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Spaces for children's play and travel close to home: the importance of threshold spaces

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ABSTRACT

There is an increasing understanding of the role of the built environment on children's neighbourhood mobility and play and the importance of this for children's development. This has led to concerns over children's declining neighbourhood mobility and calls to see an increase in children's use of public space. This paper draws on findings from a research study working with 9 and 10 year olds living in inner London, England. The children participated in go-along interviews and a range of other qualitative methods, which explored how they used their neighbourhoods for getting around and play. Findings from the study demonstrate the importance of threshold spaces for children in supporting both their neighbourhood play and their wider neighbourhood travel and mobility. Threshold spaces are defined as a semi-public space that straddle the gap between the private space of the home and the wider public realm. Children's use of threshold spaces was influenced by a reduced movement function in these spaces, restricting vehicles and people passing through, and the presence of signals that it was ok to play, with girls being more sensitive to these features than boys. Threshold spaces were important as a start point for children's wider explorations of their neighbourhoods.

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Introduction

Children's neighbourhood mobility refers to how children use and get around their neighbourhoods for both travel and play. Both the themes of play and active travel, and the interaction between these factors, relate to the public spaces in a neighbourhood and how children use these (Carroll et al. 2015).

Children's neighbourhood mobility has been shown to have a range of positive benefits for them (Marzi and Reimers 2018; Brussoni et al. 2015), such as improved skill in navigating the environment (Mackett et al. 2007; Carver, Timperio, and Crawford 2008; Rissotto and Tonucci 2002; Ahmadi and Taniguchi 2007; Rissotto and Giuliani 2006) improved social capital and cohesion (Weller and Bruegel 2009) and increased levels of physical activity (Schoeppe et al. 2014; Jago 2017; Beunderman 2010). Yet both children's active travel and outdoor neighbourhood play have been found to be reducing in recent years (Karsten 2005; Bhosale, Duncan, and Schofield 2017; Christensen and O'Brien 2003; Shaw et al. 2015). There are continued concerns on the impact that this is having on children and their well-being.

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Attempts to meet children's needs in public space have historically been through the sole provision of schools and playgrounds. Outside of school, the playground was often seen as providing sufficiently for children's needs, but there is evidence that these spaces are not necessarily what children desire (Horschelmann and van Blerk 2013; Bishop and Corkery 2017). Children need a diverse range of amenities within their neighbourhoods as well as access to nature (Brussoni et al. 2020). They need to be motivated to use these spaces and be able to get to them safely (Brussoni et al. 2020; Carroll et al. 2015; Carver, Timperio, and Crawford 2008). Children's play in their neighbourhoods, therefore, links to their ability to get around their neighbourhoods. Yet children's travel also takes a different form to that of adults, that is not captured in standard walkability measures (Janssen and King 2015). This is due to the fact that children's mobility is also about spatial interrelations (Christensen et al. 2017) and time spent in the neighbourhood, which often includes meandering, playfulness, wonder, discovery and adventure (Mitchell, Kearns, and Collins 2007; O'Brien et al. 2000; Mackett and Paskins 2008; Ross 2007; Romero 2015; Moore 1986).

The concept of third places is a framework that can be used for considering the public neighbourhood spaces that children use (Carroll et al. 2015). The term was originally defined by Oldenburg (2001), who identified third places as key sites of informal public life, located on neutral ground and accessible to all. These are in addition to the primary destination of the home and the secondary destinations of work (or school in the case of children). They can help to establish a sense of place and belonging and have been shown to be the anchors of community life. Third places can be further categorised into threshold places such as driveways and courtyards, transitory spaces such as streets, and destination spaces such as parks and cafes (Carroll et al. 2015; Gardner 2011). Studies have found that, when asked about what makes a good neighbourhood, the majority of children will state that it has places to meet and play with friends, as well as the ability to move safely around (Nordström 2010). In a review of post-occupancy evaluation studies, Cooper Marcus and Sarkissian (1988) identified over 100 qualities of what makes a good development for children, including street linkages and access to a wider environment, safe outdoor play space, private open space that links to communal open space and the general importance of spaces between buildings. These reflect that moving in order to interact with others, build social connections and play is important to children as well as getting to and from places (Horton et al. 2014). It demonstrates how children seek out these semi-public threshold spaces, which straddle the gap between the private and public realm.

The concept of threshold spaces highlights the importance of considering how children use the space in their neighbourhood close to home and demonstrates how much of children's movement around their neighbourhood is not to go anywhere at all. Although playgrounds and playspaces can be important for children's play, they are often planned in to make up for inadequacies in the street layout (Cooper Marcus and Sarkissian 1988; Woolley 2008). Children can, and will, play in other less formal spaces and when thinking about the use of space in this way, play should also be considered as part of a child's wider mobility. In their work in Wrexham in Wales, Barclay and Tawil (2013) found that children identified residential streets as the most valued play space outside of the home. A study from New Zealand found that children spend most of their time within 500 m of their house and the neighbourhood setting is of particular importance to them (Chambers et al. 2017). Similarly, a study in Canada found that around 95% of children's time in their neighbourhoods was spent near to home (Loebach and Gilliland 2016). Moving in order to interact with others, build social connections and play is important to children as well as getting to and from places (Horton et al. 2014). These spaces are also important in enabling social interactions for children, providing opportunity to play and in developing a sense of community (Brussoni et al. 2020).

There is limited evidence on the specific physical qualities that are required within a threshold space to enable a child to use it. Those features that impact on safety and perceptions of safety have been shown to have an impact on children's use. Lower traffic volumes and speeds can help to support children's outdoor play close to home, including in the form of cul-de-sacs and home zones in the UK (Lambert et al. 2019; Biddulph 2010; Gill 2007; Whitzman et al. 2010; Wheway and

Millward 1997; Handy, Cao, and Mokhtarian 2008; Islam, Moore, and Cosco 2016; Sharmin and Kamruzzaman 2017; Moore 1986). These design typologies also help to create a semi-private space, which may help to provide a feeling of safety and security that other forms of street network do not. This links to evidence that where spaces are well-overlooked and connected to each other by a network of footpaths, children are more likely to use them (Bornat 2016; Wheway and Millward 1997; Biddulph 2010; Blinkert and Weaver 2015). If a street supports social activity, then it is also more likely that children will use it (Biddulph 2010; Bornat 2016). Those who live in places that are traffic dominated and where interaction between people is limited have been found to have smaller social networks (Evans 2006). Busy roads are a significant factor in reducing the potential for interactions and a sense of community (Appleyard, Sue Gerson, and Lintell 1981).

Declines in children's independent travel and outdoor play can be linked to the size of their activity spaces. Activity spaces are used as a measure to understand how far a child goes in their neighbourhood and their broader mobility patterns (Villanueva et al. 2012). Evidence suggests that children's activity spaces have been reducing in size (Karsten 2005; Kinoshita 2009; Spilsbury 2005; Skår and Krogh 2009; Woolley and Griffin, 2014), though there are a lack of longitudinal studies to fully quantify the changes that have happened over time. However, a focus solely on the size of a child's activity space can ignore a detailed consideration of the factors that determine this and of what is important to the child (Marzi and Reimers 2018). A smaller space may simply mean that travel further afield is not necessary, for example (Babb et al. 2017). In a higher density area, children have been shown to take part in less active travel but still have improved neighbourhood mobility as they have everything they need close to home (Broberg, Salminen, and Kytä 2013). It is important to consider the proximity of destinations and places to go in determining what a child's activity space might look like, as well as the progression of this as children discover new spaces (Han et al. 2020). Weller and Bruegel (2009) sum up some of the complexities of trying to define activity spaces, stating that:

some children are not permitted to travel far but may enjoy a great deal of freedom within a small locality, whilst other children may travel unaccompanied over several London boroughs to get to school and yet are not allowed to play in their local park. (633)

This study contributes to the literature on threshold spaces by providing further knowledge on children's use these in their neighbourhoods, what features of them are important and how their use of these relates to their wider neighbourhood mobility. It also provides evidence to support understandings of activity spaces and highlights the importance of considering the quality of these as well as their size.

Methodology

This paper presents data from a largely qualitative study, exploring children's experiences of their neighbourhoods in Hackney, London, England. The aim of the study was to contribute to understandings of how children experience and use their neighbourhoods. It took a child-centred approach in the sense that it was based on the principle that children know their own lives best and aimed to provide direct insights into their experiences. The study used a mix of methods include go along interviews, workshops, travel diaries and annotated mapping. This paper focusses on data from the go along interviews in relation to children's use of the public spaces within their neighbourhoods and the influence of the built environment.

Study participants attended three different schools in Hackney in east London (Oakley school, Wigmore school and Mansfield school). Hackney is one of 32 London boroughs and is located within inner London. It has one of the highest levels of deprivation in England (Ministry of Housing, Communities and Local Government 2019) as well as high levels of ethnic diversity (Hackney Council 2019). The schools chosen to take part in the project were chosen based on convenience

sampling. All schools had a reasonably small catchment area, to ensure that the children involved in the project were likely to be from the local neighbourhood surrounding the school. Although there were differences in the neighbourhoods that each of the schools were situated in, this paper does not explore these differences in depth, but rather seeks to find the commonalities in the children's use of space.

Six children in each of two schools were involved in the study and five children from the third school, making a total of 17 children (nine boys and eight girls). The children were all either 9 or 10 years old, as this is around the age that children are considered to start to gain independence (Shaw et al. 2015; O'Brien et al. 2000; Matthews, 1992; Dodd et al, 2021). The children were a mix of ethnicities and genders and were pre-selected by their head teachers. A whole class survey was conducted to give a baseline understanding of the behaviours of the children in their class cohorts. This showed that the children involved in the detailed study generally reflected the patterns evident within the whole class. Ethical approval was granted by the University of Westminster and parental permission and child assent was obtained prior to commencing research activities.

This paper presents data from the go-along interviews that took place as part of the project. Child-led walks are a common and reliable method for investigating children's use and perceptions of their neighbourhoods (Cele and van Der Burgt, 2013; Loebach and Gilliland 2016; Carroll et al. 2015). For these interviews, pairs of children walked and talked with the researcher around their neighbourhood for between one and two hours. These interviews were guided by semi-structured interview questions, which asked the children about how they got around their neighbourhoods, the places they knew and who they spent time with. This helped to develop an understanding of their knowledge of the neighbourhood, the places they visited and the places that they did not and to start to build a picture of what the important features of the built environment were to them. It was an opportunity for the children to talk to the researcher in a relatively informal setting (Cele and van Der Burgt, 2006; Loebach and Gilliland 2010; Carroll et al. 2015). Following the interviews, field notes were used to document the walk and any reflections. All verbal data was audio-recorded and transcribed.

The data was brought together and analysed thematically (Braun and Clarke 2006) and coded in Nvivo. The themes were developed using a predominantly inductive approach, using the specifics of the data to draw out the most common themes. This initial coding and analysis was then developed further using strategies similar to interpretive description (Thorne, Kirkham, and O'Flynn-Magee 2004) to generate a deeper understanding of the realities of the children's lives and to help to develop the key themes within the data. The analysis took on an iterative process, as the original themes and codes were reviewed and further insights drawn from these. Analysis under the theme of the built environment initially took a 'destination' focus, and this was then adapted to reflect children's use of threshold and transitory spaces as well, as the relevance of these became clear.

Findings

The children in the study all lived in high density inner London. All but one of the children walked to school and all of the children had experience of getting around their neighbourhoods on foot. Walking seemed normative for the children and their families. Although these patterns reflected their class cohorts at school, they are quite different to national averages across the UK, where only 47% of children aged 5–10 are reported to walk to school (Department for Transport 2019). This context is important to note when reflecting on the findings.

The study found that where children used the threshold space near their home, these formed an important part of their neighbourhood landscape. There were two key features of these spaces that influenced their use:

- (1) Restricted movement function: restricting vehicles and people passing through and making it feel semi-public. This could be a green space or play space. Where a road formed a part of this

space, it had to have either restrictions on through traffic or traffic calming measures in place to reduce the speed and volume of any vehicles and people.

- (2) Signals that it is ok to play: a space needed clear signals that it was ok to play, either through the placement of play equipment, playable features, signage or the presence of other children.

A summary of each child and their experiences is provided at [Table 1](#).

Successful threshold spaces: restricted movement function and signals that it is ok to play

The types of threshold space that the children had available to them varied depending on where they lived. Ten of the children in the study lived in estate locations or places where there was a designated semi-public space, apart from the street, near their home, which offered some opportunity for play. Of these 10 spaces, six of them functioned successfully as threshold spaces for the children and all had a restricted movement function and signals that it was ok to play.

Warren (Oakley) lived within an estate where through traffic was restricted with speed bumps, sharp bends and a closed loop for vehicles. There were a number of green spaces and play spaces near his home within the estate that formed threshold spaces and gave signals that it was ok to play. Warren talked about how he would play football on the grass directly outside of his flat with his friends. Ashok's (Oakley) street also had restricted vehicle movement. Near Ashok's block there was a small fenced off play space for under 5s and a courtyard style pedestrianised area opposite, featuring a 'no ball games sign' on it ([Figure 1](#)). The play space appeared to give Ashok, and his family, the signal that it was ok to play in this area. When asked about the 'no ball games' sign, he appeared undeterred by it, saying:

yeah we can still play, Most of the time there's no-one there



Figure 1. Examples of threshold spaces outside of the children's homes (clockwise from top left: playspace and road next to Ashok's home; roadscape and courtyard outside Rafya's home; road and public space next to Simon's block of flats; playspace outside Zaidee's home).

**Table 1.** Summary of children and their threshold spaces.

Name	School	Gender	Home location	Threshold space features		Use of threshold spaces for independent play	Additional neighbourhood locations visited with an adult	Neighbourhood locations visited independently
				Vehicle and pedestrian movement	Signals that it's ok to play			
Warren	Oakley	Boy	Estate (flat)	Restriction of through traffic (closed loop road); traffic calming (speed bumps); green space	Playspace, friends to play with	Yes		Local shops, park, school
Ashok	Oakley	Boy	Non-estate flat	Restriction of through traffic (closed loop road); traffic calming (speed bumps)	Playspace, friends to play with	Yes	Friends house	Local shops, park, school
Henry	Oakley	Boy	Terraced street (house)	Restriction of through traffic (modal filter); green space	Playspace, friends to play with	Yes	Local shops, park, school, friends houses	
Melis	Oakley	Girl	Estate (flat)	Restriction of through traffic (closed loop road); traffic calming (speed bumps); green space		No	Local shops, park, mosque	School
Maya	Oakley	Girl	Estate (flat)	Restriction of through traffic (modal filter); traffic calming (speed bumps)		No		Local shops, park, school
Eva	Oakley	Girl	Terraced street (house)	Traffic calming (speed bumps); green space	Playspace, friends to play with	Yes	Other friends' houses, park	Local shops, friends' house, school
Rafya	Mansfield	Boy	Gated estate (flat)	Restriction of through traffic (courtyard); traffic calming (speed bumps) semi-public space close to home	Friends to play with	Yes		Local shops, mosque, school, park
Simon	Mansfield	Boy	Non-estate flat	Traffic calming (speed bumps); next to busy roundabout and road; green space		No	Local shops, school	
Zaidee	Mansfield	Girl	Estate (flat)	Restriction of through traffic (closed loop road); traffic calming (speed bumps); green space	Playspace	No	Local shops, school, friends house	
Rebecca	Mansfield	Girl	Terraced street (house)	Restriction of through traffic (modal filter); traffic calming (speed bumps); next to main road		No	Friend's house, local shops, park	Corner shop, school
Montel	Mansfield	Boy	Estate (flat)	Restriction of through traffic (closed loop road); traffic calming (speed bumps); green space	Playspace, friends to play with	Yes	School, train station	Local shops
Sophia	Wigmore	Girl	Terraced street (house)	Restriction of through traffic (filtered neighbourhood block); traffic calming (speed bumps)		No	Local shops, park, school	Corner shop
Marianna	Wigmore	Girl	Terraced street (house)	Restriction of through traffic (filtered neighbourhood block); traffic calming (speed bumps)		No	Local shops, park, school	Corner shop

Rowan	Wigmore	Boy	Terraced street (house)	Restriction of through traffic (filtered neighbourhood block); traffic calming (speed bumps)	Friends to play with	Yes	Park, school	Local shops, friends house
Leo	Wigmore	Boy	Terraced street (house)	Restriction of through traffic (filtered neighbourhood block); traffic calming (speed bumps)	Friends to play with	Yes	School	Local shops, park
Finlay	Wigmore	Boy	Terraced street (house)	Restriction of through traffic (filtered neighbourhood block); traffic calming (speed bumps)	Friends to play with	Yes	Local shops, park, school	Corner shop
Melissa	Wigmore	Girl	Terraced street (house)	Restriction of through traffic (filtered neighbourhood block); traffic calming (speed bumps)		No	Local shops, park, school	Corner shop

He stated that he would regularly play football and play on his bike, and talked about how he would just move out of the way if a car came down the road.

Rafya (Mansfield) lived in a gated estate, which only those who lived there could access (Figure 1) so movement was restricted. He talked about how he would play in his square on his bike with friends, as well as playing hide and seek and football with his father. Other children in the space had given him the signal that it was ok to play.

There are people next door that are my friends and we always come here and play on our bikes.

Eva (Oakley) was the only girl in the study who played in the threshold spaces near her home. She lived on a relatively quiet one-way road with speed bumps, and also had access to a small public garden, which functioned as a threshold space, just 100 metres from her home. It was evident that the fact that having friends to go there with was one of her main motivations for using the space and helped support her feeling that it was ok to play there.

Some of my friends I have known them since I was really little.

Seven of the children in the study lived on terraced streets in residential areas where there was no obvious threshold space, aside from the street itself, and three of these streets functioned successfully for the children. Rowan (Wigmore) and Leo (Wigmore) lived on a Victorian terraced street, within an area that had restrictions on through traffic throughout and speed bumps to reduce vehicle speeds. Their street was also slightly shorter than the other streets in the neighbourhood, with a more compact and smaller block structure (Figure 2). This appeared to further reduce the focus on the street's purpose for movement. Given the shorter length, there was even less likelihood of vehicles travelling down their street at speed, making it feel safer to them.

The boys talked about playing out on their street, going 'round the block,' sitting on the bike shed all day long and playing thumb ball on the street with a tennis ball. Although they both



Figure 2. Examples of the street spaces outside of the children's homes (clockwise from top left: Sophia's street; Rowan and Leo's street; Rebecca's street and modal filter; public space at end of Henry's street).

had back gardens, they preferred to play at the front as there was more space. The fact that the two boys were friends and lived just a few doors away from each other also had an impact on their use of the space. The children, by their presence, had signalled that it was ok to play in the space.

Henry (Oakley) also lived on a terraced street with a modal filter at one end (Figure 2) and a play space at the other. The play space was part of the neighbouring estate, which also incorporated a small green space. These gave a signal that it was ok to play and enabled him to explore these spaces relatively freely. He also knew other children on his street that he talked about playing with and his parents appeared to have good connections to his neighbours.

I play on the road and stuff because it's a dead end at the end. And then there's bike storage here. And then I know all of these people.

Unsuccessful threshold spaces: dominant movement function, lack of signals that it is ok to play or both

Eight of the children in the study did not play in the threshold spaces available to them near home. All of the locations had some form of traffic calming in place and in one instance the child also had access to a formal green space and play space. The lack of success of the spaces appeared to be related to the lack of movement restrictions in the space and there being no clear signals to the children that it was ok to play, either by the presence of appropriate physical play features or other children to play with. Gender was also an influence on how these features were perceived and girls were more sensitive to these than boys. Only one of the eight girls in the study used the threshold spaces for play by her home compared to all but one of the boys.

Simon's (Mansfield) flat was located in a 17-storey tower block, located next to a busy junction and main road (see Figure 1). This meant that there was a significant movement function in the area around Simon's flat. There was a semi-public green space located next to his block of flats, but there were not any obvious signals that it was ok to play or evidence of it having been used by children. Simon was not permitted to use this space and when asked if he spent much time outside, he stated:

No, I have to stay inside.

Zaidee (Mansfield) lived in a three-storey block of flats in a small-scale estate. An area of grass, with some simple play equipment was located between the blocks on her estate and provided some threshold space (Figure 1), but she was not motivated to use it and did not feel like there was anything for her in the space. She also had no one to use it with.

It's fun but they need more stuff for older children. Because there's only baby stuff. Even the swings are just for babies.

Zaidee's friend, Rebecca, commented that they could build a little hut with a table and board games in the space. Her comment highlighted that it was not enough just to provide a space but that the quality of it mattered to them too.

Sophia (Wigmore) lived on a terraced street and described it (see Figure 2) as 'really calm' but still did not spend a lot of time on it, apart from the annual street party that she told me happened every summer.

For this, they would close the road to traffic, changing the quality of the space from one functioning as a transitory space to one functioning as more of a threshold or destination space. Sophia talked about how they would 'stay up really late' for the street party and that:

There's lots of silly stuff, eating lots of junk food and being our own selves hanging out with our friends.

Although the neighbourhood and street were already traffic calmed with limited through traffic, it was clear that this was not sufficient to motivate her to want to play on it in normal circumstances. For Sophia and two of the other girls living in this neighbourhood, they did not perceive any signs

or signals that it was ok to play on their streets. This meant that they rarely played outside in these spaces. This contrasted with Rowan and Leo's experience living in the same neighbourhood, who played on the street frequently.

Rebecca (Mansfield) also lived on a Victorian terraced street (see [Figure 2](#)) with a modal filter at one end of it, which restricted vehicle access, only allowing pedestrians and cyclists to pass through. This appeared to create some feeling of safety for Rebecca from motor vehicles, but it was not sufficient to motivate her to want to spend time on her street for play. It was also close to a main road and a popular route for cyclists. There were no other features on her street to encourage play or people spending time there in general and there was still a sense that it was a space to pass through only. Although she walked to school from her home with friends, she did not play here.

Impact of threshold spaces on children's wider neighbourhood explorations

Threshold spaces appeared to have an impact on the children's use of their neighbourhoods beyond their homes. Eight out of the nine children that were able to explore and play in the vicinity of their home also explored their wider neighbourhood independently. Ashok (Oakley) talked of a rich play experience in the vicinity of his home, but also talked about being able to travel and explore his wider neighbourhood independently. He did not appear to see barriers to connectivity in the area that would prevent him from getting around. He was a child who seemed to see the whole environment as a playground asking to climb up drainpipes and hanging and climbing on football goals. He described his experience of a new block of flats near his house before it was built.

Before there used to be like, I don't know what it was. Some abandoned place there was poles and stuff like that and me and my friends we'd do parkour and stuff like that in there.

For Leo (Wigmore), his experiences of playing on his street acted as a start point for his wider experiences of his neighbourhood. As long as the transitory spaces and connections were there, he was able to explore his neighbourhood independently and his positive, autonomous experiences of playing near his home appeared to give him the confidence to do this.

Henry (Oakley) was the only child that played in the threshold spaces in his neighbourhood but had restricted experiences of his wider neighbourhood. This was largely due to the lack of a safe crossing point on one of the roads near his home, which significantly restricted where he was allowed to go.

The children who did not frequently play outside freely in and around their homes were less likely to have the freedom to explore their neighbourhoods more widely, with six out of these eight children having limited freedom for independent exploration. Five of these children were girls. Zaidee (Mansfield) for example, who did not want to use the threshold space next to her home, did not feel confident exploring her neighbourhood and appeared to have quite restricted freedoms. Simon (Mansfield) also did not use the threshold space by his home. He was particularly nervous about going out and about his neighbourhood and showed a very poor knowledge of it.

Two of the children, Rebecca (Mansfield) and Maya (Oakley) did not use threshold spaces for play but did take part in wider travels around their neighbourhoods. Rebecca (Mansfield) talked about making journeys around her neighbourhood independently, though these tended to be for travel rather than play or exploration. For her, the lack of any threshold space on her street seemed less important than the connections that the transitory spaces created. This was similar for Maya (Oakley), who chose not to play outside, but was permitted to make journeys independently around her neighbourhood. The fact that walking for travel was a normative behaviour in their neighbourhood may have had an influence on this. It is suggested that where travel on foot is less common, threshold spaces would be of heightened importance in enabling those early experiences of the neighbourhood.

Discussion

Threshold spaces are defined as a semi-public space that tends to straddle the gap between the private space of the home and the wider public realm (Gardner 2011). There is existing research on children's play close to home (Barclay and Tawil 2013; Chambers et al. 2017; Loebach and Gilliland 2016), but limited evidence of how this links to their wider travel and play or the design features of a space that facilitate this.

The features of threshold spaces that worked the best for the children were those that restricted vehicles and people passing through and those that gave them signals that it was ok to play, though these did not need to be formal playgrounds. The threshold spaces that they played in often included shared courtyards or green spaces within a housing estate or residential area, but sometimes extended to the street on which the children lived. Streets are commonly seen as only transitory spaces and as having a predominantly movement function, aiding people in getting around. The study provides further evidence to show that children's play does not just take place in formal playgrounds (Cooper Marcus and Sarkissian 1988; Woolley 2008; Gaster 1991; Rasmussen 2004) and also that streets can function as a threshold space for children in the right setting (Barclay and Tawil 2013). These threshold spaces were shown to be important for the children in the study, both in terms of supporting their neighbourhood play experiences and their wider mobility and travel around their neighbourhoods.

Restricted movement function

Minimal movement within the threshold space, both from vehicles and from people, helped the children to feel safer in the space and more confident to use it. In some locations, this was achieved via a separate space away from the footway and road where they could play. In other instances it was achieved via a road design that restricted through traffic movement and speeds. This was via a combination of traffic calming measures, such as speed bumps, 20 mph speed limits, closed loop roads limiting vehicles travelling through, modal filters creating a cul-de-sac for vehicles and courtyard designs. Previous research in this area has shown the success of similar design features for children (Prezza et al. 2001; Wheway and Millward 1997; Handy, Cao, and Mokhtarian 2008; Islam, Moore, and Cosco 2016; Sharmin and Kamruzzaman 2017; Moore 1986).

Signals that it is ok to play

The quality of the threshold spaces from a child's point of view and how they will use them was often based on how playable it was and what signals there were that it was ok to play. This could be through physical features, such as the placement of play equipment, or the use of the space by other children. The potential for social interaction within the space was important in influencing how motivated the children were to use it, reflecting findings from other studies (Brussoni et al. 2020; Horton et al. 2014; Biddulph 2010; Bornat 2016; Marzi, Demetriou, and Reimers 2018; Lambert et al. 2019). Parents may also perceive a space as safer for their children when there are other people using it that they know (Lee et al. 2015; Veitch et al. 2006; Karsten and van Vliet, 2006; Karsten 2005; Weller and Bruegel 2009). Evidence suggests that the amount of social interaction in a space can be influenced by the movement function of it and the volume of motor traffic in a space (Hart and Parkhurst 2011), demonstrating how these two themes of restricted movement function and signals that it is ok to play interact and support each other.

How these signals were perceived was also linked to gender. Only one of the girls in the study used the threshold spaces by her home for play and the girls in the study appeared more sensitive to the quality of the space. This could be due to differing perceptions of safety and parental safety concerns having an impact on what they were permitted to do (Porter, Spark and de Klein, 2021;

Hillman et al, 1990; Matthews, 1992; O'Brien et al. 2000; Prezza et al, 2001). Girls may also be less likely to request permission due to an awareness of social and cultural norms around how girls should use space (Brown et al. 2008). This is reflected in the fact that many of the girls in the study appeared content with the understanding that it was the norm to have more limited neighbourhood mobility than boys and they chose not to challenge this. They accepted this and would make do with the permissions that they were granted.

These findings highlight the importance of challenging the cultural norms around the presence of children in public space and their use of it, particularly for girls. Current planning policy for children usually focuses solely on children using segregated playgrounds (Wood, Bornat, and Biquelet-Lock 2019). The perception that children are not welcome in many public spaces pervades, with the ubiquitous 'no ball games' signs still being commonplace throughout England.

Wider neighbourhood explorations

The study provides new evidence on how children's use of threshold spaces links to their wider explorations of their neighbourhood and their travel behaviours. These spaces can act as a first step towards children exploring their neighbourhood further, as they can give them a first opportunity to spend time in and to take control over their actions in public space. In this way, they are also a way of encouraging further active travel, as they get children into the public realm and then build their confidence to go further. For the children in the study, active travel and walking was already the norm in their neighbourhoods. This meant that some children who did not have a threshold space to use still travelled their journeys actively. The fact that walking was relatively commonplace appeared to influence their motivation to want to do this. In places where this is not the case, then children's use of threshold spaces could be an important influence in encouraging increased levels of active travel.

The study shows that play and exploration of the neighbourhood close to home are important to children. It is known that children's activity spaces have been declining in size in recent years (Babb et al. 2017; Kinoshita 2009; Karsten 2005; Spilsbury 2005; Skår and Krogh 2009). The findings from the study highlight the importance to children of spaces close to home and, therefore, raise questions about how children's mobility should be measured (Weller and Bruegel 2009). A child's activity space is a reflection of the proximity of destinations (Han et al. 2020) and a larger activity space may not always reflect a more positive neighbourhood experience. With proximity being an important indicator of how a child will get around, the quality of a child's activity space may be a more appropriate measure than its size (Marzi and Reimers 2018). This links to recent themes around walkable (15/20-minute) neighbourhoods (TCPA 2021) and the importance of having facilities close by, reducing the need to travel.

Limitations

The study was conducted in three high density inner London neighbourhoods and the findings may not be generalisable outside of this type of setting. The children that took part in the study were selected by their head teacher, with a risk of some selection bias. In order to address this, efforts were made to ensure that the children were broadly representative of their neighbourhoods and class cohorts, as measured against a whole class survey.

The children who took part in the study were socio-economically and ethnically diverse, but the small sample size meant that it was not possible to easily understand the influence of these features on their neighbourhood mobility. Future research should investigate the findings in other contexts. It should purposively sample children from different socio-economic and ethnic backgrounds to help to understand the influence of these characteristics on children's neighbourhood mobility.

Conclusion

The children in the study showed that having access to a form of threshold space close to their homes was important, not only for their play close to home but also for their wider explorations and travel around their neighbourhoods. Current literature on children's use of public space often focusses either on children's travel or on children's play in their neighbourhoods. This study provides new evidence on how these two functions can interact within children's use of threshold spaces.

Threshold spaces worked best for the children when there was a restricted movement function for vehicles and people and where there were signals that it was ok to play. This could be through the appropriate placement of play equipment or signage, but the simple presence of other children of their age was one of the strongest signals. This highlights the importance of the need for children to be accepted within all forms of public space, not only formal playgrounds. This is particularly important for girls who were more sensitive to these signals than boys and used threshold spaces less because of this.

The children's play and exploration around their homes impacted on their use of their neighbourhoods more widely. Those children that played in threshold spaces around their homes were more likely to take part in explorative journeys around their local areas and use them more widely and independently. The play they took part in near their homes acted as a start point for further journeys and explorations. They had begun to build the confidence to navigate their neighbourhoods on their own through their autonomous play. This suggests that having places to spend time in close to home can be beneficial to children and, when it comes to children's activity spaces, a focus on quality, not just quantity and size, is important.

The importance of threshold spaces for children's wider neighbourhood mobility needs to be better understood and this study provides new evidence on the role of these spaces. Future research should consider how these spaces act as a link between children's neighbourhood play and travel. Policy should reflect the importance of these spaces for children's neighbourhood mobility and show an understanding of how they are used.

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