

The children's center itself is situated on a fenced plot surrounded by five to six-story block buildings along a four-lane tree-lined road with heavy traffic, including a bus line and a metro line in walking distance to the center. The building of the institution is gated by a fence with tall bushes surrounding the property, providing both privacy and noise reduction from the street. A prominent sign at the entrance indicates the facility's name and operating hours. The facility itself features open green spaces, a playground, a ball court, and a ping-pong table. Architecturally, the building integrates with these green spaces, surrounding a small, paved entrance plaza suitable for biking or skating. Movable benches and tables line the perimeter of this plaza. Inside, the small hallway of the building opens into various rooms. The largest room is a multi-purpose area with ample natural light, suitable for play, activities, and performances. The flexible design allows for easy adaptation to different needs, with stackable seating and mats. Another room serves as a space for games, reading, drawing, and crafting, complete with wooden climbing opportunities and niches for children to hide or retreat. However, observations suggest that these spaces are frequently used, in particular, during cold seasons for gaming, drawing, or playing an instrument or reading. During cold weather periods, we used this room for our game-based data collection.

Based on the walk-in atmosphere of the children's center, we worked together with children aged between four and 13 years old, reflecting the demographic spectrum served by the institution. We know by talking to the pedagogical staff, as well as to the children, that the children come from across the socioeconomic and cultural spectrum, many of them first- or second-generation migrant children. Most of the participants are growing up bilingual or trilingual. Only a small group of children have German as their only language.

4. Qualitative Research Design

The research project aims to explore how children construct well-being in urban settings and the role of out-of-school institutions. To this end, the project takes a child-centered approach: on the one hand, it follows

the premises of childhood studies and understands children as social actors and co-constructors of knowledge (Purdy & Spears, 2020). It also draws on strands of child well-being research that investigate what children themselves understand by well-being and that have reconstructed the three dimensions of agency, security, and self as important aspects of well-being from children's perspectives (Fattore et al., 2016). As there are few studies on well-being in urban settings from children's perspectives, the research is methodologically exploratory and characterized by the "temporary immersion of the researchers in the events to be studied" (Schulz, 2014, p. 225), with the aim of understanding the practices of meaning-making in the field.

We chose different ethnographic methods to allow the research to be open to different stories, experiences, and understandings of what well-being means for children and the role socio-spatial contexts play in promoting children's well-being in urban settings: participant observation (DeWalt & DeWalt, 1998), situated interviews (Clark, 2017), go-alongs (Kusenbach, 2003), and a game-based approach (Groat & Dodig, 2021), all focused on understanding from the children's perspectives where, when, with whom do they do well and do they feel good? What does this mean for them? How does it manifest itself for them? What does it depend on? The data collection was carried out between 2022 and 2023.

Explicit consent was obtained from the children (Fischer & März, in press). Consent was facilitated using child-friendly leaflets and ongoing conversations. Children were informed that they could withdraw from interviews, go-alongs, and the game at any time, and sometimes they did so if they were distracted by others or simply did not want to continue. We regularly checked with each child whether they were willing to continue. The research team had also been trained in child protection issues and had purchased supervision resources as part of the project funding in order to receive professional support during the project in the event of indications of "children at risk" (*Kindeswohlgefährdung*, a legal term of the German Civil Code) or other critical cases.

The participant observations, go-alongs, and situated interviews were conducted by a team of educational researchers, one of whom was already familiar with the setting from previous research. During the go-alongs, the children were asked to show places where they liked to be and to discuss what they valued there and what they experienced there. Data was collected through spontaneous and situational conversations between participants and researchers while walking around the neighborhood. Participant observations and go-alongs were documented with audio, field notes, and observation protocols, including maps. Audio segments were later transcribed. A total of 25 children aged eight and 12 years took part in these data collections.

The game-based approach was led by a team of urban planning scientists. The aim was to delve deeper into aspects of well-being by developing a game-based research tool as a participatory method of data collection to capture the interest of more children to participate in the research by creating a more relaxed environment as well as encouraging social interaction. As researchers, we can observe how choices are made, which priorities are set concerning when and where children feel comfortable or happy, and how they experience a sense of agency, security, and self. For our data collection, an existing spatial analysis game called "Agenten & Komplizen" (Benze et al., 2021) was adapted to our research and reinterpreted based on the data we had already collected through observations, interviews, and go-alongs, followed by coding and the formation of categories. The data used for the game set production mainly contained places, activities, and persons children mentioned as positive during interviews and go-alongs. They were transformed into a tile set used in the game, along with the option for participants to produce new tiles during the game

session. The game itself unfolds in two parts, engaging groups of children ranging from two to five participants (Figure 3). Initially, participants are tasked with creating a well-being map using either predefined tiles or new tiles. Placed on a game board (Figure 1) featuring distinct zones—Center, Middle, and Periphery—the tiles prompt participants to prioritize aspects of their well-being, fostering negotiation and reflection within the group. During this level, the children negotiate with each other about what is important to them for their well-being. In the second part of the game, participants are given the option to retain their perspective. Each child is prompted to express their views on key well-being domains—agency, security, and self—using DIN-A5 cards containing questions. Children are encouraged to answer the questions either in writing or with a drawing. In total, there were 13 game sessions played (Figure 1) with a total of 36 children participating.

In terms of data analysis, the game results were analyzed using grounded theory techniques, following an iterative process of data collection and analysis (Corbin & Strauss, 1990). This involved using the insights from the analysis carried out after each game session to inform the subsequent iteration of data collection. At first, we reconstructed seven categories based on the placement of the tiles, which were further refined through clustering of findings and validated again by insights from go-alongs and situated interviews:

- PERSON: This category encompasses individuals or groups explicitly mentioned by the participants.
- OBJECTS: Refers to items, goods, or food specifically written by participants on game cards.
- PLACES: Represents significant locations in the participants' neighborhood, identified as important by the participants themselves.
- ACTIVITIES: Involves games or sports that participants expressed enjoying.
- RELIGION: Encompasses religious concepts explicitly mentioned by the participants.
- DIGITAL MEDIA: Involves digitized activities and content that participants brought into the conversation.
- NATURE: Encompasses urban landscapes, as well as flora and fauna identified by the participants.

Secondly, the categories were used in a graphical analysis via diagrams and relational maps (Copeland & Agosto, 2012) and in synthesizing findings in multi-scalar mappings (Pelger et al., 2021) of children's

Figure 1. Photo documentation showing the end result of 13 game sessions. The game board itself was a poster indicating a playing field of well-being, where tiles could be placed. Source: Authors, WIKK*I.

well-being. Importantly, the diagrams and relational maps also illustrate the dynamics of play. It depicts a shift in content importance during the game, with certain elements moving from the center, signifying high importance, to the outer circle, indicating comparatively lower significance (Figure 2).

Thirdly, a joint data session was carried out as a form of triangulation (Krüger & Pfaff, 2008) with the educational scientists who had focused on participant observation and individual interviews. The educational scientist took the results of the graphical analyses—particularly the categories of persons, objects, places, activities, digital media, and nature—and identified and analyzed sequences in their data where children talked about the meaning of these categories in more detail: How do they construct particular persons, objects, places, activities, digital media, and nature as relevant to experiences of agency, security, and self? The findings presented below are the result of triangulation and are illustrated with material from both the game and the interviews, as well as participant observation.

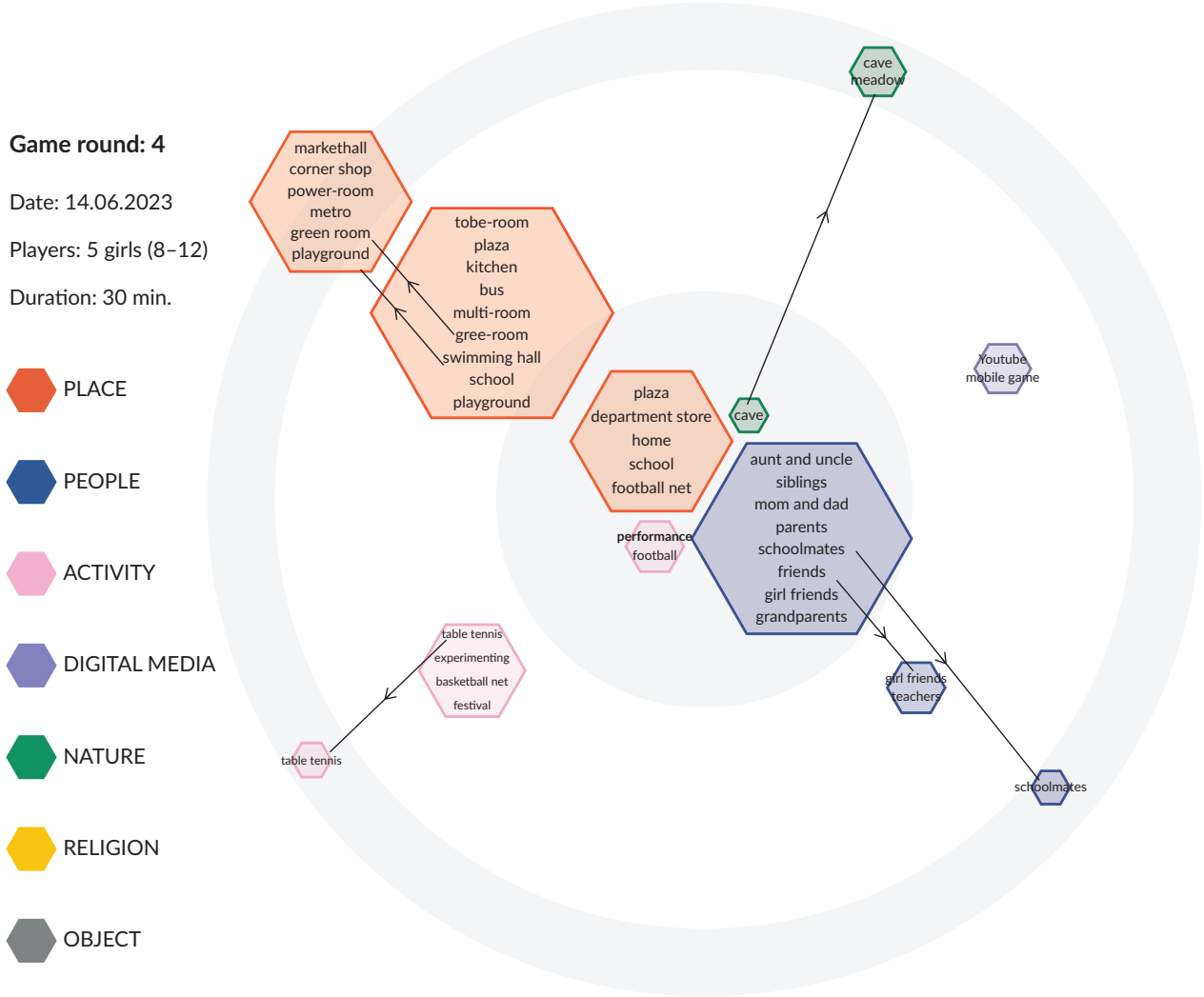

Figure 2. An analytical diagram and relational map of one game session. In this specific example, elements deemed less important were moved to the outer playing field, while overall persons and activities dominated the center stage, emphasizing their significance in the participants' well-being. Source: Authors, WIKK*I.

5. Findings: Children's Prioritization of Elements That Influence Their Well-Being

5.1. Unveiling Significance in Children's Well-Being

Figure 3 shows a collage of tiles that dominated the center of the playing field, aimed at identifying those underscored as particularly significant by participants. Notably, tiles associated with "PERSONS," "PLACES," and "RELIGION" emerged prominently in this central space, suggesting a consensus among participants regarding the importance of these elements. Throughout all game sessions, participants tended to place tiles from these categories in the center early on, signifying their immediate significance to well-being. Tiles residing in the transitional area between "particularly significant" and "not very significant" provided insights into elements that held a nuanced level of importance. "PLACES" and "NATURE" often occupied the middle ground, reflecting varying participant views on their importance to well-being. Examining the tiles along the outer edge of the playing field, labeled as "less significant," revealed patterns related to elements participants deemed less crucial or at times even unpleasant. Interestingly, "PLACES" once again dominated this outer space, suggesting that certain aspects within this category were consistently perceived as less significant or potentially undesirable by the participants.

Part of the graphical analysis also involved the analysis of dynamic Shifts and temporal patterns as they surfaced during the game sessions, particularly regarding the categories of "DIGITAL MEDIA" and "PLACES." While tiles from these categories were frequently emphasized as significant by participants at the outset of the game session, they experienced a shift in perception over time. Subsequent phases of the game sessions saw a re-evaluation, with participants categorizing these elements as "not very significant."

5.2. Family Matters: Transnational Family Ties and Religious Practices

Looking in more detail at the game results and across the various elements discussed and placed as tiles on the well-being game board, family emerged as a central theme (see also Figure 2). As the tiles indicate, the children emphasized the importance of their immediate family members, including not only parents and

Figure 3. Collage of all tiles that reached the center ring of the game board, sometimes named more than once. Source: Authors, WIKK*I.

siblings but also underscoring the significant role of a wider family in their well-being, which include grandparents, aunts, uncles, and cousins. These findings align with participant observations and interview data from the educational researchers. During the go-alongs, the children pointed out how they often roam the neighborhood with siblings or shared insights into their lives, revealing that one or two key family members serve as their primary anchors of safety and security. There are also several individual stories indicating how family structures extend beyond geographical and national boundaries, where family members might live in different countries but still share a strong familial network. It examines how these families operate across borders, influencing their identity, belonging, and social practices. It can also influence how children render certain spaces in the neighborhood, which were also declared important for their well-being during the game. One example is a central plaza that has a city district-wide importance due to its history and a major department store and mobility hub located at and under the plaza. The plaza itself is also a marketplace. One boy in a go-along explained how it reminded him of bazaar markets in his family's foreign hometown.

Closely connected to the importance of family in children's well-being, the role of religion appeared in the game sessions on children's well-being. In our research, tiles inscribed with religious terms such as "Allah" or "Gott" (spelled by one child as "got") were notably added by the children, underscoring the significance of religious practices and at times corresponding places (Figure 3). Although these religious elements were not crucial for all participants—there were game sessions where religion was not mentioned—they held particular importance for a subset, and more so among boys. Tiles related to "religion" were often placed at the center of the game board, signaling their central role in the children's lives. This observation aligns with findings from ethnographic studies where activities such as praying, attending mosque, and participating in religious festivals like the Festival of Breaking the Fast and Ramadan, including the fasting itself, emerged as integral to the respective children's narratives and identity formation. Additionally, religious practices act as a catalyst for family and community gatherings, strengthening bonds within and across families and communities. These shared activities are vital for some children, significantly affecting their sense of identity and belonging. Through these religious engagements, children find personal significance and connect with their community, highlighting the profound influence of religion on the social worlds of some children.

5.3. Children's Center as a Hub of Well-Being

Depicting the elements centrally placed by the children during the well-being discussion, the diagrammatic analysis revealed a large number and variety of tiles within different categories related to the children's center (Figure 4). It is essential to recognize the assortment of micro-places highlighted, suggesting that the children's center provides diverse micro-places of well-being, including the "Green Salon," the "Power-room," the "Workshop," and the "Kitchen." These indoor spaces feature elements like mirror cabinets and stages. Outdoor areas featuring objects such as climbing frames and soccer goals were also highlighted. Additionally, individuals like social pedagogues and various natural elements on site were acknowledged. The range and volume of aspects relating to the Children's Center stand out as significant findings within the game results.

Our analysis of the institution's environment revealed a variety of structural moments and spatial arrangements that collectively contribute to creating positive experiences. At the center of this environment are flexible educational and play opportunities as well as a flexible schedule that allows children to decide for themselves when and in which activities they participate. During the participant observations, we could

witness how the power room was a place of noisy and indeed powerful chaotic play allowing for extensive activity. In addition, the voluntary nature of participation and the diverse age structure, welcoming pupils of different ages, and having a children's parliament, also contribute to the dynamic nature of the facility and moments of agency, empowerment, and participation. In the interviews of phase 1, it was also highlighted how educators are seen as long-term reference persons. Overall, the children's center indeed creates a dense place of well-being for the children.

In this study, several children also identified school as a crucial component of their well-being, citing the importance of schoolmates, friends, and occasionally teachers (Figure 4). However, no specific micro-spaces within the school were highlighted during the game sessions. The participant observations, interviews, and go-alongs also did not reveal significant insights into micro-places of well-being at school either, but

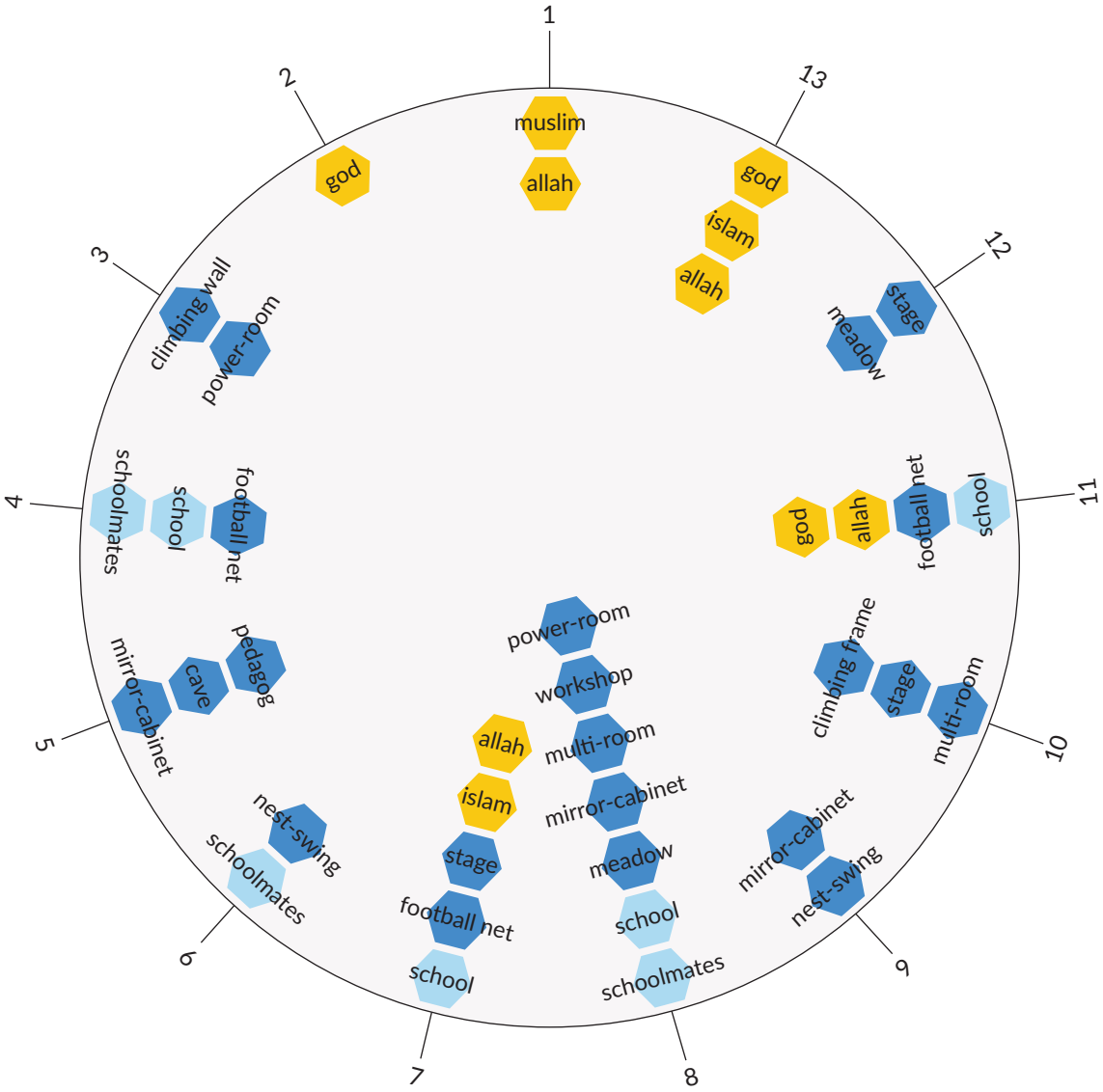

Figure 4. The analytical diagram displays all game sessions, highlighting tiles that belong to the category of religion (yellow) and elements related to the children's center (dark blue) and school (light blue). Source: Authors, WIKK*I.

some children describe the school environment as a safe place due to its enclosed gates. Additionally, one girl discussed the development of personal agency and empowerment, taking pride in personal accomplishments and the recognition by her family. Our observations include other positive remarks often tied to academic achievements or affirmations from teachers (WIKK*I field note 21). Nevertheless, one concerning incident involved a girl who reported being assaulted by a boy; she defended herself but reported that she was subsequently punished by a teacher (WIKK*I field note 18). Regarding well-being, school is multifaceted, offering both support and obstacles to the participating children. While it provides a sense of security and opportunities for some who can develop personal agency and recognition, it can also be a place where challenges such as inconsistent support and punitive responses to conflict may undermine the well-being of children.

5.4. Networking Places of Well-Being—Local and Translocal

During the game session, children identified a diverse range of places within the city quarter as important, spanning multiple neighborhoods, and, if not in walking distance, often connected by major underground lines. These places include the previously mentioned central plaza and its department store, parks, several playgrounds, a kiosk, a market hall, and spots for getting pizza or their favorite bubble tea—places they visit either independently or with siblings, family members, or friends (Figure 5).

In addition to these varied places, the children also showed considerable interest in digital content and activities, deeming them important for their well-being. In the game session, aspects such as consuming YouTube content, themes, games, and special discourses were frequently mentioned and observed in ethnographic studies of Phase 1 as a cultural code among children and peers. This is consistent with the findings from participant observations, which identified interest and knowledge of digital games and media as a cultural code among children and peers. In comparison to other categories, the tiles representing YouTube or other digital media were more frequently relocated from their initial central position on the board to a peripheral or less prominent area. We could observe how the children used their spatial knowledge of the neighborhood to offset limited access to the internet, a prerequisite for their digital activities. To illustrate this, an observation from an educational scientist can be cited here:

> A researcher is sitting at a table in the Center with three children, playing Rummikub [a game]. Two other children are also in the room. After a few minutes, these other two join me at the table. 'Can you do Internet?' Lila asks me. Instead of explaining the problem in more detail, she holds the tablet out to me so that I can take a look at the display and then she quickly and routinely navigates to the Wifi settings, where she taps on the line for the password. I notice out loud that the password is missing. Lila nods. Since I don't have it either, I refer her to Tom, the social worker. Promptly, both leave the room to look for Tom. After about 15 minutes, the two return and stop in the doorway. Lila already has her jacket on, Mary is buttoning hers as she casually says, 'We're going to the subway station for internet.' I ask with interest, while the Rummikub game is still going on, why they would need internet so badly. Excitedly, Mary tells me that they're going to download a 'really good' game that she's 'all over.' I ask if anyone else is coming along. They both grin conspiratorially at each other, then Lila denies it and announces they're both going alone. (2023_02_01_BP19_B_ Z. 18–30, LF)

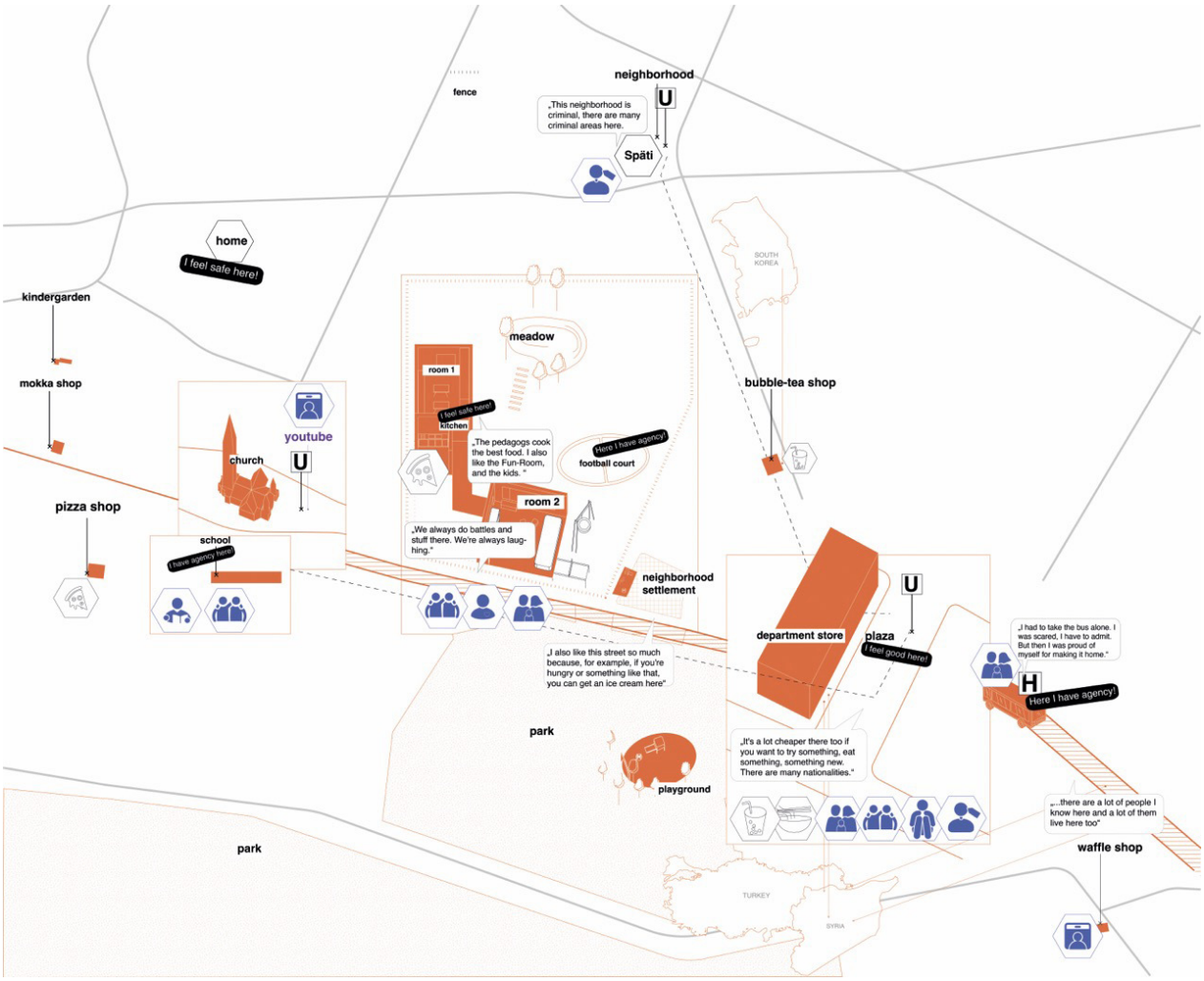

Figure 5. Multi-scalar and synthesizing map of collective well-being aspects children made central in the interviews, go-alongs, and game. Source: Authors, WIKK*I.

Transnational spatial linkages are also made in reference to local places that create well-being while recognizing global conflicts. This can be illustrated by one go-along, where three boys who have known each other for years and grown up together in the same neighborhood led us through their area. They introduced us to the market plaza, which reminded them of markets in their family's countries of origin—as mentioned before—and highlighted the diversity of languages used by the market vendors to advertise their goods. They pointed out other significant places in their neighborhood, including lively streets, restaurants, and bakeries. On a busy and important street in the neighborhood, they showed us a store window of an empty store that featured posters and stickers in Arabic writing about political conflicts in the Middle East. These insights reveal the profound ways in which the everyday environment, digital interfaces, and global issues interconnect in the everyday lives of children, shaping their well-being.

6. Discussion and Conclusion: Enhancing a Socio-Spatial Context of Well-Being

Going back to the dimensions of children's well-being and the physical environment, our findings underscore the critical role that socio-space plays. Summarizing key findings in a multi-scalar map (Figure 5), the children's

center is depicted as a pivotal location where children's well-being is particularly nurtured. Through play and the development of decision-making competence and self-awareness, children learn to choose activities they want to participate in or even decide to leave the site to engage with the broader local community. Children associate safety with familiar and secure places and individuals, such as enclosed children's centers, school gates, or family members who provide emotional and physical security. However, the ambivalent experiences some children have in these settings, particularly in schools where supportive and punitive elements coexist, highlight the complexity of these environments, much like Bagattini (2019) and Fegter and Fattore (2024) stress. The study aligns here with existing research on the dimensions of children's well-being (Fattore et al., 2016), particularly concerning self-esteem, agency, and safety and security. It provides further insights as it shows how children place significant importance on family and social interactions, but also on religious practices and places like a nearby mosque, which are integral to their identity. Especially these religious aspects of life and their spatial embeddedness in the urban environment, often related to family activities, have not been widely discussed in the existing research as an important part of children's well-being.

As spaces that offer children a sense of welcome, belonging, and support, the case study highlights the role of translocal family ties and practices that also shape environmental perceptions and bring forward places where cultural identity or religious activities can be practiced or felt. This includes religious places, but also culturally themed playgrounds or the mentioned central plaza with a market, creating an atmosphere that reflects their cultural identities. These ties provide continuity and belonging, demonstrating how global migration influences children's social worlds and sense of identity (Fattore et al., 2021b; UNICEF, 2021). Urban planning, design, and architecture should cater to these needs by securing and thoughtfully designing such places.

Compared to earlier projects like GUIC II and Bartlett (2005), our findings reaffirm the importance of safe environments while offering new insights into specific locations like children's centers and the role of digital and religious practices. Concerning this digital part of children's everyday life, the findings resonate with Barton's (2009) discussion of the duality of play and independent mobility in urban spaces while underscoring today's importance of environments that support not only physical but also digital autonomy. In the context of our study, digital autonomy refers to children's ability to independently access and use digital resources, such as the Internet, to fulfill their needs and desires. This autonomy is exemplified by their efforts to find and utilize free internet access in public spaces, like subway stations, to download games or engage in online activities. However, there are conflicting views regarding digital access for children, as psychological and developmental studies have shown that excessive internet use can have detrimental effects on their well-being. Thus, while digital autonomy provides children with valuable opportunities for learning and independence, it is important to strike a balance, ensuring that their online engagement promotes well-being without the negative effects of excessive internet use.

The findings contribute to the ongoing effort to disentangle the physical environment from social and political factors within a community setting, as highlighted by Woolcock and Steele (2008), showing that the built environment has a direct and evolving impact on children's ability to experience well-being, and efforts need to be made to shape the materiality of the built environment and the form of cities. The case study also presents learning opportunities on how to create hubs of well-being, such as the children's center, in a neighborhood facing challenges like socioeconomic disparities, lack of green spaces, and stigmatization of economically disadvantaged children. In such an environment, it is crucial to provide dedicated spaces for children that offer them the choice to visit freely, rather than confining or restricting their movement.

An under-discussed lesson in CFCs and well-being discourses is the importance of micro-places—small, intimate spaces, objects, and natural elements within broader urban settings—that foster children's well-being (Ramioul et.al., 2020). While micro-spaces are concentrated at the children's center in our case, they illustrate that, also within the broader neighborhood, the understanding and designing or securing micro-spaces is crucial for children's well-being. It could be valuable for planners and designers to adopt a socio-spatial approach in their work by integrating social work principles of openness (Reutlinger, 2022; Reutlinger et al., 2021) into urban design, as well as shifting the focus from an emphasis on learning (Pietsch & Müller, 2015) to incorporating broader aspects of well-being.

From our case study, it is evident that planning, design, and architectural strategies aimed at improving children's well-being should emphasize multi-scalar aspects. This includes scaling down beyond neighborhoods to include objects, individual natural elements, and the interior design of buildings that cater to children's needs. The participating children's center we studied highlights the importance of flexible interior spaces that accommodate personalization, varying noise levels, and shared activities like cooking. Additionally, strategies for enhancing children's well-being in built environments should expand upon the current set of initiatives (e.g., as discussed by Brown et al., 2019; Chawla, 2002; Mouratidis, 2021):

- Social infrastructure designed to serve children's needs, both indoors and outdoors, fostering movement and autonomy.
- Creating and/or securing places with translocal identity to reflect the cultural diversity of the children.
- Enhancing geographic accessibility and connectivity to places of well-being, including ICT access.

The study also illustrates the benefits of a multi-method approach with child-centric research methodologies, such as gaming, in well-being research. We also acknowledge the limitations inherent in working with a group of children who voluntarily attend the children's center, as they may not represent the views of all children. Additionally, since the children's center was the primary setting for the gaming approach, though not the only setting for data collection, it may have influenced the center's prominence in the findings. Therefore, further research exploring other institutional settings regarding the socio-spatial aspects of well-being is needed.

Given the complex interplay between the socio-spatial context and child well-being, especially in the context of increased migration and digitalization as noted also by Fattore et al. (2021b), future research should expand on how these factors could be integrated into planning, design, and architecture. For planning and design processes to enhance well-being, a shift towards securing children's perspectives in planning processes is even more necessary. The logic of children's well-being and the socio-spatial aspects that matter to them can only be fully understood with the children's involvement, asking for expanding times and opportunities to co-design and co-plan the built environment.

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Conflict of Interests

The authors declare no conflict of interests.

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Children's Perspectives of Neighbourhood Spaces: Gender-Based Insights From Participatory Mapping and GIS Analysis

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Abstract

Although several urban design and planning features, such as community spaces, green infrastructure, and traffic measures that prioritise pedestrians and children, have been identified as important characteristics of child-friendly cities and neighbourhoods, there remains a gap in our understanding regarding the specific elements of children's daily environments that influence their experiences. This study focuses on the everyday activity spaces of children (aged 9–12) living in physically and socially diverse neighbourhoods of low-to-average income in Ankara, Turkey. Drawing on findings from thematic and qualitative GIS-based analyses of 40 participatory map-based focus groups with 217 children, this study aims to understand how neighbourhood design influences children's everyday experiences across different neighbourhood types and genders. By visualising children's perceptions of their neighbourhoods and activity spaces, and thematically analysing their comments related to neighbourhood design features that may facilitate positive and negative experiences, this child-centred study contributes to the limited research on children's experiences of place. Our findings revealed key neighbourhood design features influencing children's experiences and highlighted gender-based differences. While natural settings were valued across settings and genders, boys reported more physical activities in open spaces while girls more frequently emphasised the need for accessible playgrounds and natural settings. Children in urban neighbourhoods frequented streets, parks, and local shops more often, while those in suburban and sprawling areas preferred amenities near their homes. The study demonstrates that children's positive everyday experiences can be supported by modifying the neighbourhood design, providing valuable insights for practitioners and policymakers on developing more child-friendly neighbourhoods.

Keywords
child-friendly neighbourhoods; children's activity spaces; children's place experiences; gender

1. Introduction

In the context of global urbanisation, more children are being born and raised in urban environments each year, with 70% of children and youth projected to live in cities by 2050 (UNICEF, 2022). The structure of urban forms can significantly influence children's health and lifestyles (World Health Organization, 2020). Various urban design and planning practices, such as creating community spaces, green infrastructure, and traffic measures that prioritise pedestrians and children, have been recognised as essential components of child-friendly cities and neighbourhoods. According to the United Nations International Children's Emergency Fund, a child-friendly city enables children to "live in a safe, secure and clean environment with access to green spaces, participate in community and social life, meet friends and have places to play and enjoy themselves" (UNICEF, 2018, p. 10). However, a comprehensive understanding of neighbourhood design characteristics that support child-friendly environments and provide opportunities for children to meet their physical and social needs, promoting health and well-being, remains lacking. This is due, in part, to a lack of understanding of children's experiences and perceptions of their environments, as most available material is adult-centric. Children's perceptions and use of their neighbourhood's built environment may differ significantly from those of their parents. Given that urban contexts in which children live, learn, and play can offer significant health benefits, understanding their experiences could provide an additional perspective to the existing knowledge regarding environmental barriers to and enablers of children's use of these spaces.

Scholars, including McAllister (2008), have long argued that creating child-friendly environments requires urban planners and designers to understand the factors influencing children's experiences of place. However, evidence on specific neighbourhood design features—particularly those related to their everyday activity spaces—that can encourage children to actively engage with the outdoor environment remains limited (Kyttä et al., 2012). Recent decades have seen an increase in research aimed at understanding the characteristics of children's everyday activity places where children spend their daily lives, to develop policies that support child-friendly neighbourhoods (Chawla, 2002; Manouchehri et al., 2021; Tayefi Nasrabadi et al., 2021). However, most of our understanding of children's experiences, primarily based on Western studies, fails to encompass diverse geographical settings (Malone & Rudner, 2017). Likewise, whilst research on how gender and location influence these experiences is increasing (Morrow, 2006; Porter et al., 2021; Reimers et al., 2018; Valentine, 1997), significant gaps still persist in developing countries (Severcan, 2023). Furthermore, the lack of child-centric research and insufficient child participation in urban planning hinder the development of child-friendly cities worldwide, with these challenges being particularly prominent in developing and underdeveloped nations (Derr & Kovács, 2017; Severcan, 2015).

In addressing these research gaps, this study adopts a participatory, child-centred approach to exploring the daily activity spaces of 9–12-year-olds across diverse urban and gender groups in Ankara, Turkey—a city in the developing world. Grounded on the premise that gender may shape experiences within different neighbourhood contexts, the study focuses on how children's positive and negative experiences vary by neighbourhood characteristics and gender, and how these experiences relate to specific neighbourhood design features.

The remainder of this article is divided into four main sections: an overview of the theoretical background and research gaps (Section 2), the study design and methodology (Section 3), detailed findings contextualised within existing literature (Section 4), and a conclusion (Section 5) summarising key findings, limitations, and implications for policy and practice.

2. Theoretical Background

Individuals' interactions with their local outdoor environments are based on multiple factors, often conceptualised within socio-ecological models (e.g., Sallis & Owen, 2015). In these models, the individual, social, and physical environments are regarded as key factors for driving behaviours, which in turn affect individuals' place experiences (Derr, 2002; Moore & Young, 1978). While extensive research highlights the built environment's role in motivating children to explore and engage with their surroundings (Veitch et al., 2006; Zhao et al., 2023), existing evidence regarding the role of specific neighbourhood design features in children's place perception and use remains indeterminate.

Previous research has revealed that neighbourhood environmental aspects influence how children experience and behave in them (Bao et al., 2021; Castonguay & Jutras, 2009; Hart, 1979). Objective urban form features that have been shown to promote outdoor physical activity within neighbourhoods include higher residential density, diverse land-use, well-connected street network, and neighbourhood greenness (Panter et al., 2008; Tilt et al., 2007). Some studies have concluded that safe, densely built neighbourhoods enhanced by accessible green spaces facilitate outdoor activities that promote child health, well-being, and development (Kyttä et al., 2012; Li & Seymour, 2019). Many studies have examined street-design features associated with children's neighbourhood physical activity and place perception and use, underscoring safety as an important feature that supports children's interactions with their local environments (Carroll et al., 2015; Castonguay & Jutras, 2009). Aarts et al. (2012), for instance, found a correlation between children's outdoor play in the Netherlands and traffic safety, as measured by the presence of pedestrian crossings, traffic lights, and speed bumps. More social opportunities, such as playing with friends and interacting with neighbours, have also been identified as important factors influencing children's outdoor play (Witten & Ivory, 2018). Safe and accessible routes to local destinations are associated with increased independent mobility (Villanueva et al., 2013), while areas with physical features associated with danger and antisocial behaviour, such as graffiti, litter, and poor lighting, negatively affect children's place use (Loukaitou-Sideris, 2003).

Despite considerable evidence on the role of neighbourhood design in children's physical activity and socialisation, a significant gap remains in understanding the specific elements of children's daily environments that influence their experiences, especially in developing countries (Severcan, 2023). This gap can be attributed in part to a lack of local researchers with expertise in child-focused participatory research (Driskell et al., 2001) and the limited number of studies exploring children's place experiences from an urban design perspective (Çakırer Özservet, 2015). Additionally, the complexity of factors influencing children's place experiences contributes to this gap, as research findings often vary across different contexts due to various factors including gender and place of residence.

Child-centred research methods prioritise children's active participation in the research process and are designed to accommodate their abilities, fostering inclusivity, rapport, trust, and confidence, unlike traditional methods like questionnaires (Barker & Weller, 2003). Scholars like Derr and Kovács (2017)

emphasise the importance of directly engaging children through methods such as group or individual interviews (Egli et al., 2019) and participatory mapping (Wilson et al., 2019) to better understand why children frequent specific urban settings. In his guide on participatory methods for children, including tools like guided tours and focus groups, Driskell (2002) highlights the multiple benefits of these methods, including listening to others, respecting diverse opinions, finding common ground, and fostering critical thinking, evaluation, and reflection, all while becoming more aware of their environments.

Additionally, there is limited focus in the literature on how gender influences children's use of places (Morrow, 2006). While findings vary due to differences in parenting culture, safety concerns, and the availability of child-friendly facilities, the literature suggests that girls (especially those in inner-city neighbourhoods) often spend more time in residential settings than boys (Severcan, 2023). This is attributed to expectations to assist with domestic tasks and perceptions of vulnerability (Morrow, 2006; Valentine, 1997). Typically, girls aged 9–12 use nearby spaces like home yards and parks, while boys frequent farther recreational areas like playgrounds and basketball courts (Matthews, 2003; Tezel, 2011). Studies show that boys aged 9–12 typically access a wider range of land-uses and activity spaces than girls, due to their greater independence (Hart, 1979; Porter et al., 2021). However, when allowed to explore their environments, girls often prefer spending more time in commercial places than boys (Wridt, 2004). Scholars such as Moore and Young (1978), van Vliet (1981), and Severcan (2023) have demonstrated that the place experiences of suburban and inner-city boys and girls can differ due to the opportunities and constraints of their respective contexts (such as the diversity of land-uses available).

Our understanding of what boys and girls tend to like or dislike, or what they prefer to do or avoid in their everyday places across different neighbourhood contexts, is even more limited. In her study conducted in Metropolitan Los Angeles, USA, Loukaitou-Sideris (2003) found that boys and girls in this age group share a similar preference for nature-like elements (such as greenery, trees, and flowers) in public open spaces. Contrary to studies indicating significant differences between the activities of boys and girls in public spaces (Furlong & Cartmel, 1997), Loukaitou-Sideris and Stieglitz (2002) found no significant differences in the levels of participation in sports, biking, and active recreation among 9–12-year-old boys and girls in Los Angeles parks. However, Porter et al. (2021) discovered that girls were significantly more likely than boys to mention concerns related to security and safety, specifically the presence of dangerous people in public spaces, whereas boys more frequently identified traffic, unsafe junctions, and polluted or unmaintained environments as disliked aspects of their neighbourhoods.

Drawing upon a socio-ecological framework and data from participatory map-based focus groups with children, this study addresses the above-mentioned research gaps by mapping the spatial distribution of children's activity spaces and thematically discussing how specific neighbourhood design features influence children's experiences in various urban settings within a Turkish context. The primary objectives are to (a) identify children's experiences within their activity spaces across different neighbourhood types and genders, and (b) explore how these experiences relate to specific design features of the neighbourhoods.

3. Datasets and Methods

To meet the above-listed objectives, this study used a cross-sectional, mixed-methods design including field surveys, thematic analysis, and qualitative GIS analysis. To capture children's actual neighbourhood experiences, the study design adopted child-centred participatory methodologies.

3.1. Study Area

This study was conducted in a city in a developing country: Ankara, Turkey, and its selected neighbourhoods. The city is the second largest in Turkey with a population of approximately 5.6 million, over 1 million of which are school-year-aged children aged 6–18 (Turkish Statistical Institute, 2023). We employed the transect planning model developed by Duany and Talen (2002) to classify the rural-to-urban transect into different zones based on characteristics of urban form, including street network layout, building density, land-use mix, retail density, and neighbourhood greenness. We then selected four neighbourhood types: urban core, general urban, planned suburb, and urban sprawl (Figure 1). The lack of up-to-date land-use or building density data at the building, parcel, or block level in Ankara limited our capacity to objectively categorise and randomly select neighbourhoods by urban form attributes.

The urban core neighbourhood is characterised by moderate street connectivity and retail density with several large-scale urban parks. The general urban neighbourhood features a higher land-use diversity and street connectivity, yet also a scarcity of green spaces. The planned suburban neighbourhood, featuring a mix of high-rise gated communities and low-rise houses with yards, has low street connectivity and retail density centralised at its centre. Public green open spaces are primarily found within gated communities, with a few small neighbourhood parks. Conversely, the unplanned urban sprawl neighbourhood features more green spaces, primarily within gated communities, and higher street connectivity than the suburban area but has lower building density with predominantly low-rise multi-family and high-rise residential buildings. All neighbourhoods were selected from low (US$0–550) to medium-low (US$550–800) income levels based on data reported by Uğurlar and Eceral (2014) to control for the effect of income on children's place experiences.

Figure 1. Case study neighbourhoods in Ankara, Turkey.

3.2. Sampling and Instrumentation

This study focused on children aged 9 to 12, a group that is beginning to travel to school independently and is capable of reporting their perspectives on neighbourhood environments (Li & Seymour, 2019). Five public schools were selected from these neighbourhoods, and three to five classes from the targeted age group (3rd- to 6th-graders) were invited to participate in the study based on their availability, as determined by school administrators. A total of 217 children, who provided the necessary consent/assent, participated in the map-based focus group activity. Children were asked to locate their homes on a pre-specified large-format satellite map, which covered a 1-km radius around their schools. They were then instructed to mark the streets they used for travelling to/from school, pinpoint places they frequently used, liked, or disliked using coloured stickers, and discuss the reasons for their preferences and dislikes. Moderators used smartphones to verify, and if necessary, correct children's reported locations. Researchers only assisted students who had difficulty orienting themselves, directing them to their schools on the map. This approach minimised any researcher bias and power imbalance between researchers and participants. A total of 40 focus groups were conducted, each consisting of four to seven children and lasting approximately 1.5 hours. These sessions produced two thematic maps per group: one depicting the places children frequented and liked, and another showing the places they disliked. All activities were conducted within the children's schools during the school days. The focus group discussions were audio-recorded, and moderators took notes simultaneously. Finally, children's homes and their activity spaces were geo-coded into ArcGIS and categorised as positive/liked and negative/disliked, with explanations for why they liked/disliked these activity spaces. Of the total children, 53 were from the urban core (62% girls), 55 from the general urban (54% girls), 48 from the urban sprawl (50% girls), and 61 were from the planned suburb (44% girls). All focus group participants (n = 217) indicated that their homes were located within a 1-km radius of their schools.

3.3. Measuring Neighbourhood Design

Due to the lack of recent GIS data providing accurate information on the urban form characteristics of children's neighbourhoods—particularly regarding land-use mix, building density, and neighbourhood greenness—local government datasets were updated for areas within a 1-km radius around children's schools. This update, aligned with the map boundary areas provided to children during focus groups, was achieved through field surveys and manual analysis of the latest aerial photographs following neighbourhood selection. The limited number of researchers and time constraints prevented the authors from updating larger map areas. The 1-km threshold distance was selected based on findings from earlier studies on children's walking behaviour to school (e.g., Yelavich et al., 2008), and the requirement in Turkey that children enrol in public schools close to their registered home address. All data were collected at the finest-resolution spatial units (i.e., land-use variables were measured at the building-level while street connectivity was measured at the segment-level). The urban form characteristics of children's neighbourhood environments (defined as 400-metre radial buffers around homes located within 1 km of the school) were evaluated through four GIS-based objective measures: land-use mix, urban density, street connectivity, and neighbourhood greenness. The 400-metre buffer distance was selected in line with previous studies that defined children's immediate neighbourhood environments (or home environments; Loebach & Gilliland, 2016; McMillan, 2007). Building density was calculated by dividing the total built-up area by the buffer area. Land-use mix at the building-level was computed using the entropy index, where 1 represents a perfectly mixed-use environment (Frank et al., 2004), across eight categories: residential,

mixed-use residential, mixed-use non-residential, commercial, educational, cultural, institutional, and other. Retail density was determined by dividing the ground floor retail area by the total land-use area within the buffers. Street connectivity was assessed using the syntactic "global angular integration," which measures how accessible each street is within the system (Yamu et al., 2021). A neighbourhood greenness index was derived from Landsat 8 satellite sensor data, with numbers closer to 1 indicating increased greenness (Shankhwar et al., 2021). Neighbourhood urban form (i.e., averages of objective measures) varied significantly by neighbourhood type (see Ozbil Torun et al., 2022).

In addition, detailed field observations using Google Street View and site visits were conducted prior to the focus group activity to document street-level design characteristics (e.g., vehicular versus pedestrianised streets, traffic crossings, and sidewalk availability) of children's neighbourhoods. The moderators utilised these data to double-check the accuracy of the children's responses during the focus groups, asking them additional questions where necessary to reduce recall bias.

3.4. Analysing the Data

To meet our aim of spatially investigating children's everyday experiences, children's comments on their activity spaces and related neighbourhood design features were transcribed and thematically analysed. Participants' comments were imported as open-ended responses into MAXQDA and coded into categories under the main themes of "positive" and "negative," with the gender and home neighbourhood of children who mentioned them noted. The thematic analysis was both deductive, using themes previously documented in the literature, and inductive, with themes emerging from children's responses. The codes were then visualised in charts, organised by frequency, to examine potential associations between themes and neighbourhood types, as well as between themes and genders. In line with our research questions and previous cross-sectional studies highlighting differences in children's neighbourhood evaluations based on gender and place context (see e.g., Moore & Young, 1978; Severcan, 2023), we presented the frequency distributions for each theme, grouped by our two explanatory variables: gender and type of neighbourhood. The analysis of a total of 1,197 responses revealed seven themes: physical activities (27%), amenities/land-uses (13%), nature (7%), quality of the built environment (19%), safety and security (23%), accessibility and mobility (4%), and social ties (7%). To gain insight into the spatiality of children's place perceptions of their neighbourhood environments, children's activity spaces linked with their positive and negative experiences were then mapped using ArcMap, and the Kernel Density tool was used to depict these emerging geo-spatial locations. These geovisualizations contextualised children's everyday experiences by revealing significant hot-spots across different neighbourhood types in relation to neighbourhood design features.

4. Results and Discussion

4.1. Children's Positive Experiences Across Neighbourhood Types and Genders

Figure 2 depicts the emerging themes and their frequencies related to children's positive experiences across neighbourhood types and gender groups along with selected children's comments. Overall, the two most often highlighted themes were related to physical activities, and amenities/land-uses across all neighbourhoods, while responses concerning safety and security, as well as access and mobility, were

comparatively limited. Thematic analysis of focus groups revealed notable gender differences in community space experiences, with boys mentioning physical activities more frequently (58.1%) than girls (48.2%), aligning with some studies (Coakley & White, 1992; Furlong & Cartmel, 1997) but not others (Loukaitou-Sideris & Stieglitz, 2002). Conversely, girls more often discussed amenities/land-uses, quality of the built environment, and safety and security compared to boys. Themes related to nature, access and mobility, and social ties were mentioned equally by both genders, consistent with research showing no gender differences in satisfaction with nature-like elements (Loukaitou-Sideris, 2003).

Of the five sub-themes of physical activities reported by children in their liked places, playing was mentioned more often across all neighbourhoods, followed by biking/scootering/skating/skateboarding. Urban children—children living in the urban core and general urban neighbourhood—often played in parks and streets, as reported by a boy (Ç.G.) from the urban core: "First of all, I love playing games in the 50.

	Urban Core			General Urban			Planned Suburb			Urban Sprawl		
POSITIVE EXPERIENCES	**total**	**girls**	**boys**	**total**	**girls**	**boys**	**total**	**girls**	**boys**	**total**	**girls**	**boys**
Physical Activities	**213**	**111**	**102**	**165**	**77**	**88**	**154**	**76**	**78**	**92**	**58**	**34**
Walking	27	16	11	19	10	9	22	16	6	7	5	2
Doing exercise	16	10	6	5	2	3	6	1	5	2	0	2
Riding a bike/scooter/skating/skateboard	49	28	21	48	30	18	41	23	18	18	13	5
Playing	121	57	64	93	35	58	85	36	49	59	35	24
Other activities (e.g. swimming, painting)	0	0	0	0	0	0	0	0	0	6	5	1
Amenities/Land-uses	**76**	**53**	**23**	**30**	**14**	**16**	**55**	**32**	**23**	**74**	**53**	**21**
Cultural and historical places	9	6	3	0	0	0	0	0	0	0	0	0
Educational places	18	10	8	2	0	2	5	3	2	17	13	4
Commercial places	43	36	7	25	13	12	44	29	15	55	39	16
Entertainment places	4	4	3	1	0	1	0	0	0	2	1	1
Other places (e.g. health, sacred places)	2	0	2	2	1	1	6	0	6	0	0	0
Nature	**52**	**24**	**28**	**9**	**6**	**3**	**49**	**25**	**24**	**19**	**16**	**3**
Observing nature	7	2	5	0	0	0	8	3	5	0	0	0
Activities in nature	45	22	23	9	6	3	41	22	19	19	16	3
Quality of Built Environment	**21**	**20**	**1**	**7**	**4**	**3**	**2**	**2**	**0**	**2**	**2**	**0**
Clean environments	5	5	0	5	3	2	0	0	0	0	0	0
Fun places	10	10	0	1	1	0	0	0	0	0	0	0
Visually appealing places	6	5	1	1	0	1	2	2	0	2	2	0
Safety and Security	**6**	**5**	**1**	**1**	**0**	**1**	**5**	**3**	**2**	**3**	**3**	**0**
Safe environments	6	5	1	1	0	1	5	3	2	3	3	0
Access and Mobility	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Access to public transportation	1	0	1	0	0	0	0	0	0	0	0	0
Social Ties	**52**	**33**	**19**	**46**	**23**	**23**	**38**	**15**	**23**	**19**	**16**	**3**
Spending time with friends	33	23	10	29	15	14	32	14	18	12	12	0
Spending time with relatives	19	10	9	17	8	9	6	1	5	7	4	3

Urban Core Neighbourhood

"I skate on the rink of Kurtuluş Park. There is a skateboarding track over there…I have a mountain bike, we race on slopes and hills with my friends, it is very enjoyable." (E.K., boy)

"I like cycling in the neighbourhood. I cycle with me friends. I also ride a bike in the park." (D.D.Y., boy)

General Urban Neighbourhood

"First of all, I love playing games in the 50. Yıl Park. Then I play in Kartaltepe Park and on the street with my friends." (Ç.G., boy)

"There is one ice cream parlour there and also a market. I like to go there and have ice cream and food." (D.S., girl)

Planned Suburb Neighbourhood

"Sometimes we play games in the social facility…and we hang out in the [community] site." (E.S.K., girl)

"I always cycle on our site because I enjoy it and it is safe." (H.M., boy)

Urban Sprawl Neighbourhood

"Since the site is safe, we play games until midnight. We play hide and seek… We hide in the bushes." (N.N.Y., girl)

"We have a stationary shop on-site, I love shopping there." (Z.K., girl)

Figure 2. Children's positive experiences of their everyday activity spaces as thematically coded across neighbourhoods along with selected quotes. The sizes of circles and squares represent the frequency (reported in numbers), with larger ones indicating a higher number of mentions.

Yıl Park. Then I play in Kartaltepe Park and on the street with my friends." On the other hand, those living in the planned suburb and urban sprawl used home gardens or gated outdoor areas, which were deemed safer: "Sometimes we play games in the social facility…in the community space" (E.S.K., a girl from the planned suburb). Urban areas also saw children enjoying biking in their local streets and skating in neighbourhood parks. Children living in the urban core frequently walked to friends' homes, stores, schools, and other destinations. On the other hand, children living in the urban sprawl engaged in these physical activities to a notably lesser extent. A gender-focused analysis of physical activity sub-themes revealed that boys consistently reported higher engagement in playing across all neighbourhoods. While there were no consistent gender trends for these physical activities across settings, in the urban core both genders reported similar levels of participation in walking, biking/scootering/skating/skateboarding, and exercising.

Amenities/land-uses was another recurring theme. Unlike previous research findings (Hart, 1979; Wridt, 2004), access to commercial activities, such as groceries and shops, was valued by children across all neighbourhoods regardless of gender. Urban children recognised local shops, particularly around their schools and homes as well as along their school route, as a positive aspect of their everyday experiences, as highlighted by a girl (Z.E.G.) in the urban core: "There are lots of restaurants, coffee shops, and stores here. The food is great in these restaurants and the stationary stores sell colourful school supplies." On the other hand, those residing in the planned suburb and urban sprawl reported enjoying time at shopping malls and local markets within their gated communities, often with family or friends: "I buy snacks with my friends, and we hang out on the site" (A.D.A., a boy from the planned suburb); "There is a market on the community grounds, I love going there" (A.K., a girl from the urban sprawl). The school was a favoured place for socialising, playing, and having fun across the entire sample: "I have many friends here. We love to play football in the schoolyard" (B.G., a boy from the planned suburb).

Children also mentioned features of nature, including neighbourhood parks, playgrounds, and local green spaces, as their liked neighbourhood places. Since playgrounds in Ankara are typically found inside local parks, we combined playgrounds and parks. However, this theme accounted for only 11% of all responses regarding liked locations, with children from both the planned suburb and urban core where natural elements are more present most frequently citing natural elements. Spending time in parks and other open green spaces and observing plants and animals within the green areas emerged as positive aspects of children's everyday activities across all neighbourhoods, particularly among children in the urban core and planned suburb: "This is the place where I feed the animals" (A.N.A., a girl from the planned suburb); "I feel happy when I hear the singing of birds in this park" (A.A., a girl from the urban core). Except for children in the urban core, spending time in parks and other green open spaces was more frequently mentioned by girls than by boys in all neighbourhood contexts.

Comparatively, quality of the built environment and safety and security were less often mentioned themes among children's positive places/experiences, accounting for only 3% and 1% of participant responses, respectively. Children living in the urban core reported a significantly greater number of related responses (65% for the quality of the built environment and 50% for safety and security), referring positively to features like clean, enjoyable, and visually appealing locations in their neighbourhoods, as well as environmental features connected to personal safety. Boys and girls equally characterised their activity spaces as safe in all contexts.

Children from the same neighbourhood type, regardless of gender, identified similar neighbourhood design features. For example, only children in the urban core, where there is a relatively higher-quality active travel infrastructure (i.e., with a denser street network as well as a continuous sidewalk system), associated accessibility and mobility with positive experiences: "I like walking along these streets…they are entertaining. There are many shops and restaurants" (E.K., a girl from the urban core). These children appreciated "a variety of ways to access basic amenities," "quiet local streets to walk and cycle," and "streets with commercial activities," underscoring the importance of route options and street connectivity. Conversely, children from the suburban neighbourhood with fewer route options preferred using shortcuts in their daily urban navigation: "I like crossing inside this park on my journey to school. It is a shortcut and has a nice playground " (A.A., a girl from the planned suburb).

Aligning with the existing literature (Egli et al., 2019), our analyses revealed that social ties emerged as a major theme in children's positive everyday experiences. Notably, children in the general urban neighbourhood more frequently mentioned "spending time with friends/family" as a key part of their positive experiences (18%), compared to their peers in the urban sprawl (9%).

4.2. Children's Negative Experiences Across Neighbourhood Types and Genders

When negative neighbourhood experiences expressed in focus groups were thematically coded, safety and security, along with the quality of the built environment, emerged as key concerns among children of all genders (Figure 3). These two themes accounted for 45% and 35% of all responses, respectively, in terms of disliked locations/negative experiences. While there were no notable gender differences in safety concerns across contexts—contrary to Porter et al.'s (2021) findings in inner-city suburbs of Melbourne, Australia—girls were more likely than boys to cite issues with the quality of the built environment (e.g., unmaintained environments). Other themes accounted only for about 0.2%–9.0% of all responses. The most noted negative physical activity-related experiences were mainly linked to a lack of playgrounds and sports fields. Linked to this, the most prevalent sub-themes associated with nature were a lack of densely vegetated parks and green areas, especially among children living in the planned suburb and urban sprawl neighbourhoods. These children cited "the shortage of parks and trees/tree canopies" and "the presence of vacant plots as opposed to local parks and playgrounds" as negative aspects of their everyday experiences. Comments related to green spaces cited not only their scarcity but also their poor quality: "The nearby [parks] are not well-maintained" (K.K., a boy from the planned suburb); "The park has an empty and derelict space" (A.N., a girl from the planned suburb); "I wish there was extensive tree cover within these empty lots" (D.M.Y., a girl from the urban sprawl). A girl (A.Y.) from the urban core noted: "You know that empty green space next to our house, right? Well, they dump a lot of trash there, it's littered everywhere. It's supposed to be a green space, but there's always garbage." Contrasting prior studies (Matthews, 2003; Tezel, 2011), our Ankara research found that girls consistently emphasised the need for accessible playgrounds and natural settings across all neighbourhoods.

As regards safety and security, children's concerns centred on perceived traffic-related and personal safety threats. Children indicated that they felt unsafe due to "speeding cars" and "traffic infringements," and they mentioned "crossing the street" and "parked cars on sidewalks" as aspects of discomfort during their everyday activities within their neighbourhoods. Girls specifically cited unsafe streets/roads as negative experiences across neighbourhoods besides the urban core. Approximately half of the children from the planned suburb

NEGATIVE EXPERIENCES	Urban Core total	Urban Core girls	Urban Core boys	General Urban total	General Urban girls	General Urban boys	Planned Suburb total	Planned Suburb girls	Planned Suburb boys	Urban Sprawl total	Urban Sprawl girls	Urban Sprawl boys
Physical Activities	**5**	**3**	**2**	**2**	**2**	**0**	**3**	**2**	**1**	**1**	**1**	**0**
Lack of sport fields	0	0	0	0	0	0	2	1	1	0	0	0
Lack of playgrounds	5	3	2	2	2	3	1	1	0	1	1	0
Amenities/Land-uses	**12**	**7**	**5**	**22**	**10**	**12**	**15**	**8**	**7**	**20**	**6**	**14**
Lack of access to basic services	0	5	4	0	0	0	1	1	0	0	0	0
Empty spaces	3	2	1	22	10	12	14	7	7	20	6	14
Nature	**1**	**1**	**0**	**11**	**5**	**6**	**24**	**6**	**18**	**7**	**7**	**0**
Lack of parks	1	1	0	11	5	6	1	1	0	0	0	0
Lack of green areas	0	0	0	0	0	0	23	5	18	7	7	4
Quality of Built Environment	**102**	**66**	**36**	**75**	**48**	**27**	**183**	**108**	**75**	**47**	**32**	**15**
Polluted and unmaintained environments	82	53	30	67	41	26	139	77	62	42	30	12
Crowded places	16	11	5	7	6	1	2	1	1	13	1	2
Visually unpleasant places	4	2	2	1	1	0	42	30	12	2	1	1
Safety and Security	**129**	**62**	**67**	**133**	**72**	**61**	**200**	**98**	**102**	**56**	**37**	**19**
Traffic	22	11	11	34	9	25	38	24	14	4	0	4
Inadequate lighting	1	0	1	0	0	0	11	10	1	6	6	0
Unsafe streets/roads	11	5	6	15	10	5	14	10	3	10	9	1
Presence of dangerous people	71	31	40	52	30	22	67	19	48	8	4	4
Access and Mobility	**7**	**4**	**3**	**3**	**3**	**0**	**12**	**4**	**8**	**1**	**0**	**0**
Street dogs and other dangerous animals	17	11	6	29	20	9	59	31	28	27	18	9
Traffic infringements	31	17	24	21	7	14	46	21	25	6	4	2
Unsafe junctions	5	2	3	5	3	2	2	2	0	6	4	2
Nonpermeable/inacessible places	23	14	9	14	4	10	20	13	7	0	0	0
Lack of sidewalks	2	1	1	2	0	2	17	4	13	0	0	0
Lack of pedestrian crossings/overpasses	1	0	1	0	0	0	7	2	5	0	0	0
Social Ties	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**1**
Being lonely	0	0	0	0	0	0	0	0	0	2	1	1

Urban Core Neighbourhood

"At the intersection, there is traffic and noise pollution." (Z.E.G., girl)

"There is a big area in Kurtulus Park with trash bins. It smells really bad there most of the time. It's a dirty place, like a total mess." (A.A., boy)

General Urban Neighbourhood

"Crossing the road at this location is challenging due to cars parking on the sidewalks." (S.Ç., girl)

"I dislike walking along these streeta to my school because the sidewalks are narrow." (N.A.A., boy)

Planned Suburb Neighbourhood

"There is noise and air pollution emerging from surrounding industrial areas and dilapidated construction sites." (B.K., boy)

"I dislike visiting the park [because] I have to walk a long way." (Z.E.A., girl)

Urban Sprawl Neighbourhood

"I wish there was extensive tree cover within there empty lots." (D.M.Y., girl)

"There are no adequate sidewalks..." (E.M., boy)

Figure 3. Children's negative experiences of their everyday activity spaces as thematically coded across neighbourhoods along with selected quotes. The sizes of circles and squares represent the frequency (reported in numbers), with larger ones indicating a higher number of mentions.

and the urban core reported interactions with harmful individuals and other incivilities, such as "being bullied by peers," and "people drinking in vacant lands," as well as other nuisances such as "discomforting sounds of smashing glass." Unlike prior studies (van Vliet, 1981), our research found that boys, except in the general urban neighbourhood, perceived the presence of dangerous individuals as a greater barrier to using public spaces than girls. These gender disparities likely arise from different parental practices, such as girls spending more time with their parents (Wridt, 2004), and neighbourhood characteristics that uniquely affect each gender (Morrow, 2006). Consistent with findings from earlier research (van Vliet, 1981), this issue was reported more frequently in the urban core (25.3%) and general urban neighbourhoods (19.7%) compared to the suburban (14.2%) and sprawling areas (5.7%). In Ankara, fear of stray dogs significantly impacted children across all neighbourhoods, forcing both genders to alter their home–school routes to avoid them, a safety concern rarely noted in Western studies.

Within the theme of built environment quality, polluted and unmaintained environments and visually unpleasant places emerged as prominent sub-themes. They were particularly prevalent among children in the planned suburb, accounting for 38.8% of all negative experiences mentioned in this neighbourhood. These children often cited "traffic pollution at heavy junctions" as well as "noise and air pollution emerging from surrounding industrial areas and dilapidated construction sites," a lack of maintenance, and visually unappealing areas, such as "vacant, abandoned sites/plots," as part of their disliked experiences. Girls emphasised the quality of the built environment, particularly poorly maintained environments, more than boys across all neighbourhoods, which contrasts with Porter et al.'s (2021) findings. This concern was most pronounced in the urban sprawl.

While access and mobility emerged as a theme associated with positive experiences only among children in the urban core, it was represented in the negative experiences throughout the full sample. Children noted issues such as poor access/impermeability and heavy traffic as daily concerns, with no notable gender differences. Both boys and girls in the urban core and general urban neighbourhoods reported difficulty crossing roads due to "unsafe pedestrian crossings," "traffic congestions at the junctions," and "traffic accidents at the intersections." Nonpermeable/inaccessible spaces such as "alleys with no through-access," as well as a "lack of pedestrian crossings/overpass" and "narrow or non-existent sidewalks," were also other recurring sub-themes related to access and mobility, except for those living in urban sprawl. These issues related to street design caused children to "avoid visiting the park [because] [they] have to travel a long way" (Z.E.A., a girl from the planned suburb). Considering that our findings on gender-based differences in themes related to unsafe junctions and streets/roads contrast with previous research (Porter et al., 2021), we anticipate that the differences identified between boys and girls in Ankara may be attributed to contextual factors.

Although social ties were not a key theme, "being lonely" was mentioned exclusively by children in the urban sprawl (1.5%), where dispersed, less accessible spaces limit social interaction. These findings support earlier studies (Veitch et al., 2006) that highlight neighbourhood design's role in promoting or hindering children's social opportunities and physical activity.

4.3. Geovisualization of Children's Activity Spaces

The geovisualization (i.e., hot-spot mapping) of children's activity spaces linked with their positive and negative experiences across neighbourhood types is shown in Figure 4. These maps shed light on the spatiality of children's experiences of their local environment, highlighting distinct differences in the geo-spatiality of activity spaces across neighbourhood types.

Consistent with previous research in non-Western contexts (Mizrak et al., 2014), this study found no gender-based territorial differences in the everyday activity spaces of 9–12-year-olds in Ankara, challenging earlier studies (Tezel, 2011; Valentine, 1997) that suggest girls' outdoor activities are restricted by domestic responsibilities and perceived vulnerability. The findings indicate that the same urban locations were linked to children's both positive and negative experiences for the full sample. The coexistence of both positive and negative features in these locations may help explain this dichotomy, supporting earlier findings, such as Zhou et al. (2016), who found that children's play places and "bad" places overlapped in Yantai, China. Children in the suburban and sprawling neighbourhoods typically frequented gardens and playgrounds

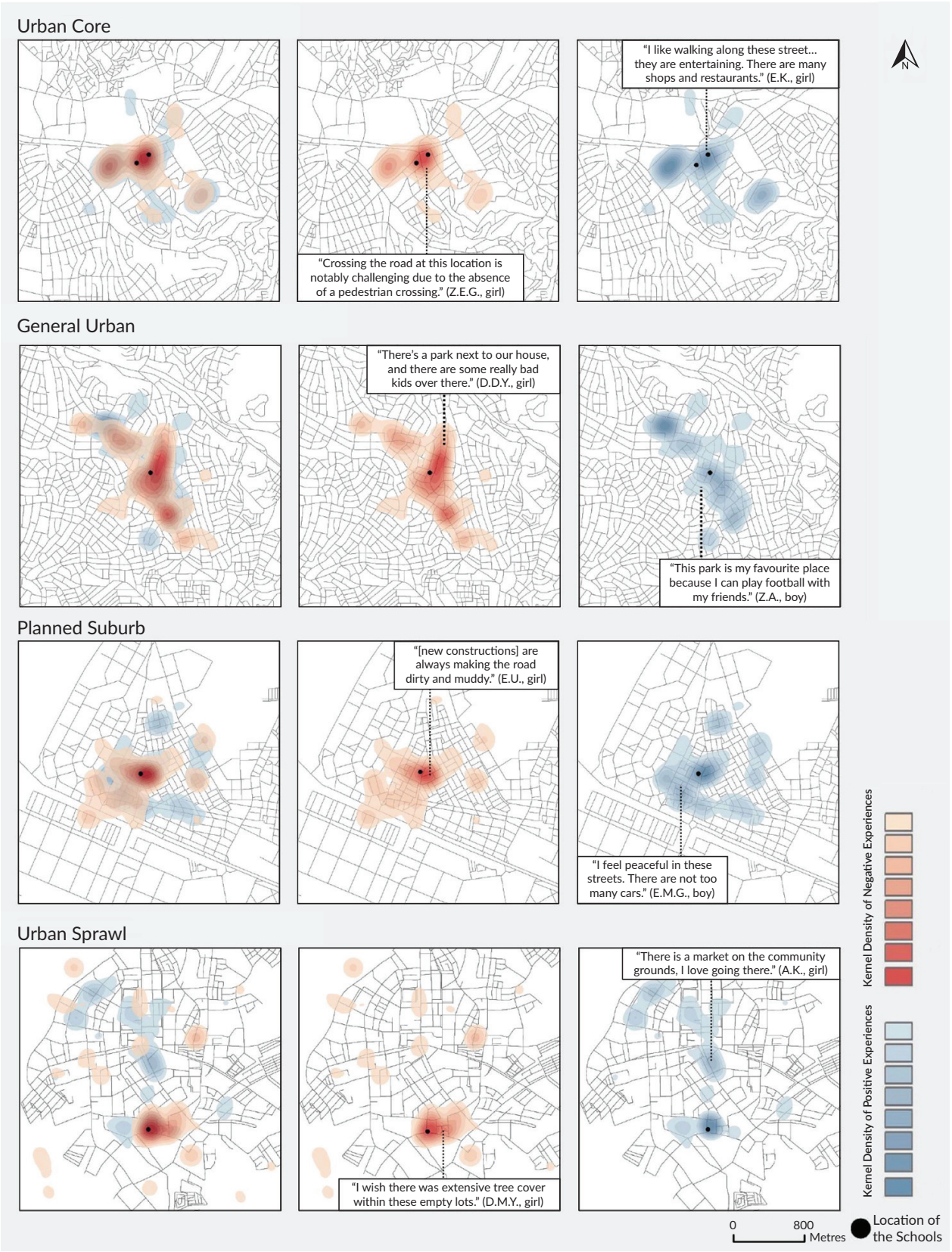

Figure 4. Focus group hot-spot maps based on the frequency of mention: places indicated as "liked" (blue) and "disliked" (red) by children.

within their gated communities and planned residential areas, primarily identifying a shortage of public green spaces, natural areas, or street trees as issues. In contrast, their counterparts in inner-city areas experienced issues with these spaces that were mainly related to personal safety (e.g., "There's a park next to our house, and there are some really bad kids over there. You can see people who look dodgy, and they're smoking at a young age" (D.D.Y., a girl from the general urban), and maintenance (e.g., "There is a big area in Kurtuluş Park with trash bins. It smells really bad there most of the time. It's a dirty place, like a total mess" (A.A., a boy from the urban core). On the other hand, the presence of physical features such as "slopes and hills" as well as "skate rinks" were also liked in these parks.

When these emerging geo-spatial locations were examined in greater detail, the variations in how children used and perceived activity spaces across the four types of neighbourhoods became more apparent, highlighting the role of specific neighbourhood design features in these variations (Figure 5). In the well-connected street network of the urban core neighbourhood, streets were viewed both negatively, due to traffic-related safety concerns, and positively, as vital spaces for children to socialise and be active (Figure 5a). Busy main streets and junctions were generally disliked (e.g., "There's a somewhat excessive flow of cars here, and I'm apprehensive about cycling in that area" (K.T., a boy from the urban core); "Crossing the road at this location is notably challenging due to the absence of a pedestrian crossing. There was even an instance when a car came close to colliding" (Z.E.G., a girl from the urban core). Conversely, the ease of access to destinations was appreciated (e.g., "easy to walk to the bus stop or public transport"). The streets identified by these children for playing/cycling/walking are easily accessible from their surroundings, with some being local high streets and/or pedestrianised green streets. Contrarily, children's physical activity spaces in the urban sprawl were primarily confined to the home context (e.g., gated communities), with schools and adjacent areas serving as the primary locations for playing/cycling/walking (Figure 5b). These children expressed a preference for walking only within their gated communities or neighbourhood parks, voicing concerns about street safety that suggest limited mobility due to the lack of an interconnected street network.

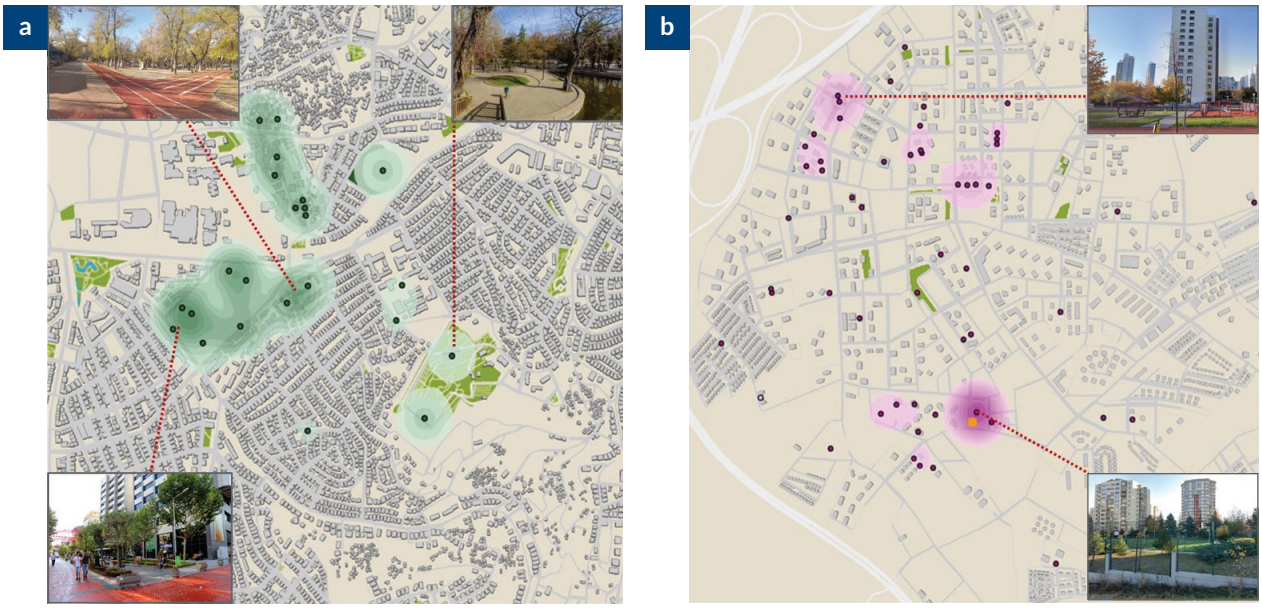

Figure 5. Geovisualization of children's everyday activity spaces related to playing/cycling/walking in the (a) urban core and (b) urban sprawl neighbourhoods.

Figure 6 visualises children's activity spaces across genders, showing no significant differences in the locations of liked places. However, aside from the urban core, disliked places varied by gender across neighbourhoods: Girls reported disliking more distant places in general urban and urban sprawl areas, while boys in the planned suburb noted more problematic places farther from their schools. In the planned suburb, boys reported both positive and negative experiences predominantly in the northeast, likely reflecting the influence of a local residential district.

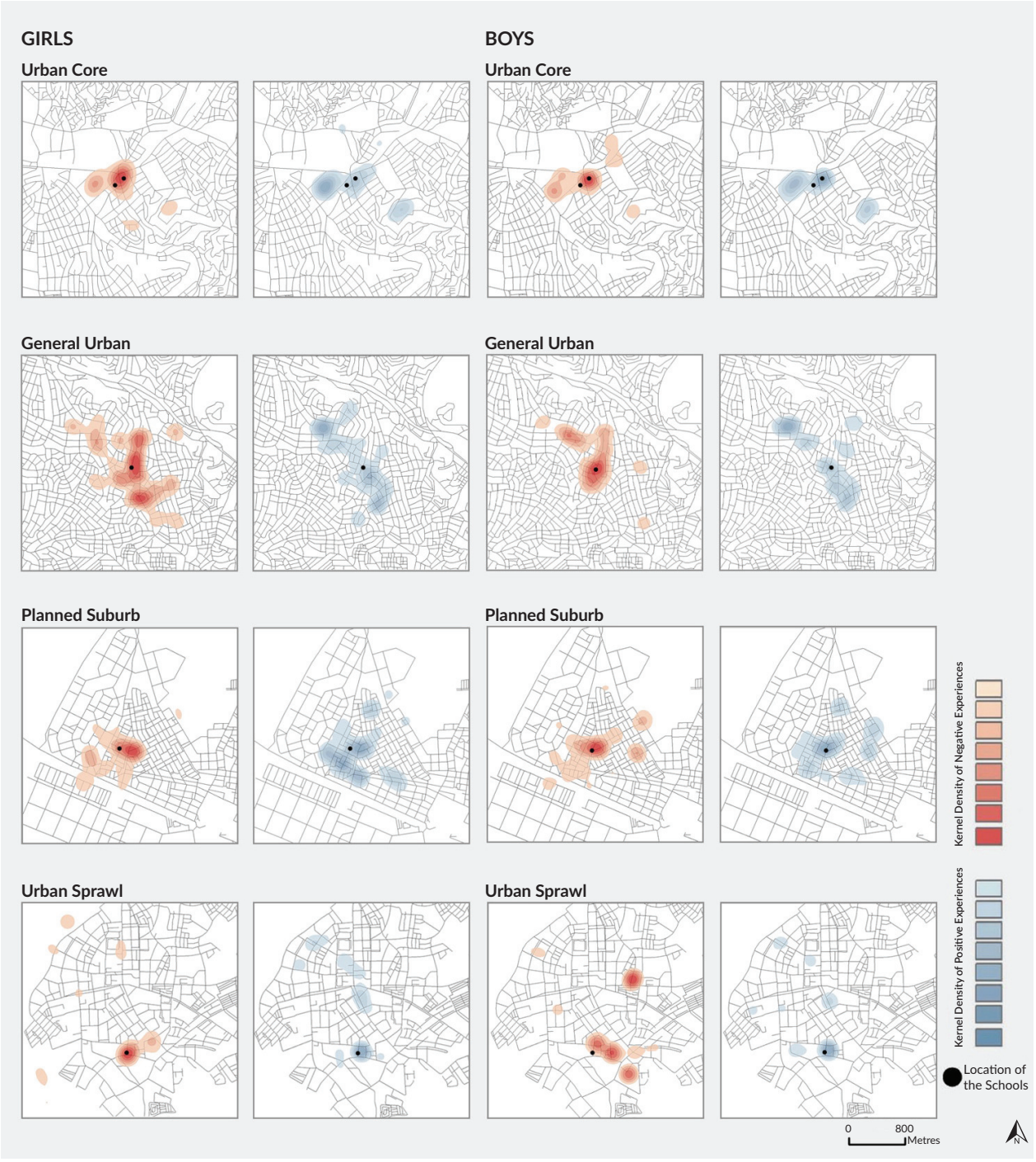

Figure 6. Focus group hot-spot maps based on the frequency of mention: places indicated as "liked" (blue) and "disliked" (red) by girls and boys.

5. Conclusion

This study's objectives were to determine children's activity space experiences across neighbourhood types and genders and to examine how these experiences relate to specific design features. Our analysis of mapping activities revealed that certain neighbourhood design characteristics are likely to influence children's experiences, both positively and negatively, regardless of the geographical setting. For example, while access to commercial amenities and the presence of safe and appealing spaces that provided children with opportunities to play surfaced as popular themes of positive neighbourhood experiences, safety concerns due to a lack of pedestrian-friendly infrastructure along with poor built environment quality (e.g., vacant lands) were barriers to children's engagement with outdoor places. While no significant gender-based differences in safety concerns were observed across contexts, our research found that, apart from the general urban neighbourhood, boys perceived the presence of dangerous individuals as a greater barrier to using public spaces than girls did. Children's positive comments about visiting or playing in parks highlighted their appreciation of green areas. Children across all neighbourhoods and genders enjoyed interacting with their peers in parks and playgrounds. While boys were more likely than girls to mention themes related to physical activities in open public spaces as part of their positive experiences, girls were more likely to cite the quality of the built environment as both positive and negative experiences. They consistently emphasised the need for accessible playgrounds and natural settings across all neighbourhoods. Hence, increasing neighbourhood greenness by developing diverse accessible local green spaces, such as sports fields, parks, and playgrounds, may foster increased opportunities for socialisation and physical activity among children. This is supported by previous studies that report positive associations between open green spaces and physical activity (Tewahade et al., 2019). Specifically, we found that street network design was notably linked to children's both positive and negative experiences. Children cited ease of access and a variety of routes as aspects of their positive daily experiences while impermeable spaces such as alleys without through-access were noted as safety threats.

More importantly, the geovisualization of children's physical activity locations revealed that, while no gender-based differences were observed, certain activities and sub-themes were associated with specific areas across different neighbourhoods. Children in the urban core and general urban neighbourhoods with well-connected street networks that provide multiple route choices and less complex navigation more frequently utilised local outdoor spaces like streets and neighbourhood parks and recognised local shops positively in their daily experiences. In contrast, their counterparts in the planned suburb and sprawling neighbourhood typically used and liked amenities located primarily within immediate home sites. This observation was supported by analysis of thematic data collected by focus groups, which showed that children in urban areas reported a wider range of activity spaces within their neighbourhoods, including those close to their homes, whereas children in peripheral areas reported fewer activity spaces, largely concentrated near their homes. Similar findings have reported limited mobility and a preference for outdoor spaces among children living in settings with low land-use diversity and accessibility (Moran et al., 2017), emphasising the significance of urban form in their daily activities and neighbourhood experiences.

5.1. Implications for Policy and Practice

Apart from its contributions to knowledge, this study also suggests insights for policy and practice as described below.

5.1.1. Urban Form as an Enabler and Barrier of Child-Friendly Neighbourhoods

The geovisualization of children's activity spaces revealed that the same urban locations were associated with both positive and negative experiences. Understanding this spatial overlap can help policymakers create environments where children thrive. Specifically, street connectivity and land-use appear to be essential components in developing child-friendly neighbourhoods. A street network that offers multiple routes and easier navigation would encourage outdoor use. From a design policy perspective, designing street networks that are integrated within their surroundings and require fewer direction changes between home and school can foster positive experiences among children and support their health. This study also highlights the importance of planning policies that prioritise local green spaces such as community gardens, parks, and sports fields to encourage children's outdoor activities. The notable link between neighbourhood greenness and children's daily experiences, especially among girls who often reported a lack of playgrounds and spending more time in green spaces than boys, emphasises the need to improve access to these areas to foster children's health and well-being.

5.1.2. Neighbourhood Design as a Provider of Social Opportunities

In addition to providing physical activity opportunities, child-friendly neighbourhoods are likely to foster social interactions. Our analysis showed that social ties positively influenced children's everyday experiences, especially in the urban core (e.g., "spending time with friends/family"). In contrast, children in urban sprawl reported a lack of social connections because "there is nothing around [my] gated community" (E.U., a girl from the urban sprawl). This difference suggests that more connected urban environments with greater outdoor access may facilitate stronger social interactions, providing children with more opportunities to engage with peers and family in shared spaces. Our findings reveal that, regardless of urban location, children's everyday place experiences are influenced by perceived traffic-related and personal safety risks, although this was more prominent in inner-city (urban core and general urban) neighbourhoods. Therefore, environmental modifications such as installing crosswalks and traffic lights, along with widening sidewalks, particularly on spatially prominent streets, could enhance safety perceptions, reduce negative experiences, and promote social interactions.

5.1.3. General Considerations for Policy and Practice

These implications for designing child-friendly neighbourhoods suggest that local governments should focus on developing context-specific policies sensitive to the specific needs and experiences of children. For instance, in more restrictive settings like suburbs with fewer green spaces and less connected street networks, policies should prioritise minimum zoning and land allocations for a larger proportion of green recreational spaces and accessible streets with diverse uses. Such measures would particularly benefit children who typically have limited access to outdoor spaces. Alternatively, in inner-city settings where safety is paramount, promoting the development of safer streets and alleys (e.g., traffic calming measures and green features) could provide children with increased opportunities to play and spend time outdoors, which in return would help foster strong community ties.

5.2. Limitations of the Study

The study has a number of limitations. First, the small sample size resulting from the in-depth mixed-methods approach adopted and the potential bias in respondent selection (due to the non-probability sampling method employed) limit the generalisation of the findings. For instance, the study excluded children below or above the 9–12 years of age range, as well as those schools whose participation was not approved by the school officials (e.g., due to availability, etc.). Consequently, the results may not be generalizable to all children living in the selected neighbourhoods. Despite this, we suggest that the systematic sampling from schools in different neighbourhoods, combined with the mixed-methods approach, provides a comprehensive method to explore how neighbourhood design may influence children's experiences within their everyday activity spaces. Additionally, the self-reported nature of children's activity spaces might not accurately reflect all of their actual behaviours in these spaces. More precise data collection methods, such as unobtrusive field observations and GPS tracking, may offer deeper insights into specific attributes and behaviours in these environments. Not using place/street audits to quantify the streetscape characteristics could be considered a limitation and future research could utilise environmental audit tools and quantitative methods to better understand the underlying mechanisms of how neighbourhood design impacts children's place experiences. Finally, while our case-study sites include a variety of urban areas, including suburban and urban core, these environments are arguably more walkable than their rural counterparts. Therefore, future research should include a wider geographical reach.

Despite these limitations, this study contributes to the developing field of child-centred urban design by exploring the spatial distribution of children's activity spaces and examining how specific neighbourhood design features influence children's experiences across different urban contexts and genders. Our study provides evidence that children's positive everyday neighbourhood experiences can be supported by modifying the neighbourhood design. Importantly, effective policy development for child-friendly neighbourhoods requires a multi-disciplinary approach that incorporates children's perspectives.

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Conflict of Interests

The authors declare no conflict of interests.

Data Availability

The data that support the findings of this study are available from the corresponding author upon request. Due to confidentiality, the data are not publicly available.

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