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Pedestrians with Disabilities and Town and City Streets: From Shared to Inclusive Space?

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Abstract
This article highlights the importance of ensuring that accessibility and inclusion for people with disabilities, as required by the UN Convention on the Rights of Persons with Disabilities, is fully embedded in efforts to reduce the dominance of cars in city streets and promote more active modes of travel (including walking, wheeling and cycling) in line with global agendas. Drawing on emerging findings from the Inclusive Public Space research project, we present and critically reflect on types of difficulty associated with streets in which what is commonly known as a 'shared space' design operates, and those in which all or part of the available space is designated as primarily for pedestrian use. The data on which this analysis is based is qualitative, deriving from 83 semi-structured interviews about the experiences of our participants (a substantial majority of whom identified as having a disability) in two large UK cities and their wider metropolitan areas. The types of exclusionary experience described by our participants are organised into two broad overlapping categories – first, difficulties associated with navigating environments in which kerbs have been removed; and second, difficulties associated with interacting with vehicles (including bicycles) within and at the boundaries of shared or pedestrian spaces. Our findings are in line with those of previous projects that challenge and complicate claims that 'shared space' design, with its removal of kerbs and controlled crossings, enhances safety and mobility for all. Further, they demonstrate that many of the concerns associated with 'shared space' environments are also applicable to other types of street environment intended primarily for pedestrians. As well as highlighting and raising awareness of potential types of exclusion against which action should be taken, we draw attention to measures that could reduce the risk of such exclusionary barriers arising and persisting.

Keywords: shared space, pedestrianisation, accessibility, people with disabilities, exclusion, human rights

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1. Introduction

Commitments to increasing active travel, enhancing environmental sustainability and making town and city centres more vibrant and people-friendly have combined to generate powerful trends toward pedestrianisation and the opening up of streets to cyclists and people using other forms of micro-mobility (Parajuli and Pojani, 2018; Villani and Talamini, 2021). Such commitments are fostered and supported by Global Agendas such as the United Nation's (UN) Sustainable Development Agenda 2020-2030 (UN 2015) - particularly goal 11 of the Sustainable Development Goals (SDGs) on 'Sustainable Cities and Communities'), and the New Urban Agenda (UN 2016). The importance of ensuring that such initiatives produce spaces which are accessible, inclusive and to which there is 'universal access', including for people with disabilities (PWD), is highlighted in Target 7 of SDG Goal 11; and is a cross-cutting priority in UN Habitat's strategic plans for 2020-2023 (UN General Assembly 2020, para 76). It is also firmly embedded within the UN human rights system – most notably by articles 9 and 19 of the UN Convention on the Rights of Persons with Disabilities (2006) – henceforth CRPD.

Article 9 of the CRPD sets out the right to accessibility and requires States that have ratified the Convention to take 'appropriate measures' to ensure to persons with disabilities 'access, on an equal basis with others, to the physical environment' and 'transportation' and 'other facilities and services open or provided to the public". It goes on to specify that these measures should apply to 'roads' and 'transportation' as well as 'buildings, and other indoor and outdoor facilities' (CRPD, art 9(1)(a)). The UN Committee on the Rights of Persons with Disabilities (CRPD Committee) notes that implementing these rights is 'a vital precondition for the effective enjoyment of many rights covered by the Convention' (UN CRPD Committee, 2014 para 36) and that the CRPD envisages a world in which persons with disabilities can 'move in barrier-free streets' (2014 para 15). Article 19 sets out a right to live independently and be included in the community. Paragraph (c) of this requires States to take measures, including ones ensuring that 'community facilities for the general population', such as town and city streets, 'are available on an equal basis to persons with disabilities and are responsive to their needs'. In its general comment on this provision, the CRPD Committee repeatedly stresses that Article 19 requires that community facilities are accessible (2017 paras 14, 33, 38(d), 53, 54, 59, 79 and 98(b) and (d)).

Accessibility and inclusion should therefore be firmly embedded within initiatives to give greater priority to the needs of pedestrians, cyclists and others using different modes of active travel (Greed, 2011). In practice, however, there is a risk that new and possibly unanticipated forms of disabling barrier will be created – particularly in the absence of strong and effective mechanisms for involving persons with disabilities and their representative organisations in the early stages of planning and design (Park et al., 2019; Keates et al., 2003; Reuter, 2019) – a practice required by article 4(3) of the CRPD and recommended by UN Habitat Assembly 2019A (Annex paras 51 and 72 and 2019B (para H6)).

In this article we draw on emerging findings from the Inclusive Public Space project (IPS) – http://inclusivepublicspace.leeds.ac.uk. This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (advanced grant agreement No 787258). It is a five-year study, based at the University of Leeds with international collaborators in the Netherlands, India, Kenya and the United States of America. The authors of this paper all work on the project.

In this paper we reflect on various difficulties experienced by persons with disabilities and others in connection with shared space areas and other types of pedestrian environments with which our participants identified similar types of difficulty – notably pedestrianised spaces and pavements and pathways shared between pedestrians and cyclists. Difficulties reported include ones arising from design features as well as ones arising from the unlawful or irresponsible behaviour of cyclists or drivers. While the data presented here is UK-based, its implications for accessibility and inclusion are relevant to other countries, particularly those in Europe and the Global North. Our study makes a novel contribution in that it draws on extensive qualitative data which is neither confined to a particular street or type of pedestrian. Although we initially envisaged that the focus of this paper would be on shared space schemes, a close analysis of our data made it clear that participants understood the term 'shared space' broadly and that many of the difficulties they associated with it also have implications for other types of urban developments aimed at increasing pedestrianisation and active travel. Our findings and conclusions therefore have relevance beyond debates about shared space.

2. Shared space: Origins and UK Policy Context

Shared-space, in the mobility and transport context, is a form of street design developed in the Netherlands during the 1970s and 1980s by Hans Monderman, a Dutch traffic engineer. It aims to transform interactions between road users by creating environments in which drivers take cues from pedestrians and other road-users rather than simply complying with traditional forms of traffic regulation. In its conventional or pure form, it thus entails the removal of all traffic controls, including traffic lights, signs and markings, kerbs and physical divisions between pavements, roads and cycle paths. A range of measures (such as natural features, aesthetic objects and speed limits) are often used to promote positive driver-pedestrian interaction (Che et al., 2021). The element of uncertainty introduced by such schemes is intended to increase safety (de Hann, Nota, 2012) – the idea being that, if it is no longer clear who has the right of way, informal codes of human politeness will come into play (Kenniscentrum, n.d.). Road-users are thus expected to follow informal social protocols, act responsibly and cautiously and negotiate their right of way (Beitel, 2018; Havik et al., 2012; Havik et al., 2015).

Shared space design integrates vehicular traffic with pedestrians and other forms of human activity and aims to create environments which are not just part of the travel chain, but also pleasant spaces in which to be (Havik et al., 2015; Kaparias et al., 2015). They typically have limited or no formal traffic control (e.g. controlled pedestrian crossings and traffic lights), nor physical separation between vehicles and pedestrians (Hamilton-Baillie, 2008; Beitel et al., 2018; Che et al., 2021). The term 'shared space', however, lacks technical precision and is used to cover a range of different types of design. Kaparias and Li (2021) suggest that shared space should be regarded as a set of 'context-sensitive design treatments' aimed at creating pedestrian-friendly environments, noting that they range from the type of approach discussed above, which they refer to as 'naked streets' (because they have no or very little delineation between pedestrians and vehicles), to more 'light-touch solutions' involving, for instance, the replacement of controlled pedestrian crossings with uncontrolled ones.

There are some suggestions from the Netherlands (Kijkopkennis, 2018) and the UK (Swinburne, 2006) that the introduction of shared space can increase the safety of streets

– with traffic moving more slowly and the rate of major accidents declining. Shared space is also said to hasten progress toward a sustainable transport system (Hopkinson and Wardman, 1996; Wardman et al., 1997; Department for Transport (UK), 2011) and to better relationships between people, traffic and places (Hamilton Bailie, 2008; Hammond and Musselwhite, 2013). Because of perceived benefits such as these, the approach has been replicated extensively, including in the UK.

Nevertheless, shared space schemes have also raised serious concern. Evidence suggests that pedestrians face higher risks of collisions with pedal and electric bicycles (Paschalidis et al., 2016; Delaney, 2016; Hatfield and Prabhakharan, 2016; Poulos et al., 2015; Beitel et al., 2018; Liang et al., 2021). There is also growing evidence that they present particular risks for persons with disabilities and older pedestrians (Atkin 2010; Hammond and Musselwhite 2013; Matthews et al. 2015), many of whom therefore avoid such streets (Thomas, 2008; TNS-BMRB, 2010). This can lead to spatial and social marginalisation (Imrie, 2012), erode social infrastructures and entrench inequalities (Gharebaghi et al., 2018; Latham and Layton, 2019).

In the Netherlands, while shared space schemes continue to expand, concerns such as these have recently prompted a conversation amongst local authorities and road-users (Gerlag et al., 2015). A number of cities have strengthened traffic regulation in shared spaces, e.g. by prohibiting cyclists from using them between certain times of day. There are also examples of places in which shared space schemes are being completely abandoned (Maas, 2020).

In the UK too, recent years have witnessed a heightened profile for shared space in public debate. In 2017, a cross-party parliamentary committee (House of Commons 2017, para 170), noted widespread concerns about the extent to which the introduction of such schemes complied with the Equality Act 2010 – both in respect of the anticipatory reasonable adjustments duty and the Public Sector Equality Duty. One cause of the problem, highlighted by both that Committee (paras 172-175), and an earlier House of Lords Committee (House of Lords 2016, paras 323-324) was the lack of clear central government guidance on shared space. Such guidance as there was – in the Department for Transport's Local Transport Note 1/11 (2011) – was withdrawn in England in 2018, alongside the introduction of a government moratorium on the introduction of new shared space schemes, pending the publication of revised stronger government guidance. This was in line with recommendations from the House of Commons Committee (2017, paras 173-4 and 181) and others – including Holmes (2015, p 20) and the Disabled Persons Transport Advisory Committee (2018). Analogous steps have not yet been taken in Scotland, however.

3. Research Design, Methods and Analysis

This paper draws on qualitative data from the IPS project - a multinational study investigating problems caused by unequal access to city streets and the roles of law in shaping inclusionary, as well as exclusionary, environments. The study is ongoing and extends beyond the scope of this paper. For present purposes, only data from interviews with UK pedestrians were used – data collection from UK stakeholders and from both pedestrian and stakeholder participants in other countries being incomplete at the time of writing. This paper is based on a qualitative study of semi-structured interviews exploring participants' experiences of using streets in two large UK cities and their surrounding

areas – Leeds (England) and Glasgow (Scotland). Both these cities are vibrant conurbations with strong histories of commitment to equality and inclusion.

A total of 83 people were interviewed – 50 in Leeds and 33 in Glasgow. Participation in the study was open to any adult who had experienced difficulties using streets in these areas, although our recruitment strategies focused particularly on persons with disabilities, older people and parents/carers of young children. Invitations to take part were disseminated via social media platforms, gatekeeper organisations, personal networks, and snowball sampling. Participants were then selected using a purposive sampling strategy (Robinson, 2014) with a maximum variation approach, to ensure a wide range of experiences, practices and perceptions. The sample composition was therefore diverse; there were thirty-eight people who self-identified as female (Leeds, n=21; Glasgow, n=17), forty-five as male (Leeds, n=28; Glasgow, n=17) and one as non-binary. Participants' ages ranged from 18 to above 85. While people under 18 years of age were not included in the sample, the problems they encountered when using streets were presented by participants who were parents, grandparents or other carers. Participants were asked to describe their ethnicity and any impairment type – a process that resulted in a wide range of answers. While exact categorisation is therefore not possible, it is clear that there was a good degree of ethnic diversity (e.g. 'White British', 'German', 'English South Asian', 'African', 'Scottish', 'Caucasian English', 'White Asian' and 'human and highly melanated'). It is also clear that a substantial majority of the participants were persons with disabilities with impairment types including with vision, hearing, mobility, cognition and multiple impairments, mental health and long-term health conditions such as asthma, diabetes and chronic fatigue. Across all these groups, the pedestrian experience of street barriers ranged from occasional or minor obstacles to complete isolation. The wide range of sampling criteria allowed us to collect in-depth accounts of inclusionary and exclusionary experiences of streets and thus to achieve theoretical saturation (Guest et al., 2006). There was some variation between the Leeds and Glasgow based sample populations. Particularly noteworthy was the greater proportion of Blind and partially sighted (BPS) participants in the Glasgow sample. This appears to be linked to the fact that Blind and partially sighted participants were particularly concerned about various pedestrian-related developments in Glasgow, such as the 'Avenues' programme aimed at pedestrianising the city centre. Problems relating to shared space are raised much less frequently by Leeds participants – perhaps reflecting the City Council's longstanding commitment to minimising 'shared space' in the city.

Ensuring accessibility of the research tools and process was a high priority throughout the research process. Participants were invited to request project information in formats of their choice, including standard text, large print, Braille, audio and easy read, in hard copy or electronic format. Due to Covid-19 restrictions we were not able to conduct the interviews in person, as originally planned so, depending on the choice of the participant, interviews took place via phone or an online platform such as Teams or Zoom. Participants with cognitive impairments were interviewed by a member of the research team who has extensive experience of working with and alongside this population group, using techniques such as simple words and short sentences, asking one question at a time, various rephrasing techniques and self-directed reflections (Eskytė, 2019; Rodgers, 1999). The interviews gathered data about the participants' experiences of streets, but many of them indicated that they had not visited relevant areas for some time because of COVID-19 and other risks and difficulties associated with navigating the relevant space.

Participants also stressed that significant alterations were taking place in both Leeds and Glasgow at the time of our data-collection process. The aim of the interviews was not to gain an accurate and up-to-date understanding of the nature of streets in the two cities. Rather it was to gain an in-depth understanding of types of street environments which participants found problematic and exclusionary and the reasons for this.
Interviews using a semi-structured topic guide lasted 30-90 minutes and were conducted by phone (Leeds, n=22; Glasgow, n=17) or online (Leeds, n=28; Glasgow n=17). Interviewees were asked to reflect on types of streets and pedestrian journeys they found challenging, as well as on what made such journeys more accessible for them. A wide range of challenges were identified, which will be addressed in subsequent publications. The focus of this paper, however, is purely on difficulties associated with shared space schemes and other types of pedestrian environments often referred to by participants as 'shared space' and raising similar types of difficulty for them. This focus was selected because of the frequency with which such difficulties were mentioned by our interviewees and the importance they attached to them.
With the participants' consent, all interviews were audio-recorded, transcribed, and pseudonymised before undergoing thematic analysis (Ritchie and Spencer, 2002). Initial thematic coding was carried out independently by two team members – IE and AL -– with emerging themes then being compared and discussed within the broader team to promote rigour and facilitate consensus regarding coding choices (Blaikie, 2010).
Ethical approval was obtained from the University of Leeds Business, Environment and Social Sciences joint Faculty Research Ethics Committee (19-004); and the European Research Council Ethics authority.

4. Findings

Two key overlapping themes connected with shared space environments emerged: first, difficulties associated with navigating environments in which kerbs had been removed; and second, difficulties associated with interacting with vehicles within and at the boundaries of shared or pedestrian spaces. These two themes will be used to organise this section. After discussing each of them, we will reflect on the strategies used by participants to address the challenges posed by these types of streets.
To provide context to readers, where reference is made to a participant, we generally include codes to indicate the relevant city (Glasgow – GL, and Leeds - LD) and the impairment type of the participant in question (blind or partially-sighted – bps; and mobility impairment – mi). Where these codes are not used, relevant contextual information will be provided in the text.

4.1 Difficulties Associated with Navigating Environments Without Kerbs

Many Blind and partially sighted participants commented on the importance of kerbs as an orientation cue, and the difficulties caused by their removal in shared space and other pedestrianised environments. For example, William (LD, bps) noted that:

> The main difficulty is when they do like block paving straight across, […] and you've got no differentiation between the roadway and the pavement. That is problematic.

Similarly, Jeffrey (GL, bps) explained:

> There are no kerbs. So, the road is completely flat so it's really difficult to understand where I am. Whether I am standing on a pavement. Whether I am standing on a traffic island, or, whether I am standing in a cycle lane or whether I am in the road because there is very little to guide me about that, because the kerb in a sense has been removed. And where there are tactiles, there aren't enough of them and where they have been placed isn't that helpful.

Neil (GL, bps) also stressed that the tactile markings provided were insufficient for locating particular features within a street with no kerbs, noting that:

> I mean at the traffic lights now yes you've got the dimples to raise awareness where the traffic lights are and that's fine. That's brilliant. But getting to the traffic lights is a different matter.

Several participants described how the removal of kerbs affected navigating with a guide dog or a long cane. Richard (GL, bps) noted:

> Most shared spaces I find very difficult to navigate. My cane can make contact with lots of things because there is not as many raised or obvious tactile delineation of maybe where pedestrian walkways or cycle paths or indeed roads [are], so it mostly blends together. A lot of the time it can be big open spaces. Also, with my guide dog, you know, they are trained to walk in the middle of the pavement and you come to a large open area, they very much struggle to figure out where they are supposed to be walking because it is all just one big open space.

Wendy (GL, bps), after recognising that "having the kerbs was a huge thing for us", explained that shared space environments might be:

> great for lots of people but they are very disorientating because we don't have a kerb to go by. You could be anywhere in that full vicinity of from one side of the road to the other […] and yes, you're telling your dog where to go and what to do but if she finds that there's something in front of her she'll go the easiest route which might end up taking you in a completely different place to where you expect to be. I would automatically think I was coming to the lights at the right-hand side. But if she's done a few detours, I could be on the left.

Similarly, Neil (GL, bps) told us that:

> if you're up there with a cane and you're totally blind you just would not have a clue where you are. There's nothing to get a reference off. Like there's no kerb, there's no edges, nothing. It's just flat. It's fine in an architect's ideal world. Reality is it's no working.

Blind and partially sighted participants also drew attention to the additional difficulties in navigating shared or pedestrianised streets created by awkwardly positioned street

furniture and other obstacles. Several drew attention to how this prevented them from being able to follow building lines (e.g. with a long cane), which is particularly important where there is no kerb to follow. Larry (GL, bps) told us that:

> I can't use my high street because all the café furniture is along the building line and that's where blind people follow. With a white cane you need something to follow and that usually is the building line. So when there's café furniture up against the building line, we then have to work our way around all the tables and chairs. And we can't socially distance when there are people sitting at chairs and we get our cane tangled up with tables and chairs.

Wendy (GL, bps) also noted:

> You're going to have to make detours. So instead of keeping your shops on your left hand side or your right hand side and knowing your shops, you're having to move out and go towards the centre. So I find it very confusing, I find it very difficult because you can end up in amongst chairs and trees and wires and things instead of next to your boundary which is so important for us [and] if you lose your boundary you lose your bearings completely. And it's very difficult to get that back.

Such problems could be at least partially mitigated by measures such as clear tactile way-marking that could be followed by cane-users or by appropriately ring-fencing café furniture with solid barriers which would then effectively become an extension of the building line.

Other problems were also created by the positioning of street furniture. William (LD, bps) noted:

> The shared space areas are terrible to deal with. […] And you do have this with these pedestrian areas as well. Where it is wide and then you got stuff in the middle. It is keeping your bearings depending on where you are going and the weather conditions and how much crowds there is and all that stuff.

Richard (GL, bps) also observed:

> If you are going in a shared space, I run the risk of completely losing my, place and space essentially. […] I find the street furniture, that is a bad problem in most streets but shared spaces seems to be an excuse for people to put up any and all you know, street furniture, whether it be trees and bins and electric boxes and any other number of things they want to throw up there, very frustrating, I don't understand it, or why it needs to be there.

Participants also expressed concerns about badly positioned structures such as bollards, statues, arty marble blocs, planters, etc., when used either for practical purposes (such as separating pedestrians from cyclists or to carve out rest spaces) or simply for aesthetic reasons. The unpredictability of such artefacts may pose additional barriers to navigation, potentially leading to physical injury, as made clear by Ian (GL, bps):

> They put in all these weird little just blocks, marble blocks which were, to me they probably come up to […] just below my knee and they, they are murder when you smack into them, you know, because they are randomly placed. So you have got a solid marble block, you crack your knee off or you crack your shin off and it is excruciating …

Interestingly, this point was echoed by Nicole (GL, mi) who, unlike the participants quoted above, has no visual impairment but does have a mobility impairment which causes balance problems:

> They try to beautify it with lovely hanging baskets and things which then puts another pole in the middle of the walkway where people are going to be going past.

She stressed that, while additional pedestrian seating would be helpful, it should be positioned carefully so as not to create additional obstructions:

> What would be good is maybe more benches for people to sit down but in a proper area rather than sometimes it just seems like random areas.

In summary, the removal of kerbs without clear alternative route-finding tactile markings, as well as badly positioned or inappropriately ring-fenced street furniture and other obstacles, were the key navigational barriers caused by shared and pedestrianised space that emerged from the data.

4.2 Difficulties Associated with Interacting with Vehicles

In this second theme, we present participants' reflections on interacting with vehicles when using shared space and related areas (including pedestrianised environments and pavements with attached cycle-ways). There was evidence that pedestrian-vehicle interaction within such spaces was often problematic, as was identification of the boundaries between such spaces and those through which cars, bicycles or other vehicles travelled at speed.

Several blind and partially sighted participants expressed feelings of alarm, frustration or exclusion because of the proliferation of shared space schemes in which controlled crossings were removed and safe pedestrian-driver interaction depended instead on making eye contact. In the words of Stephan (GL, bps):

> And also, some of the crossings, […] they've actually now made it that there isn't even really any place where you could reasonably look for the control box for the button because all you have is a great big space which I suppose traffic and cyclists and everybody else are supposed to mingle in and the pedestrians, certainly the blind pedestrians are right down the bottom of the list of consideration.

Similarly, Larry (GL, bps), referring to a town outside Glasgow, explained:

> My local town, they've taken away all the traffic lights and controlled crossings at a four-way junction. Now nobody knows who has right of way where in fact nobody has. And people like me simply avoid the area.

He added:

> That is the basic concept of shared space. You make eye contact and the driver stops, that's the theory. But practice is different.

Similar concerns were expressed by Arthur and Ian, respectively:

> I know a lot of cities are looking at shared spaces with pedestrians and cyclists altogether but the whole thing about that is about eye contact and drivers and cyclists and pedestrians don't work unfortunately. That doesn't apply to blind people. (Arthur, GL, bps)

> What they say is that the drivers should slow down and, you know, they should be more aware and watching for pedestrians and you don't manoeuvre until you can see the driver's eyes and the driver can see your eyes but that is fine when you can see but if you can't see that is a problem and the trouble is that because there is still a throughway for vehicles, you will get some drivers who will just fly along and go through at normal speed and don't even consider it. (Ian, GL, bps)

A number of participants mentioned interacting with motor vehicles in spaces primarily designated for pedestrians. Tom (GL, bps) stated:

> A problem that I face quite a lot in pedestrianised areas is from traffic, especially from motorised traffic; trucks, cars, vans that are serving buildings and doing maintenance emptying bins and things. I can't see them to get out the way.

Eric (GL, mi), a wheelchair user who does not have a visual impairment, commented on a street in Glasgow city centre:

> Basically, it has got the shared space and they have designed it wrong, and, it is now dangerous for me but, more dangerous for anyone that is blind […] because a lot of the cars don't bother slowing down. And, if you have a collision with a car they tend to win; they might be in the wrong but you end up in hospital.

Ally and Wendy also highlighted the anxiety and risk associated with the unexpected presence of delivery and service vehicles in what they assumed to be pedestrianised space. These encounters happened more at certain times of day, exacerbating a sense of unpredictability and confusion:

> On the main high street I have experienced it with delivery vans …. I mean just really not expecting to kind of have to dodge vans and cars along the area because I thought it was all just a pedestrianised space. (Ally, GL, bps)

> And the fact that you have, you have delivery vans on the streets from certain times. I know it's certain times but if you've got them and you don't know that they're there, I would say that's probably [one of] the most dangerous things that you've got to watch. (Wendy, GL, bps)

Several participants had experienced difficult encounters with people using micro-mobility devices such as scooters and skateboards. The sense of precarity generated by such experiences is apparent from the following words spoken by Ian (GL, bps):

> Generally, the guys with the skateboards will wiz passed no problem but it is anticipating them, you can hear them coming <laughs>, they are coming quite close to you but you don't know if it is going to hit you, you don't know […] if they've seen that you can't see, so that can be a problem.

Kathleen (LD, bps), who has a guide dog, described feeling "as if we're invisible", in her interactions with e-scooters. Significantly perhaps, in the following passage she makes no distinction between her encounters with e-scooters and cyclists:

> The scooters and the bikes should stay on the outside near to the road. But they don't, they are all over the place. They are zooming up and down. And I don't hear them coming. There are no bells. Sometimes I hear someone on a mobile phone when they are riding. But it is a nightmare, an absolute nightmare. […] you get the scooters and the bikes, and they are just drifting past all over weaving in and out. It's a license for them to just get mobile, really mobile. And I understand these scooters can go up to twenty miles an hour. But it is quite scary. It is unnerving. They are weaving in and out. They are not all like that, but some just don't care. They want to get on and get moving. But it is quite scary when you don't hear them. You don't hear them coming. And then you know it is quite rude when they are moving across in front of you. If someone is coming around you, and then across you and they are seeing you with a guide dog, surely they realise that I must be visually impaired.

Mary, a wheelchair-user from Leeds who has learning disabilities, also drew attention to the hazards of encounters with scooters:

> It can get really dangerous around here and with scooters as well you know, peoples' mobility scooters even they, they can be quite dangerous as well sometimes a lot of the time when I'm going on the path if they're on the path as well they won't let you get past and they'll just drive into you so you've got to kinda get out of the way of them.

The type of road-user with which participants most commonly reported having problematic encounters was cyclists. The speed and silence of bicycles makes sharing space with them particularly challenging for Blind and partially sighted people. As Arthur (GL, bps) observes, 'one of the problems for most Blind people is bicycles because you can't hear a bike.' Because of this, he adds, 'most of the near misses I've had in the streets of Glasgow have been with bikes, just missing maybe because I don't see them coming.'

Near misses with cyclists were also reported by other participants with various impairments:

> The main traffic problem that I've had in localised areas is from cyclists in our shared spaces. And I've often had either a cyclist coming up taking me unaware and frightening me or because, going past when I'm walking forward and because I can't see them, and they haven't taken in the fact that I have a white cane or have a guide dog with me that they just think that they can go straight past me. And I've had a couple of near misses. (Tom, GL, bps)

> But then suddenly out of this glare you'd have a cyclist on the pavement coming straight at you. Now that could get quite stressful. (Luke, LD, bps)

> Yeah, I might have had a near miss with a cyclist come round a corner and nearly hit me. (Trevor, LD, heart condition)

Anxiety about such encounters was also expressed by Brenda – an older person from Leeds who did not identify as a 'person with a disability':

> Especially I worry about, I mean I do worry about them coming up behind you. They come up behind you and they know you're there but you don't know they're there.

Many, but by no means all of the participants' difficult interactions with bicycles involved inconsiderate, dangerous or unlawful behaviour by cyclists. In the words of Arthur (GL, bps), 'there is a lot of responsible cyclists I must admit but there are just some, who aren't responsible, really-really dangerous.' He describes an encounter with cyclists on a pedestrianised street in Glasgow City Centre, 'they must have been going about thirty/thirty-five mile an hour. It was frightening'.

Ally (GL, bps) spoke of 'really frustrating experiences with cyclists on what I thought was pavement areas', many of whom were delivery cyclists who 'tend to be quite focused and they've also they've got a time limit, and seem completely blinkered of what is going on around them'.

Ronald, a wheelchair-user who enjoys taking his dog for walks on the walkway along the Clyde (Glasgow), noted that, 'the thing that is most difficult about that is that it's also a cycle lane. Sometimes cyclists think it's their cycleway and you go, "no it's actually a walkway for everyone"'.

Eric, another wheelchair-user from Glasgow, when describing the danger presented by cyclists, noted:

> The cyclists are meant to stop and give you way but, the cyclists don't bother. The cyclists are meant to get off their bikes but, the cycle lanes are straight and there are four or five areas where they are meant to get off and walk with the cycle. But, you never see them do that, they just cycle through and so, if anyone goes across and they don't get a perception of the speed and things like that you end up with a collision. Cyclists are worse than drivers most of the time.

Observations such as these highlight the danger faced by all pedestrians, but especially, of crossing fast-moving cycle-ways without controlled crossings. Many Glasgow participants spoke of the difficulties they had experienced when trying to cross cycle lanes which run between bus stops and pedestrian spaces – a design often referred to as a 'bus-stop bypass' or a 'floating bus-stop'. Larry (GL, bps), who has a visual impairment, likened the experience to playing "Russian roulette" and added:

> Not many people are prepared to cross a cycle or a two-way cycle lane to get on and off a bus. And if we consider even mothers with a buggy when they come off a bus, they tend to come off backwards so they're coming off and backing straight into a two-way cycle lane.

The second type of problematic traffic interaction mentioned by participants concerned poorly demarcated boundaries between shared or pedestrian space and fast-moving vehicles. Such boundaries can broadly be divided into those which are lateral and those which are linear. All shared and pedestrian space has lateral boundaries marking its limits, but other lateral boundaries, typically created by more standard roads intersecting shared or pedestrian spaces are also fairly common, featuring in many of the accounts of participants, particularly in Glasgow. Linear boundaries, typically where cycle lanes or roads run adjacent to pedestrian space, also caused problems for many participants. Boundary identification issues typically entail interaction with other road users, hence their discussion here, but it is important to acknowledge the thematic overlap with orientation and navigation problems discussed above. The following words of Richard (GL, bps) neatly demonstrate this overlap:

> I don't know whether I am on the pavement, whether I am on the cycle path, or whether I am on the road a lot of the time.

As regards lateral boundaries, several Blind and partially sighted participants indicated that it was impossible to identify with any certainty whether they were walking on the correct side of the boundary between pedestrian and road space, because of the absence of kerbs and appropriate tactile markings. As Larry (GL, bps) explained:

> Normally you would come to the edge there and there would be a dropped kerb and you would have some tactile marking there to let you know that you're coming to the end of the kerb, dropped kerb. And you would cross the road carefully. Well, what they're doing now is raising the road, the side road up to the same height as the pavement. So we don't know whether we're on the pavement or on the road. And this is again, it's kind of part of shared space.

This point was also made by Wendy and Ian respectively, who both highlighted the dangers arising from the absence of continuous tactile markings to indicate boundaries between pedestrian or shared space and roads:

> I would say the highest risk is when they've got rid of the pavements and it's a crossing. You could miss that and be halfway across the road before you realise you're actually on the road. And it's not for the lack of crossings or boxes that they put in because they pretty much have a box at each side. So they do have

> plenty of crossings. But I can't see the crossings so it's very much luck of whether you go on the tactiles. […] And I would say that's probably the most dangerous bit. (Wendy, GL, bps)

> You've got three or four roads that cross that pedestrianised street and very, numerous times I've gone there […], and struggled with the crossings because they are not obvious. If you don't hit the tactiles next to the crossing poles then you can easily drift onto the crossroad without realising you are on the crossroad. (Ian, GL, bps)

As regards linear boundaries, a key concern to participants was poor differentiation between cycle lanes and pedestrian spaces. The lack of accessible information to indicate the existence and position of a cycle lane was highlighted by a number of Blind and partially sighted participants:

> … there is nothing to distinguish between the pavement and the cycle path itself. So Blind people can walk onto it. […] the same applies with the road itself, there is no kerb, you can walk right onto the incoming traffic [and] when you come off a bus you are right onto the cycle way, there is nothing, there is not a kerb or anything to tell you, you are on that cycle way. (Arthur, GL, bps)

> They have made the pavement wider and then they have put in a two-way cycle lane and then a bus stop, a separate raised pavement for stopping. No delineation between the pavement and the cycle lanes. [And] there is a twenty-millimetre lip on the pavement, that's all the kerb that's there, twenty millimetre which is almost indiscernible with a white cane. (Larry, GL, bps)

> Now one difficulty that you have is you know when you get cycle ways, and you get a white line down the pavement. That can be problematic because dogs are taught to work centre pavement. This is no good because you know you can't differentiate which side of the line you are supposed to be. And you know one side is the cycle way and the other side would be the pedestrian walkway. Now the difficulty is knowing where you are, you know, because there is nothing – if there is just a painted line on a pavement that doesn't really help you, you know. So it is difficult it is very difficult. (William, LD, bps)

Some Blind and partially sighted participants also found that obstacles in pedestrian spaces made it more difficult to avoid drifting into poorly demarcated cycle lanes:

> you've got to be mindful and have to stick to the left, but when you stick to the left, you end up with overgrown bushes sticking out on the left. So, yeah, you're having to go round them but then you're mindful that cyclists might be coming down and you've got to step out. So, you know, it's kind of like stepping out into the road, you know, something much quicker and bigger than you might be coming. (Sandip, LD, bps)

> Once you cross the cycle path there is a tactile pavement so you can then walk down the kind of reservation, where the bus stops are but there is also, at the bus stops, at the bus shelters there is racks to put bikes on, you've got to try and get round that and you are right on the cycle way. (Arthur, GL, bps)

Some Blind and partially sighted participants highlighted the increased dangers associated with navigating unfamiliar or newly designed shared spaces:

> So the first time I tried to navigate that I came off the bus and I walked backwards along to where, I was going to [a coffee shop] and I didn't realise I was walking down the centre of the vehicle aspect of that shared space and it wasn't until somebody pointed out that I was indeed walking down the middle of the road with a long line of traffic. (Ian, GL, bps)

> Cause I know which one's a cycle path and which isn't, you know, it's not so bad for me, but if I was to cross the road and I'd get to the other side and have the other tactile markings to tell me I'm on the pavement, there's a cycle lane and then you have to walk a bit further and there's a white dividing line, which has a little bit of a bump so you can sort of tell it's there if you concentrate. And then it's the walking path, but I could guess if you didn't know the cycling path was there, you'd just start walking on the cycling path. It's the first bit of pavement that you come to that's not on the road, you might not know that there's a second section further along which is for pedestrians. (Sandip, LD, bps)

Similar problems were also mentioned by two participants with other types of impairment. Justin from Leeds, who has a neurological impairment, noted:

> Well that is very problematic with the cycle lane because it is the same colour as the pavement and so, you can very easily step into the cycle lane, […] you can't see that it is a cycle lane. So, again, it is separating cyclists from the road but, it doesn't separate the cyclists from the pedestrians so, it is just complete thoughtlessness again. I have a bit of a fear of this when I am walking along, and, I have constantly got one eye on the cycle lane, don't step into it, don't step into it. In places it is the same height and there is no demarcation at all.

Mary, a Leeds-based wheelchair-user who has learning disabilities, told us about her local cycle lane:

> The problem is we're not able to tell which is which so you don't know which is the cycle and which is the pedestrian lane in certain parts. It's like they have like a little sign on the floor, but on most of it there's no signs so quite a few times when I've been out for a walk with my carer now, been on the wrong side. I might have been on the cycle one not knowing it was a cycle lane and I've had abuse telling us to move out the way and that we're in their way […] But the thing is if, it's not labelled properly, how are people supposed to know what side to go onto - because I don't want to get into anyone's way but I wasn't sure which side you know is the best side for me to get onto. And the problem is there's a big

> concrete like a step sort of thing that goes in between the two paths so even if a bike did come my way I wouldn't be able to move out of the way because if I moved, my chair would've been tipped over, because it's like a slanting lip in between, so if anybody like went over there, your chair would just like tip over.

These accounts highlight the importance of clear information, in visual and tactile form, allowing all pedestrians to identify and negotiate boundaries between pedestrian and cyclist space. Such tactile boundaries should be of a type that is obvious to Blind and partially sighted people but easily navigated by people needing to escape from or cross over cycle lanes. Whilst there was recognition amongst the participants of the importance of keeping cyclists safe, their testimonies powerfully demonstrate the danger and anxiety that interactions with fast-moving cyclists generate for many pedestrians with disabilities – interactions which multiply when they are required to share space with cyclists or to cross cycle lanes without the help of controlled crossings.

4.3 Avoidance of Problematic Shared Space Environments

Participants reported employing various strategies to deal with barriers in shared spaces. These include using relevant streets outside rush hours and being accompanied by others. However, when accessing public space independently, the dominant strategy was to avoid problematic areas altogether, and use alternative routes instead.

> To be honest it is much easier just to do a thirty-minute avoidance route than it is to cut through the shared space which takes two/three minutes, you know, and that is fine on a nice day but it is also, it is not good if it is crap weather, it is not good if it is, you know, night-time and it is dodgy dark streets. You want to cut through the middle of the area that is well lit and has the security cameras. You don't want to cut through the dodgy dark streets to avoid the anomalies you are going to face cutting through the shared space. (Ian, GL, bps)

This has more wide-reaching implications for the participation of persons with disabilities in society. Not only does it restrict their pedestrian participation, but it also affects their participation in other activities – such as engagement with retail markets as a consumer:

> I would definitely alter routes if possible, […] and maybe go the long way round or decide to, if it's a choice that I'm meeting somebody someplace, no we won't go to that restaurant, it's too difficult to get to, let's go to another one. (Sheila, GL, bps)

> So if I lose my bearings in that respect then I very quickly get fed up to be quite honest <laughs>. I get fed up just like oh do you know what, I'm just going home, I'll get it the next time and I just don't bother going. I'm not a great shopper so anything like that just puts me off and I think "no, I'll just no bother, I'll just leave it today". (Wendy, GL, bps)

While persons with disabilities, particularly persons who are Blind and partially sighted, are undoubtedly affected by these exclusionary aspects of shared and analogous space, Larry and Ian note that in some situations the exclusionary impact extends to the population more generally:

> They've taken away all the traffic lights and controlled crossings at a four-way junction. Now nobody knows who has right of way where in fact nobody has. And people like me simply avoid the area altogether. And that doesn't help local business. The town is now a ghost town. Shops are closing. (Larry, GL, bps)

> The first thing you are taught when you are a small child with your parents is not to step off the kerb into the road, you know, so kids are going to struggle with that but then you've got the other end of the scale, you've got maybe adults with learning difficulties, who are really going to struggle with that because they are not going to realise in some cases that they are on the road or you've got elderly people with Alzheimer's or with dementia. There are so many different people from different aspects of life who it is going to affect. It is not just me as a blind person. (Ian, GL, bps).

5. Discussion

There is global recognition that many cities are becoming more 'sprawling, fragmented, unwalkable … car-dependent, and unsustainable (UN Habitat Assembly 2019B, para K1). This has a particular impact on the mobility of people who are poor, elderly, children, and who have disabilities, with the risk that their 'democratic right to access the city and the city's public spaces' will thereby be undermined (UN Habitat Assembly 2019B, para K1). There is therefore an urgent need to develop road planning that promotes mobility through active travel (such as walking, wheeling and cycling) rather than cultivating dependence on cars (UN Habitat Assembly 2019B, recommendation H3(3); UN Habitat 2020, p 3). It is this need to which shared space schemes and pedestrianisation initiatives seek to respond. Despite the evident importance of their aims, our findings demonstrate that the environments which are shaped by such policies sometimes fall far short of providing access for all.

Shared-space is often viewed as a compelling concept, offering a sustainable and flexible solution to public space design and interaction between different road-users (Greed, 2011; Barr et al., 2021; Che et al., 2021). Our research, however, supports earlier work in highlighting discrepancies between the theoretical ideals of shared space and its operation in practice (Bates, 2008; Moody and Melia, 2014; Parajuli and Pojani, 2018; Villani and Talamini, 2021). While shared space environments presented particular challenges for our blind and partially sighted participants those with mobility, cognitive and neurological impairments also experienced problems using it. Its underpinning principles of mutual observation, eye contact and social protocol were regarded by many as based on ableist assumptions about the capacities of 'normal' pedestrians – and as being akin to the rules of a game for which they were not fitted and in which the stakes were set too high.

Our findings indicate that types of difficulty associated with conventional forms of shared space were also experienced by participants in other types of environment – particularly ones which were fully or largely pedestrianised with adjacent cycle lanes and intersecting roads or cycle lanes. Hence, there is an urgent need and opportunity for learning about disability inclusion in the shared space context to inform the active travel agenda more broadly. Unless this happens, there is a risk that assumptions, which have been

contested in the shared space context, will be permitted to build exclusion into other types of city space.

Another key finding is that shared and pedestrianised spaces often pose particular challenges in terms of navigation and orientation for Blind and partially sighted people. In line with other studies (Bates, 2008; Havik et al., 2012; Imrie, 2012), our findings suggest that a major cause of these problems is the removal of kerbs. Way-finding using alternative methods was often not possible – because of cluttered building lines or the absence of appropriate tactile markings. Risks associated with these navigation difficulties extend beyond inconvenience and pose a risk of serious injury – for instance of a person inadvertently walking into the path of oncoming vehicles. They are also likely to result in other forms of isolation and exclusion (Church, Frost and Sullivan, 2000).

The absence of controlled crossings, and the location of bus-stops on the other side of busy cycle lanes, are other examples of design features which many participants found extremely problematic. So too are items of street furniture or ornamentation, particularly when positioned in unexpected places without clear markings. Accessibility barriers are commonly thought of as being positive obstructions, such as flights of steps, high kerbs, uneven or lumpy surfaces, street furniture or overhanging vegetation (Clark and Gallagher, 2013; Campisi et al., Smith et al., 2021). Importantly, however, the absence of features (such as kerbs, tactile markings, boundary fencing and pedestrian crossings) was also experienced by many of our participants with disabilities as a form of accessibility barrier causing disorientation, injury, anxiety, and avoidance strategies resulting in reduced participation and increased social isolation (Bates, 2008; Moody and Melia, 2014; Villani and Talamini, 2021). The importance of introducing, maintaining and retaining such features, where context does not make doing so impossible, therefore merits emphasis in the type of accessibility standards and guidelines mandated by article 9 of the CRPD.

Some of the problems reported by participants arose, not from the presence or absence of particular features in the physical environment, but from the reckless and possibly unlawful behaviour of other road users – including people riding bicycles and scooters. Addressing such problems would entail clear and well-publicised regulations about road-user behaviour, backed up by strong and effective enforcement. The importance of "efficient regulation" of "mobility innovations entering the urban space", together with the need to build the capacity and resource to make this possible, has been acknowledged by UN Habitat (2019B, recommendation H5). Thus, although streets will not be inclusive without good physical and infrastructural design, an exclusive focus on design issues will not suffice. Regulation too is key.

As with other areas of policy and practice, effective consultation with persons with disabilities and their organisations in design and planning processes is likely to minimise the risk of exclusionary barriers becoming part of city streets. It is for good reason that requirements to involve people with disabilities lie at the heart of the CRPD. Establishing and operating such consultation and involvement processes is far from straight-forward, however, despite the helpful guidance offered by the CRPD Committee in its General Comment No 7 (2018). This is particularly so where attaining accessibility and inclusion for all entails identifying and negotiating different types of need which sometimes pull in different directions. We therefore urge cities to ensure that issues relating to effective involvement and consultation remain part of ongoing processes of capacity-building and best practice sharing (UN Habitat Assembly 2019B, recommendation H5).

6. Conclusion

Developing our towns and cities in ways that are accessible is a key requirement of the UN CRPD and a cross-cutting strategic commitment in relevant global agendas. It is therefore essential that initiatives to reduce the dominance of cars in urban spaces are designed and implemented so as to make streets useable by and inclusive of pedestrians with disabilities as well as those without. Innovations, such as 'shared space' design can and do result in the unintentional creation of new disabling barriers. Our findings add to the weight of other research projects which challenge suggestions that 'shared space' design enhances pedestrian safety and well-being. Many of our participants with disabilities – particularly, but by no means exclusively, those who were blind or partially-sighted – experienced such design as confusing, dangerous and exclusionary. Interestingly, it was clear from their interviews that many of the problems commonly associated with shared space design were also encountered in other environments intended primarily for pedestrian use.

Attentiveness to both physical design and regulation are key to the creation of urban environments which enable people with disabilities, safely and confidently, to navigate around town and city streets and to interact with other road-users within them. So too are effective processes for early and ongoing consultation with and involvement of persons with disabilities and their representative organisations. These are all issues that merit a high profile in existing (and future) efforts to build capacity within town and city planning bodies, share good practice and engage in mutual learning.

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