Journal of Transport & Health 41 (2025) 101961

Contents lists available at ScienceDirect

Journal of Transport & Health

journal homepage: www.elsevier.com/locate/jth

A meta-review of literature reviews of disability, travel and inequalities☆

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A B S T R A C T

Introduction: The importance of travel for mental and physical health and the adverse impacts of transport on health are increasingly recognised in policy and practice, but less attention is paid to the effects of disability on the ability to travel.
Methods: We searched the TRID database on June 1, 2023, using abstract keywords 'disability' or 'disabilities'. We used the index term 'literature reviews' in 'all publications' from 2019 to 2023 inclusive. We also searched the journal *Transport Reviews*, finding six reviews, and were informed of two additional reviews. We repeated the search in July 2024, using Google Scholar. Forty-three unique recent reviews examined travellers with physical or cognitive disabilities; 24 met our inclusion criteria and underwent quality appraisal.
Results: Travel behaviour differs between transport users with and without disabilities. Those with disabilities make 10–30% fewer trips. They tend to use different transport modes and travel to nearer destinations but their journeys often take more time, are more complex, and can cost more. Individuals with disabilities are less able to travel both locally and regionally. This reduces independence, increases unemployment, and leads to missed medical appointments. Travel barriers vary with type and severity of disability, socioeconomic status, and transport infrastructure quality. People with disabilities often use familiar routes for comfort. Systemic obstacles include public transport unreliability; long waiting times; maintenance issues (e.g. pavement [sidewalk] maintenance, vehicle accessibility equipment); accessibility and affordability; and poor access to technology and information. Training for people with disabilities and transport staff is beneficial.
Conclusions: The United Nations Convention on the Rights of Persons with Disabilities highlights the importance of transport to help people with disabilities access the same services, goods, and people as other people. Taking a universal design approach benefits everyone. Barriers can be overcome with accessibility policies integral to the transport planning process.

1. Introduction

Disability is "an umbrella term for impairments, activity limitations and participation restrictions, denoting the negative aspects of the interaction between an individual (with a health condition) and that individual's contextual (environmental and personal) factors"

☆ This paper is a shortened and updated form of Mindell JS, Amin S, Mackett RL, Taylor J, Yaffe S. 'Disability and travel'. Chapter 2 in Mindell JS, Watkins SJ (Eds). *Health on the Move 3: The reviews*. Elsevier, 2024. It is published here with permission of the publisher and of the book series and journal editors.

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https://doi.org/10.1016/j.jth.2024.101961
Received 28 March 2024; Received in revised form 7 November 2024; Accepted 22 November 2024
Available online 4 December 2024

(World Health Organization, 2015). Disability can result from congenital disorders, injuries, or conditions acquired while aging. Disability can impede day-to-day activities including travelling. Travel is important for independence and quality of life, providing access to education, employment (Tessier et al., 2024), social and leisure activities, healthcare, shops, family and friends (Mindell and Watkins, 2024).

Three main types of disability affect travel behaviour: cognitive, mobility and sensory (Park et al., 2023). Cognitive problems include neurodevelopmental disorders, particularly Autism Spectrum Disorder (ASD) and Attention Deficit/Hyperactivity disorder (ADHD), learning disability, and cognitive decline, including dementias. Mobility problems from physical impairments include musculoskeletal, neurological, and reduced physiological reserve with respiratory and circulatory diseases, each of which increases with age. Many people have multiple health issues. For example, some long-term stroke survivors have one or more problems: motor, sensory, visuo-perceptive, language and/or cognitive deficits and poor mental health (McNamara and Dalton, 2024). In 2020, around 1.1bn people globally had vision loss, of whom 43 million were blind (Seetharaman et al., 2024).

Disability type and severity, and location (including rurality), can affect travel behaviour (Park and Chowdhury, 2022; Park et al.,

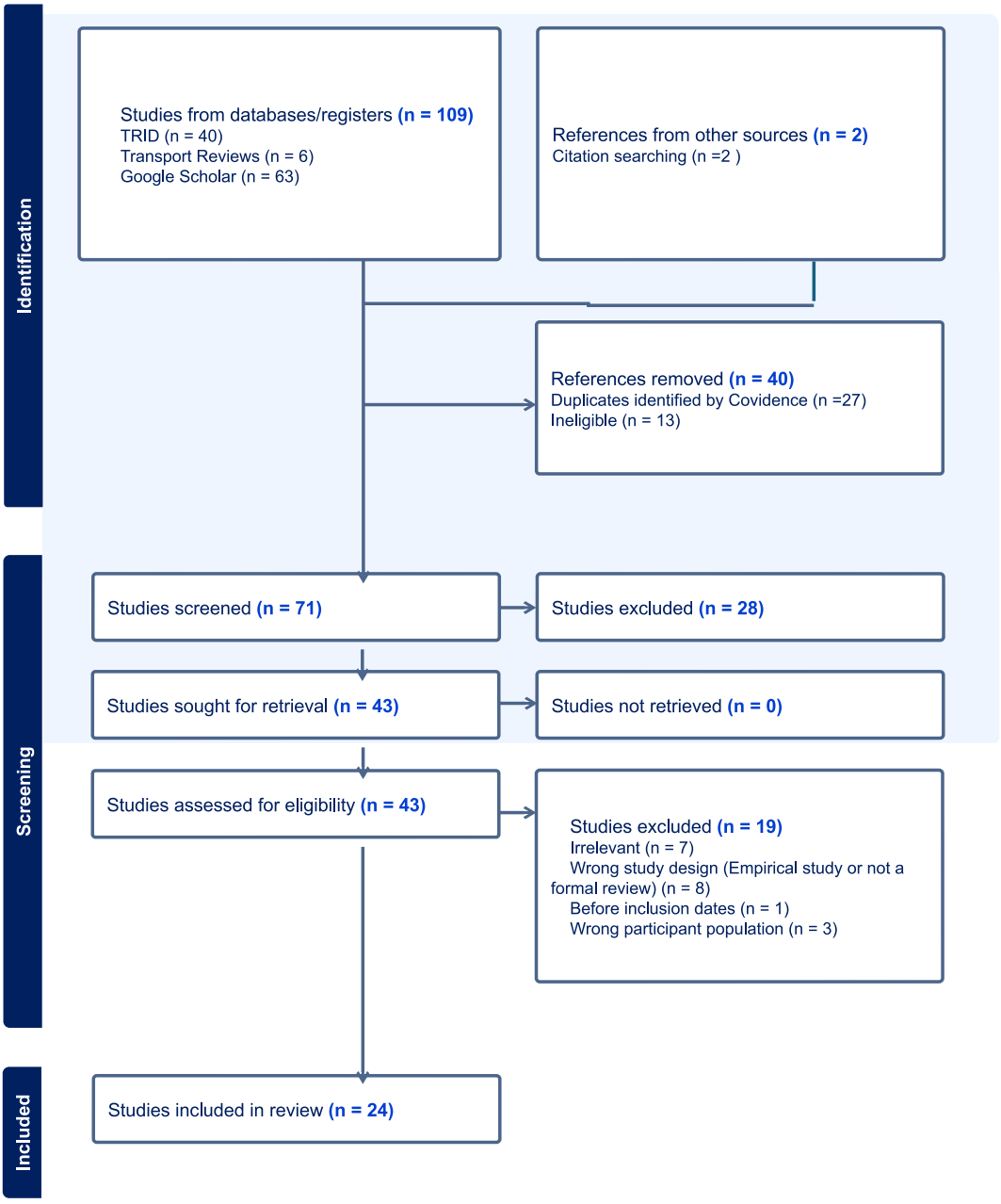

Fig. 1. PRISMA flow chart of literature search.

2023; Shen et al., 2023; Tessier et al., 2024). People with disabilities are less likely to be independent and more likely to be unemployed (Park and Chowdhury, 2022; Park et al., 2023; Tessier et al., 2024), partly through transport difficulties impeding access to healthcare and employment, and have less economic resources (Jahangir et al., 2024). In the USA, 11.2 million medical appointments are missed because of travel difficulties for people with disabilities. Providing rides for these people would have saved $19 billion in healthcare costs (Dicianno et al., 2021). Employment-related travel difficulties pose challenges in obtaining a job and travelling both to and for work (Tessier et al., 2024).

Several reviews of the literature on travel and disability have been conducted in recent years. This paper reviews 24 of the most recent comprehensive ones, in terms of the travel behaviour of people with disabilities, the barriers that make travel challenging for

Table 1
Quality assessment of the 24 included reviews.

Study ID	Was there a sufficiently focused question?	Were sufficient databases searched?	Did the authors look for the right type of papers?	Were all the important, relevant studies probably included?	Did the review's authors do enough to assess quality of the included studies?	Are the results clearly described?	Can the results be applied elsewhere?	Were all important outcomes considered?
Unsworth et al., (2021) [a]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chan [a]t al., (2024) [a]	Yes	Yes	Yes	Yes	Yes	Yes	Not necessarily	Yes
Kapsalis et al., (2024) [a]	Yes	Yes	Yes	Yes	Yes	Yes	To HICs	Yes
[b]rescott et al.,[b] (2020) [b]	Yes	Yes	Yes	Yes	No/Can't tell	Yes	Yes	Yes
Park and Chowdhury (2022) [a]	Yes	Yes	Yes	Yes	No/Can't tell	Yes	Yes	Yes
Park et al., (2023) [a]	Yes	Yes	Yes	Yes	No/Can't tell	Yes	Yes	Yes
Shen et al., (2023) [a]	Yes	Yes	Yes	Yes	No/Can't tell	Yes	Yes	Yes
Georgescu et al. (2024)	Yes	Yes	Yes	Yes	No/Can't tell	Yes	Yes	Yes
Lanthier-Labo[b]té et al. (2024) [b]	Yes	Yes	Yes	Yes	No/Can't tell	Yes	Yes	Yes
Mwaka et al. (2024) [b]	Yes	Yes	Yes	Yes	No[a]Can't tell	Yes	Yes	Yes
Tessier et al. (2024) [b]	Yes	Yes	Yes	Yes	No/Can't tell	Yes	Yes	Yes
Bolic Baric et al., (2024) [b]	Yes	Yes	Yes	Yes	No/Can't tell	Yes	To HICs	Yes
Downie et al. (2020)	Can't tell	Yes	Yes	Partially	Yes	Yes	Yes	Yes
Kett et al. (2020)	Yes	Yes	Yes	Partially	No/Can't tell	Yes	Yes	Yes
Dicianno et al., (2021) [a]	No	Yes	Yes	Partially	Yes	Yes	Yes	Yes
Parker et al. (2021)	Yes	Yes	Yes	Yes	No/Can't tell	Yes	Partially	Yes
McNamara and Dalton (2024) [b]	Yes	Yes	Yes	Yes	No/Can't tell	Yes	Yes	Yes
Ross et al. (2020)	Yes	Yes	Yes	Yes	No/Can't tell	Partially	Partially	Partially
Jahangir et al. (2024) [b]	Yes	Yes	Yes	[c]	No/Can't tell	Yes	[c]	Yes
Seetharaman et al., (2024) [b]	Yes	Yes	Yes	Yes	No/Can't tell	Yes	Not necessarily	Yes
Venkataram et al. (2024)	Yes	Can't tell	[c]	[c]	No/Can't tell	Yes	[c]	Yes
Bates et al., (2019) [a]	Yes	Yes	Partially	Partially	No/Can't tell	Partially	Can't tell	Partially
Gaustad et al. (2019)	Can't tell	Can't tell	Partially	Partially	No/Can't tell	Yes	Partially	Yes
Campisi et al. (2023)	No	Can't tell	Can't tell	Can't tell	No/Can't tell	Partially	Partially	No

[a] Used PRISMA guidelines.
[b] Used PRISMA-ScR guidelines (PRISMA guidelines adapted for Scoping Reviews).
[c] The assessment was 'Yes' in relation to the stated aim of the review, but 'partially' in terms of our internationally-focusssed meta-review.

them, the range of policies and actions that have been proposed to address the issues and identifies some of the remaining gaps.

2. Methodology

2.1. Literature search

The TRID database (https://trid.trb.org/) was searched on June 1, 2023, using abstract keywords 'disability' or 'disabilities'. We used the index term 'literature reviews' in 'all publications' from 2019 to 2023 inclusive. The studies included in each of those reviews covered considerably longer timeframes. We also searched the journal *Transport Reviews*, finding six reviews and were informed of two additional reviews. On July 31, 2024, we updated the literature search using Google Scholar, to cover the widest range of publications, using the search terms 'disability', 'disabilities', 'travel', 'transport' and 'transportation', for reviews published from 2019 to 2024. As we were interested primarily in issues with everyday travel for people with disabilities, we excluded reviews predominantly on tourism or air travel. We used Covidence (www.covidence.org) to manage the review process. Fig. 1 shows the numbers of papers screened at each stage.

We assessed 24 reviews (Bates et al., 2019; Bolic Baric et al., 2024; Campisi et al., 2023; Chan et al., 2024; Dicianno et al., 2021; Downie et al., 2020; Gaustad et al., 2019; Georgescu et al., 2024; Jahangir et al., 2024; Kapsalis et al., 2024; Kett et al., 2020; Lanthier-Labonté et al., 2024; McNamara and Dalton, 2024; Mwaka et al., 2024; Park and Chowdhury, 2022; Park et al., 2023; Parker et al., 2021; Prescott et al., 2020; Ross et al., 2020; Seetharaman et al., 2024; Shen et al., 2023; Tessier et al., 2024; Unsworth et al., 2021; Venkataram et al., 2024). Further details of the original search are reported elsewhere (Mindell et al., 2024). Fig. 1 shows the literature search PRISMA (Preferred Reporting Items for Systematic Reviews) flow chart.

2.2. Critical appraisal

Two reviewers (JM and SA) assessed each of the included reviews, using the Critical Appraisal Skills Programme (CASP, n.d.) checklist.

The quality assessment is shown in Table 1, ranked in descending order in terms of risk of bias. Although Gaustad et al. (2019) and Campisi et al. (2023) presented no evidence about the literature search methodology used, they were included because they raised important issues. Venkataram et al. (2024) described their review as comprehensive but not a systematic or scoping review but the search was thorough. It explicitly focussed on the USA context. Kett et al. (2020) was a thematic review based on a systematic search.

Seventeen papers were rated highly (Bolic Baric et al., 2024; Chan et al., 2024; Dicianno et al., 2021; Downie et al., 2020; Georgescu et al., 2024; Kapsalis et al., 2024; Kett et al., 2020; Lanthier-Labonté et al., 2024; McNamara and Dalton, 2024; Mwaka et al., 2024; Park and Chowdhury, 2022; Park et al., 2023; Parker et al., 2021; Prescott et al., 2020; Shen et al., 2023; Tessier et al., 2024; Unsworth et al., 2021), and five were of reasonable quality (Bates et al., 2019; Jahangir et al., 2024; Ross et al., 2020; Seetharaman et al., 2024; Venkataram et al., 2024). Although 20 papers did not discuss the quality of the papers they reviewed (Table 1), ten of these (Bates et al. (2019), Prescott et al. (2020), Ross et al. (2020), Bolic Baric et al. (2024), Jahangir et al. (2024), Lanthier-Labonté et al. (2024), McNamara and Dalton (2024), Mwaka et al. (2024), Seetharaman et al. (2024), and Tessier et al. (2024)) were scoping reviews, for which quality assessment is generally excluded.

3. Travel behaviour

3.1. Frequency of travel

People with disabilities travel less often: the frequency decreases with greater disability (Dicianno et al., 2021; Park et al., 2023; Shen et al., 2023). Over 30% of Americans with disabilities sometimes choose not to travel; many cannot travel spontaneously; >6% rarely leave home (Dicianno et al., 2021; Park et al., 2023; Shen et al., 2023). A higher proportion of their trips than other people's are to healthcare; they make far fewer trips for recreation and to cultural activities (Park et al., 2023; Shen et al., 2023).

3.2. Mode of travel

More trips are made by bus, taxi, and as car passengers by people with disabilities (Bolic Baric et al., 2024), than other people, with fewer as pedestrians, cyclists, or car drivers (Park et al., 2023). Walking remains an important mode of transport for people with disabilities, even if this is a smaller proportion than for people without disabilities (Venkataram et al., 2024). Walking is a major first/last mile travel mode for those using public transport. Driving is common in car-oriented societies (Venkataram et al., 2024). Driving or travelling with friends, relatives, companions or car-pooling is common in rural areas (Tessier et al., 2024).

Some people with ASD never use public transport; use of fixed route transport was uncommon in some studies. Those who do were likely to prefer buses to trains because of greater predictability and ease of learning, shorter waiting times, comfort, and seating, despite concerns about missing the right stop to alight (Bolic Baric et al., 2024). Having a disability can make simple journeys by public transport preferable; having to wait for ramps to board or alight from a train can make car or taxi more attractive (Kett et al., 2020; Prescott et al., 2020).

Some people with disabilities have difficulty entering and leaving a car (Shen et al., 2023). They are also less likely to be car owners or hold a driving licence (Dicianno et al., 2021; Shen et al., 2023). This is particularly an issue in rural areas and societies with high car

ownership levels and less public transport provision (Gaustad et al., 2019). Many low- and middle-income countries (LMICs) have public transport provided by private companies using shared minibuses, which are often not accessible (Dicianno et al., 2021); have drivers without disability training; and operate only limited services. Thus cars and taxis are often preferred by people with disabilities in LMICs (Kett et al., 2020).

3.3. Travel time

People with disabilities are more likely than other people to use the bus. This can be time-consuming because travel time includes waiting at bus stops and use of circuitous routes (Park et al., 2023). Individuals with disabilities may need more preparation and longer boarding times than when travelling by car (Dicianno et al., 2021; Prescott et al., 2020). This can lead to fewer trips being made (Shen et al., 2023). Taxi drivers are often reluctant to carry passengers with disabilities (Tessier et al., 2024), particularly wheelchair users, because of the extra time required loading a wheelchair and entering and leaving the vehicle (Kett et al., 2020).

3.4. Cost of travel

Travel costs can be higher for people with disabilities. For example, adapting a car to make it suitable for use by a person with a disability is very expensive (Downie et al., 2020). The high cost of taxi and car rental, particularly in rural areas, can reduce access to services, jobs and education for people with disabilities (Kett et al., 2020). In some countries, travel can be cheaper if booked early, but people with health conditions that fluctuate from day-to-day may be able to decide only on the day of travel.

3.5. Children

Across the world, a range of levels of provision of accessible travel are offered for children with disabilities. In France, they tend to travel to school by public transport; in Denmark, they may use a 'disability car'; in the USA they may travel on 'Special Ed' school buses (Downie et al., 2020). In some countries, they are given priority access to school buses (Ross et al., 2020). Those with behaviour issues may travel in separate, special vehicles (Downie et al., 2020).

While bus travel may be safer for some children with disabilities than travelling by car, standard vehicle restraints may be unsuitable for some children with disabilities. Downie et al. (2020) reported that some parents are ignorant about travel safety issues for their children with disabilities, for example about needing suitable restraints. Both cost and resistance by children to using them can exacerbate the problem. Another issue is the need to carry mobility aids or oxygen for some children (Ross et al., 2020). In Sweden, only 20% of parents with children with autism knew about the requirement for special safety equipment for their children. Parents of these children had more concerns than parents of children with other disabilities (Downie et al., 2020). These issues can make access to education more challenging for children with disabilities than other children (Ross et al., 2020). Other safety issues include worries about children with poor verbal communication being left on the bus (Bolic Baric et al., 2024). High staff turnover and insufficient staffing also impede good provision of appropriate school bus transport provision (Chan et al., 2024).

4. Barriers to travel

4.1. The nature of travel barriers

People with disabilities require every stage of a journey to be accessible (Mwaka et al., 2024; Shen et al., 2023). Unsworth and colleagues, in their systematic review of public transport accessibility for people using mobility devices, describe four stages of a journey.

i. Travelling to and/or from a public transport stop;
ii. Waiting at a public transport stop;
iii. Boarding and alighting public transport; and
iv. Moving within a public transport conveyance to the allocated space (Unsworth et al., 2021).

In addition, they need to plan the trip and buy any tickets (Bolic Baric et al., 2024; Lanthier-Labonté et al., 2024). For people with neurodevelopmental disorders, planning included consideration of life as a traveller and whether this was worth the effort before the stage of seeking information (Bolic Baric et al., 2024).

Given that people with disabilities are more likely to use public transport, the well-known five dimensions are even more important (Lanthier-Labonté et al., 2024).

- Availability (the existence of transport services);
- Accessibility (the service can be reached and used easily);
- Acceptability (the service meets users' expectations of quality standards);
- Affordability (fares/fees that are similar to driving); and
- Adaptability (transport which can accommodate individuals' specific needs.

The entire trip must also be affordable and available (Park and Chowdhury, 2022). Gaustad et al. (2019) found a range of barriers which they ranked in descending order in terms of the number of papers of the 40 reviewed that mentioned them. The top three were inadequate facilities, rurality, and mobility. Other barriers include poorly designed infrastructure, such as inappropriate signposting, and unsuitable pavements [sidewalks] (Prescott et al., 2020), institutional ones (policy, politics and legislation), poor vehicle design, lack of appropriate information before and during the journey, and attitudes of staff and fellow travellers.

4.2. Behavioural barriers

4.2.1. People with disabilities

People with physical disabilities may have difficulty progressing along the street or need frequent rests. These may make journeys longer and require the use of mobility aids, such as crutches or mobility scooters. However, many mobility scooter users are unsure where to ride their devices and how to access public transport stops (Unsworth et al., 2021).

Sensory overload, including noise, lights, smell, touch, balance, motion sickness, and claustrophobia, unwanted contact and insufficient personal space cause problems for people with ASD (Bolic Baric et al., 2024). Sensory impairments reduce the amount of information that can be received from the environment and other people. People with poor hearing may not hear travel announcements. Those with visual impairments may lack awareness about the environment around them, such as where road crossing points and information signs are, trip hazards, and the approach of a bus. The inability to see landmarks can make wayfinding and locating entrances difficult (Prescott et al., 2020; Shen et al., 2023). Although street objects can be a hazard to those with poor vision, they can also provide landmarks to aid wayfinding, as completely clear walking paths can be hard to navigate (Seetharaman et al., 2024) The increase in the number of electric vehicles (EVs) is making crossing the road more challenging for those who cannot see, because of the quietness of the vehicles. These issues often mean that some people with disabilities tend to stick with familiar routes (Prescott et al., 2020). Many people find the time allowed at signalised crossing is too short because of the assumed walking speed of 1.2 m/s, e.g. in England (Asher et al., 2012) and Brazil (Duim et al., 2017). This applies particularly to people using canes and walking frames (Prescott et al., 2020) or wheelchairs. Larger intersections might require islands with a separate walk signal.

People with cognitive impairments such as dementia, acquired brain injury and learning disabilities, have difficulty receiving and processing information (Park and Chowdhury, 2022). Those with neurodevelopmental disorders can have difficulties processing information, which needs to be clear and comprehensive, to enable detailed planning so the traveller feels in control (Bolic Baric et al., 2024).

Travel behaviour change requires self-efficacy, belief in one's ability to perform the task (Mwaka et al., 2024). The review of public transport use by people with neurodevelopmental disorders found some confident to use public transport and others uncertain. The latter found the unpredictability, inconsistency and inflexibility of public transport difficult, especially for new routes. The need to manage quick changes and cope with cancellations, delays and route changes were particularly problematic. Uncertainties cause emotional distress (Bolic Baric et al., 2024).

4.2.2. Transport staff

Staff behaviour can impede or aid the mobility of people with disabilities (Venkataram et al., 2024). Discourteous behaviour is common in Bangladesh (Jahangir et al., 2024). Jerky driving, with rapid acceleration and braking, increases the risks of injuries and poor experience of travel for people with disabilities (Mwaka et al., 2024). Bus drivers sometimes agreed to stop for and transport people only in smaller mobility devices and would not always 'kneel' the bus, even when this was required for access (Mwaka et al., 2024; Unsworth et al., 2021), or claimed there was no room on board (Venkataram et al., 2024). Safety concerns of parents of children with neurodevelopmental disorders regarding school buses include inadequate staff knowledge of the children's abilities and needs, as well as their children's communication and sensory difficulties, and lack of safety regulation compliance (Chan et al., 2024).

4.2.3. Other people

Family members who discourage public transport use hinder travel but relatives and friends may provide lifts to work or elsewhere (Tessier et al., 2024).

Some people with a disability rely on a travelling companion, for example to drive them or to receive and process information when wayfinding in unfamiliar surroundings (Bolic Baric et al., 2024; Prescott et al., 2020). Dicianno et al. (2021) found that over 40% of people with disabilities require a companion when travelling.

The behaviour (Kett et al., 2020; Park et al., 2023) and attitudes (Unsworth et al., 2021) of other travellers can adversely affect people with disabilities when travelling and make them feel unsafe, isolated, resented, and frustrated ((Bolic Baric et al., 2024; Mwaka et al., 2024; Park and Chowdhury, 2022). This is an issue particularly for people with non-visible disabilities which others may not recognise or understand (Shen et al., 2023) and is a major determinant of dementia-friendly communities (Lanthier-Labonté et al., 2024). Bullying affects some children using school buses, especially older children with behavioural problems (Chan et al., 2024).

Other travellers with disabilities find unwanted assistance troublesome (Mwaka et al., 2024). Some users of wheeled mobility devices are made uncomfortable by the warning sirens often deployed for safety reasons when ramps are moved, because of bringing unwanted attention (Unsworth et al., 2021). Employer behaviour, such as preventing car-pooling for blind employees or on-site bus access, also limits job-related travel for people with disabilities (Tessier et al., 2024).

4.3. Environmental barriers

4.3.1. Weather

The weather can cause extra challenges for people with disabilities. Some people with disabilities may drive themselves but only in daylight and good weather (Venkataram et al., 2024). Difficult conditions underfoot, such as snow or ice, can make travel in winter even more challenging for people with disabilities (Mwaka et al., 2024; Park et al., 2023) and are particularly problematic for pedestrians with visual disabilities (Seetharaman et al., 2024). In countries with rainy seasons, flooding on roads and footpaths can result in precarious conditions for people with disabilities (Jahangir et al., 2024). Snow can also reduce visual contrast for those with some limited vision (Seetharaman et al., 2024).

Weather can also affect willingness to travel by bus, particularly for people with dementia if there are no bus shelters (Lanthier-Labonté et al., 2024), and use of mobility aids such as mobility scooters, which are usually not rain resistant (M. Mindell, personal communication). Charging batteries in very hot weather can reduce their effective life (https://loaids.com/tips-on-how-to-extend-the-life-of-your-power-wheelchair-battery/).

4.3.2. Built environment

4.3.2.1. General. The built environment is the main factor that affects travel by people with disabilities, although the picture is complex. Areas of mixed land use may make wayfinding more difficult for blind people but reduce trip lengths, assisting people with mobility difficulties (Shen et al., 2023). Large open spaces may be more difficult for blind people to navigate (Prescott et al., 2020; Seetharaman et al., 2024) but easier for manoeuvring a wheelchair (Prescott et al., 2020). Complex intersections and layouts, such as roundabouts, can be difficult to navigate safely (Seetharaman et al., 2024). Noisy environments can prevent travellers with poor vision from being able to hear auditory cues: both traffic noise and auditory prompts at crossings can obscure each other (Seetharaman et al., 2024). Excessive noise can also be distressing for people with dementia or neurodevelopmental conditions (Bolic Baric et al., 2024). Lack of quiet spaces may hinder people with dementia who need to avoid over-stimulation (Lanthier-Labonté et al., 2024). Crowded spaces, including platforms, are problematic for users of mobility devices.

4.3.2.2. 'Pedestrian' infrastructure. One problem is lack of pavements and footpaths (e.g. <20% of roads in Dhaka) and discontinuities (Jahangir et al., 2024). Bangladesh footpaths have the lowest walkability scores in Asia (Jahangir et al., 2024).

Poorly designed and maintained infrastructure underfoot can cause substantial problems, for example, narrow, obstructed, absent and poor quality pavements, cracks, potholes, steps, slopes and uneven surfaces and tree roots or vegetation (Bolic Baric et al., 2024; Georgescu et al., 2024; Kapsalis et al., 2024; Mwaka et al., 2024; Prescott et al., 2020; Seetharaman et al., 2024; Shen et al., 2023). Lack of auditory signal and/or insufficient time at signalised pedestrian crossings can impede movement by people with mobility difficulties, including dementia (Lanthier-Labonté et al., 2024), visual impairment (Park and Chowdhury, 2022; Seetharaman et al., 2024) and users of mobility devices (Kapsalis et al., 2024). Lack of tactile paving and audible traffic signals, and cars parked on the pavement each cause difficulties for blind people (Park and Chowdhury (2022), as do suboptimal changes in levels (both too small and too high) and increase the risk of falling (Seetharaman et al., 2024). These problems, and absent or inadequate dropped kerbs [curb ramps, cut curbs], also impede users of wheeled mobility devices (powered wheelchairs or scooters and manual wheelchairs). Sloping pavements can cause pain and fatigue, while cracked surfaces can cause harmful vibrations. Tactile paving and high kerbs, provided to aid people with visual impairment, can be challenging for users of wheeled devices (Georgescu et al., 2024; Kapsalis et al., 2024).

Blocked pavements, steps, and lack of ramps and lifts can hinder progress by people in wheelchairs and others with mobility difficulties (Park and Chowdhury, 2022). Other problems include transition between soft and hard surfaces or on slopes or other uneven ground, and where heights differ.

While fixed obstructions (including poles and signs) can be a challenge, they are easier to locate and recall than temporary or mobile obstructions. Objects at waist or eye level, including tree branches and open windows and doors, are hard to detect and avoid by people with visual impairments (Georgescu et al., 2024; Seetharaman et al., 2024). Other problems include a lack of high contrast between the pavement and road (Georgescu et al., 2024). Tactile surfaces can be slippery when wet, while white canes can get caught in the bumps (Seetharaman et al., 2024). Georgescu et al. (2024) provide a table highlighting which pedestrian infrastructure issues cause problems for which group(s) of travellers with disabilities.

4.3.2.3. Facilities. Insufficient or inadequate adequate seating may make travel more difficulty for those who need to rest frequently (Georgescu et al., 2024; Mwaka et al., 2024; Park et al., 2023). Bus shelters may not have sufficient space for users of wheeled mobility devices to wait comfortably (Unsworth et al., 2021) or be grassy (Mwaka et al., 2024). Bus shelters can affect air movement and ambient noise, affecting auditory cues to people with visual disabilities (Seetharaman et al., 2024). Provision of public toilets and accessible toilets at interchanges are also important for people with a wide range of mobility issues, including dementia (Lanthier-Labonté et al., 2024). Inadequate lighting can cause confusing shadows and make landmarks harder to identify for people with visual disabilities, although bright sunlight can hinder detection of changes in levels (Seetharaman et al., 2024).

Problems for users of wheeled mobility devices (and short travellers) include: controls for signalised pedestrian crossings sited too high (Kapsalis et al., 2024); information at stations and bus stops sited too high to be read (Unsworth et al., 2021); information on buses and trains being wrong or inaudible; non-functioning escalators or lifts (Mwaka et al., 2024; Venkataram et al., 2024); and lack of ramps to bridge physical gaps (Kapsalis et al., 2024). Even where ramps exist, their design and use can be problematic (Kapsalis et al.,

2024; Venkataram et al., 2024). The optimal angle of incline is around 5° (8.8%) for users of wheeled devices (Unsworth et al., 2021); the American Disability Act proposes a maximum of 8% (ADA Compliance Directory, 2024). Ramps also need to be strong enough for devices carrying heavier people (Unsworth et al., 2021).

4.3.2.4. Public transport. Long walking distances from stations and bus stops are another major barrier to public transport use (Mwaka et al., 2024). In Bangladesh, where public transport is mostly road-based, a lack of interconnected roads of different levels in the road hierarchy discourages people with disabilities from using buses. Although cycle rickshaws can aid first/last mile stages, they also increase congestion (Jahangir et al., 2024). People with neuro-developmental disorders also fear assault during the walk from public transport (Bolic Baric et al., 2024).

Poor public transport vehicle design can cause further issues. These include narrow entrances; lack of accessible seating and space for wheelchairs to manoeuvre inside the vehicle; alerts and pull-cords or buttons to request the bus stops sited too high; and large gaps between the vehicle and the kerb or platform (Kett et al., 2020; Mwaka et al., 2024; Park et al., 2023; Unsworth et al., 2021). The Jerusalem light rail was designed for easy use by people with disabilities, but ticket machines were initially sited too high for wheelchair users (J Mindell, personal communication). Vehicle design, including painful seating, can also be a problem for car drivers and passengers (Venkataram et al., 2024). Vertical and horizontal gaps between platforms and stations, and bus stops and vehicle floors, prevent users of wheeled mobility devices accessing public transport (Kapsalis et al., 2024).

4.4. Financial barriers

People with disabilities often have lower incomes than others because they cannot find suitable employment (Mwaka et al., 2024; Park and Chowdhury, 2022). They may have extra expenses in travelling, such as purchasing or leasing mobility equipment or specially adapted cars (Venkataram et al., 2024), or paying for an escort or more expensive journeys, all of which exacerbate inequalities (Shen et al., 2023). In car-oriented societies, with few other transport options, they may be excluded from work because of not being able to afford a car or its modification, or because the location of car rental companies is inaccessible (Venkataram et al., 2024). Accessing financial support may be difficult even when it is available (Downie et al., 2020).

4.5. Wayfinding and the use of technology

All trips require some form of wayfinding (or navigation) to reach the desired destination. This is a very complex process (Farr et al., 2012), requiring decisions to be made using information obtained while travelling or recalled from memory (Mackett, 2017, 2021). Finding one's way can be affected by the nature and perception of the local environment, and the ability to process information about it (Parker et al., 2021). The choice of route may vary by time of day, the weather and because of temporary blockages (Prescott et al., 2020). Not knowing in advance whether a particular bus stop is accessible can be very stressful (Unsworth et al., 2021).

People with disabilities may find routes other than the shortest more suitable for their needs, in terms of familiarity, simplicity, safer crossings, or less clutter, traffic, or crowding (Prescott et al., 2020). Some people with disabilities may need extra training at tactile and audible signals, particularly people using guide dogs and long canes (Parker et al., 2021).

People with cognitive impairments, especially those with dementia, have particular challenges when wayfinding, making more errors and hesitations (Prescott et al., 2020). Memorizing their destination and orientating themselves on the journey may be harder. In France, 41% of community dwellers with mild to moderate Alzheimer's disease could not travel on public transport even with assistance. Interchanges are particularly difficult (Lanthier-Labonté et al., 2024). People with neurodevelopmental disorders may find it challenging to understand signposts and other visual clues (Bolic Baric et al., 2024).

Some people lack the hand dexterity needed to key in websites accurately and use search engines on mobile phones. Others may need screens with specific font and size characteristics along with the ability to zoom in easily. Some may need fully accessible technology including accurate speech-to-text and screen-readers. Consequently, they often cannot use the technology for wayfinding, to order rideshares when travelling (Shen et al., 2023) or for making electronic payments.

5. Some fundamentals

5.1. Key issues

Access to transport improves the wellbeing of people with disabilities (Dicianno et al., 2021). The challenges that people with disabilities face with travelling are best tackled through collaboration between users and policy makers, planners and operators, producing a supportive environment with accessible communication channels (Downie et al., 2020; Park and Chowdhury, 2022; Park et al., 2023; Prescott et al., 2020).

Park et al. (2023) stress considering a variety of disabilities when planning accessible transport. The design of vehicles and transport systems needs to cover all types of disabilities, and mobility aids such as walking sticks and wheelchairs. Mobility vehicles, both powered and unpowered, need to be easily available. Buses and trains need to be designed to accommodate these aids with the vertical and horizontal gaps between the vehicle and the pavement or platform as small as possible. Surfaces should be non-slip wherever possible, and design of ramps, railings and other infrastructure considered. People with visual impairments are assisted by the use of tactile and Braille signals and signs (Shen et al., 2023). Accessibility of the first/last mile also needs consideration (Tessier

et al., 2024).

Park et al. (2023) highlights how people with disabilities change their travel behaviour to avoid barriers. That review also stresses the repercussions of travel barriers on people with disabilities compared with other transport users, including on travel patterns, travel frequency, and cancellation of trips (Park et al., 2023), which can hinder the ability to socialise (Bascom and Christensen, 2017), affecting quality of life, physical and mental health and wellbeing, and increasing loneliness (Georgescu et al., 2024). Reliance on others to drive or accompany people with disabilities also puts demands on others' time, reducing the ability to travel (Venkataram et al., 2024).

Policies can have unintended consequences without adequate testing. People with disabilities using adapted cycles in a UK town had to overcome social and financial challenges. Utility journeys were problematic because of physical barriers, e.g. needing to dismount in pedestrianised areas. Those with non-visible disabilities felt particularly exposed cycling alongside motor traffic (Cox and Bartle, 2020). Some UK taxi drivers have religious or cultural objections to transporting dogs, reducing taxi availability for service animal users (Tessier et al., 2024). Increasing use of quiet EVs has been accompanied by more pedestrian collisions at urban crossings (The TAS Partnership Ltd, 2013).

Other barriers include inadequate toilet facilities (Mindell et al., 2014), and difficulty remembering the bus number for people with short-term memory loss. Because of poor availability of public transport in rural areas, some people with disabilities move to urban areas (Tessier et al., 2024).

Universal Design makes transport accessible for people with disabilities (Mindell et al., 2011). This approach benefits everyone, for example, kneeling and low floor buses, and train access without steps and with minimal gap (Unsworth et al., 2021), and good quality, well-designed and well-maintained pedestrian infrastructure, particularly adequate pavements, pedestrian crossings, and bus stops benefits people with a wide range of disabilities (Mwaka et al., 2024). Universal design is now widespread across Asia as well as North America and Europe (Unsworth et al., 2021).

5.2. Policy and legislation

Solving transport problems for people with disabilities has important equity value. A wide range of solutions designed to eliminate or circumvent barriers or directly address specific disabilities is required. The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) (UNDESA, n.d.) highlights the importance of transport to help people with disabilities access the same services, goods, and people as other people. It focuses on universal design and has been signed by many countries but is often not enforced.

Goal 11 of the United Nations' Sustainability Development Goals (https://sdgs.un.org/goals), *Making cities and human settlements inclusive, safe, resilient, and sustainable*, has a target: *'By (2030), provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons'* (target 11.2). The specific targets and indicators are tailored to the context or priorities of specific countries.

Policy and legislative examples such as the US *Americans with Disabilities Act* and the UK *Equality Act* offer an opportunity for continuing improvements. Transport-specific regulations, cross-disciplinary/departmental monitoring and financial assistance often lag behind the introduction of new technologies (e.g. app-based DRT; autonomous vehicles) or business models (ride-sharing such as Uber or Lyft). Many countries provide insufficient financial support to cover these additional costs of travel (Schuelke et al., 2022). Service providers need to address accessibility issues encountered by people with disabilities and to reduce stigma, including use of the British Design Council's Double Diamond approach (discover, define, then develop and deliver) for co-production (Tuli et al., 2023).

It is important to include a wide range of people with disabilities at every stage of planning and implementing transport policies. Not doing so often results in barriers that cost more to dismantle (Charlton, 1988). Monetizing accessibility when assessing infrastructure proposals could increase the priority accorded to inclusiveness (Burdett et al., 2017).

Co-operation is required between agencies. For example, Education Ministry support of inclusive education needs active Transport Ministry support (Kett and Deluca, 2016). Examination of over 50 London transport and cycling strategy documents found few mentioned or showed people with disabilities as actual or potential cyclists (Andrews et al., 2018).

Easily accessible, accurate information is especially important for people with disabilities to plan their journeys and choose transport options. Disability is higher among the unemployed: transport discounts based on income can improve independence and opportunity (Park and Chowdhury, 2022).

5.3. Heterogeneity of needs

Haptic cues (vibration, friction and acoustics) received through a white cane, are the most useful sensory cues for people with impaired vision. Tactile cues for such individuals can be naturally occurring elements of the environment or deliberately provided to aid navigation, such as tactile surfaces near street crossings or in railway stations (Seetharaman et al., 2024). However, some street elements can be a facilitator for some individuals but a barrier for others (Georgescu et al., 2024). For example, tactile surfaces for people with visual impairment can impede travel by users of wheeled devices (Kapsalis et al., 2024). Ticket booths and turnstiles need to be useable by people of different heights, while auditory information provided at turnstiles about remaining balance when 'tapping in' are other examples (Mwaka et al., 2024).

People with cognitive impairment are aided by simplifying key information points (physical displays or screen-based). Signs need to be easy to find and recognise (Lanthier-Labonté et al., 2024). Communication materials should be simple and include route branding or colour coding, along with staff to help at key interchanges, awareness training for staff, and passengers carrying discreet passes

(manual or electronic) to alert staff to potential needs for support.

6. Improving accessibility

6.1. Financial assistance

Many people with disabilities have low incomes and find public transport and taxi fares expensive (Tessier et al., 2024). In many countries, free travel or reduced fares are offered to people with disabilities, for example the United Kingdom (Shen et al., 2023), China and South Africa (Kett et al., 2020). Employers can facilitate access to work by providing suitable transport or financial assistance (Tessier et al., 2024).

Another approach is providing grants to modify vehicles, which can increase volumes of travel by people with disabilities, including children (Downie et al., 2020). In Sweden, families are offered grants to modify their cars (Shen et al., 2023) or to purchase motorised wheelchairs.

6.2. Staff training

All staff involved in transport operations, both those who interact directly with the public and management staff, need training in ways to assist passengers with disabilities, including awareness of the requirements of those with non-visible disabilities (Mwaka et al., 2024; Park et al., 2023), the needs (and rights) of people using wheeled mobility devices (Unsworth et al., 2021) and the needs of people living with dementia (Lanthier-Labonté et al., 2024). Many individuals with disabilities report needing well-trained drivers to promote feeling safe using public transport (Venkataram et al., 2024).

Staff involved in travel by children need training to understand how to assist with a range of behavioural issues that may occur during journeys (Downie et al., 2020). Security staff also need appropriate training, to understand that some behaviour which they find challenging may be due to a disability (Park and Chowdhury, 2022; Prescott et al., 2020).

Infrastructure engineers and transport planners need training in accessible design, including appropriate surfacing materials (Kapsalis et al., 2024), awareness of the importance of considering every stage of journeys, interchange between modes and alternative paths during construction (Prescott et al., 2020).

6.3. Training for people with disabilities

Travellers with disabilities, especially those with non-visible disabilities, can be given greater confidence through travel training (Shen et al., 2023). Three-quarters of the parents who had children with disabilities found a safe travel handbook useful (Downie et al., 2020). Training is often provided to improve walking by survivors of strokes with motor problems, but few interventions consider people with communication or cognitive problems, and few provide training for public transport or car use (McNamara and Dalton, 2024).

It is recommended that everyone living with dementia should receive training in public transport use, without making assumptions about their functional level (Lanthier-Labonté et al., 2024). People with neurodevelopmental disorders benefit from training in independent travel, ideally with 1:1 support of a companion before attempting travelling alone, including practising interacting with staff and coping with unpredictability. Strategies to ease reaching the ultimate destination include memorizing landmarks and learning the route visually (Bolic Baric et al., 2024).

People with non-visible disabilities can use driving simulators to improve their driving skills enabling them to focus on individual skills before multi-tasking (Bates et al., 2019).

6.4. Service provision

Special transport services (STS) are provided for people with disabilities in many countries, but Kett et al. (2020) identified none in low-income countries. The availability of transport services for community-dwellers with dementia, and the proportion granted public transport services varies widely, even within HICs (Lanthier-Labonté et al., 2024). 67% of family carers for such individuals in China reported transport service needs; 30% of free-living older adults with dementia in Hong Kong had unmet transport needs (Lanthier-Labonté et al., 2024). In many LMICs the emphasis has been on designing accessible public transport vehicles (Schultze et al., 2012). Sometimes vehicle modification is subsidised through government grants. Providing STS may be less cost effective than making ordinary public transport services accessible. Additionally, they segregate people with disabilities from other travellers.

STS provides travel for children with disabilities. For example, children in Curitiba, Brazil, are brought by bus to a central hub where they transfer, then the buses take them to schools across the city (Ross et al., 2020). The system also facilitates education of children about the travel environment, interaction with fellow passengers and drivers, and independent travel. In Nordheim in Germany, the MogLi project uses a bus that is identical to ones in service to train children with cognitive impairments (Ross et al., 2020). Training is also provided to bus drivers to understand the requirements of children with Down's syndrome and ASD. In Sweden, children with disabilities are tracked and intelligent bus stops used to provide information and other services (Ross et al., 2020).

Because interchange between services can be difficult for some people with disabilities, transfer facilities are often designed to assist them, including minimizing transfer times (Park and Chowdhury, 2022).

DRT (Demand Responsive Travel) offers flexible services from door-to-door, which suits many people with disabilities and

guarantees a seat or wheelchair space, but means that rides have to be booked in advance by telephone or internet, can be lengthy and are offered only at certain times (Campisi et al., 2023; Tessier et al., 2024). They can be expensive to operate, although some are operated by co-operatives or use volunteer drivers. Some services require users to pay towards the cost, which can make them expensive, particularly in places where conventional public transport offers free travel to people with disabilities. DRT is often difficult to provide in rural areas because of the long journey distances and low population density (Kett et al., 2020; Lanthier-Labonté et al., 2024).

6.5. Technology

The WHO considers access to assistive technology is both a human right and a necessity for equal participation opportunities (WHO, 2022). However, only a minority of the ≈2.5 billion people worldwide who might benefit have access to assistive technology. Several new apps provide user prompts at each stage of the trip (www.nadtc.org/news/blog/transit-accessibility-for-people-with-disabilities/), enabling people with learning disabilities or cognitive impairment to repeat regular trips independently.

'Smart bus stops' display arrival times in many cities. One in Paris provides wi-fi and USB charging and is accessible. London has 100 'Clear Channel shelters' using Google Outside to display information. The Portuguese TOMI (interactive electronic information stands) has smart furniture, including a bus ticket kiosk designed for people with disabilities. A range of cities are introducing increasingly complex bus stops with wider ranges of accessible services (Padrón Nápoles et al., 2020).

Technology can be used to modify vehicles, for example, to enable people to board and alight from cars, including their mobility devices (Dicianno et al., 2021). Technology can assist people with dexterity conditions by using voice or face recognition.

Ticket machines can pose challenges for people with disabilities, particularly people with cognitive or visual impairments (Park et al., 2023). In Durban, people with visual impairments had difficulties both finding and using such machines (Kett et al., 2020). Electronic ticketing and purchasing tickets beforehand are useful for people with neuro-developmental disorders (Bolic Baric et al., 2024).

Information technology, e.g. smart phone apps, can assist people with disabilities in both planning routes and travelling, for example, finding suitable bus routes at the trip planning stage. These may minimise walking distance or identify routes suitable for children with behavioural issues (Ross et al., 2020). They can also provide real-time information about the arrival of buses and trains (Kett et al., 2020) or suggest less crowded routes or journey times for people with ASD (Bolic Baric et al., 2024).

Wayfinding technology increases the probability of making independent journeys for some people with disabilities, particularly equipment that facilitates virtual previews of the journey and provides a comprehensive route description (Parker et al., 2021). However, some users preferred apps that produce information when required during the journey, to avoid information overload (Parker et al., 2021).

Parker et al. (2021) assessed 35 papers from 14 countries, reviewing wayfinding technology designed to assist those with visual impairments. These included apps and devices such as robots and smart canes that offer real-time guidance. Some devices provided information via headphones or through the body by haptic touch, such as vibration. Some users wanted information presented in Braille. Many of the systems studied included training. The positioning of the device on the body impacted its accuracy and how information could be accessed. Using a wayfinding device could also affect the use of other equipment, such as holding on to handrails on stairs and escalators. Some users wished to receive information in advance; many wanted it repeated. People who used guide dogs, who tend to walk faster than other people with visual disability, required information more quickly to prevent them passing junctions before receiving instructions. This was addressed by allowing users to adjust the timing of the information received.

6.6. Autonomous vehicles

Autonomous vehicles (AVs) offer people with disabilities the potential to travel wherever they wish without relying on others to drive them. As many as two million AVs have been estimated to be required to meet mobility needs of people with disabilities in the USA (Dicianno et al., 2021).

AVs would need to be designed appropriately to meet these needs (Dicianno et al., 2021). Travellers with mobility issues need careful alignment between the vehicle and the platform. People with dexterity issues need to be able to reach and manipulate the controls. The vehicles need to be large enough to allow a wheelchair to be manoeuvred, with a door wide enough for two people to enter side-by-side to assist people who need an escort to travel. People with visual impairments require information to be audible or use large print and tactile indicators to show where to go. People with impaired hearing require visual information. People with cognitive impairments need simple controls and very clear information.

Speech-recognition software needs improvement, because some currently find recognition of female voices difficult (Criado-Perez, 2020). A key need is for the software used to recognise the movement of pedestrians on the street to identify pedestrians with disabilities, so they are allowed more time for road crossing and moving out of the way.

Until fully autonomous vehicles are in operation, their potential for people with disabilities will be limited. Some technology being developed as part of the process towards that stage may assist some people with disabilities, for example, those with dexterity issues.

7. Strengths and limitations

This paper focused on searching systematically for and analysing recent, high-quality reviews. Our methods fit the published best practice guidelines for conducting a meta-review (Hennessy et al., 2019), including transparency of methods, reproducibility,

conducting a systematic search, duplicate screening, quality appraisal, including assessment of possible bias, and reporting all steps. However, not all individual studies of disability and travel have been reviewed. Sixteen of the 24 reviews included had themselves used PRISMA or PRISMA-ScR guidelines.

Several studies described travel patterns of people with disabilities without comparing those with people without disability. Further limitations are exclusion from reviews of relevant topics (e.g. see section 5.1 above).

Some reviews were specific to a single country (Bangladesh (Jahangir et al., 2024), USA (Venkataram et al., 2024)); to people with one type of disability (e.g. visual impairment (Parker et al., 2021), dementia (Lanthier-Labonté et al., 2024), or stroke (McNamara and Dalton, 2024)); a population group (e.g. children with disabilities (Gaustad et al., 2019; Ross et al., 2020), older people (Jahangir et al., 2024)); or to users of specific mobility aids (Unsworth et al., 2021). Bolic Baric and colleagues (2024) noted that only one of the studies they included focused on people with ADHD, expressing their concerns that such individuals are ignored during transport planning.

Most of the reviews included only papers written in English, although two reviews also included papers in French (Lanthier-Labonté et al., 2024; Tessier et al., 2024), and consequently also excluded barriers experienced in some other countries by travellers with disabilities. Kett et al. (2020) was the only review that focused on the Global South, where people with disabilities are likely to encounter worse transport barriers while Jahangir and colleagues' 2024 literature review focussed on Bangladesh. Only around one-quarter of studies included by Kapsalis et al. (2024) were not from Global North HICs, with Georgescu et al. (2024) finding even fewer (from China, Ecuador, Malaysia, and Mexico, all upper-middle income countries). The impact of accessibility barriers that people, especially children, in LMICs face are far greater than in HICs. One solution for children is motorised tricycles pulling trailers, used in Mashonaland West Province, Zimbabwe (Kett and Deluca, 2016).

Many reviews combined information on a wide range of disabilities. Even where more specific, e.g. visual impairment, reviews reported that the empirical studies included often did not distinguish between different causes or severity of impairment and how this affected travel (Seetharaman et al., 2024). The USA Transportation Technical Assistance Coordination Library (TACL, www.nationalrtap.org/Resource-Center/TACL) was not included in this review. Issues of inaccessible indoor space are important (Kapsalis et al., 2024) but were not within the scope of this review.

8. Conclusions and future research

A wide range of barriers and some facilitators to travel by people with disabilities have been reported. Many of these also affect the general population, but to a lesser extent (Venkataram et al., 2024). The most commonly mentioned barriers are pedestrian infrastructure, particularly non-existent, narrow, or uneven pavements, while wide, good quality pavements with benches ease travel to local destinations and public transport stops. As people with disabilities generally have below average income and above average expenditure, transport costs are another substantial barrier. Improvements in public transport provision, including vehicle design as well as service frequency, need to be complemented by training for transport staff as well as for people with disabilities. All these issues are worse in rural areas and in LMICs.

Research is needed to resolve or prevent travel barriers that people with a wide range of specific disabilities, especially cognitive, face regularly. Research gaps include planning and design for dementia-friendly transport services (Lanthier-Labonté et al., 2024) and how best to enable both users of mobility devices and people with visual impairment to navigate, where facilitators for one group pose barriers to another. Only one of the 24 reviews focused on interventions (McNamara and Dalton, 2024), rather than describing the travel barriers and facilitators people with disabilities encounter.

Longitudinal studies would improve understanding of long-term consequences and how disabilities are affected by transport policies. Gaustad et al. (2019) mentioned that routine, aggregated data can hide issues faced by subgroups. Few studies have included comparator groups with similar demographic and socio-economic characteristics but without disabilities. That could identify which barriers are particularly important for people with disabilities and which are shared with larger population groups.

Unsworth et al. (2021) commented that their review of public transport accessibility for users of wheeled mobility devices found no studies of platform access for light rail and trams, another important gap to fill. They also recommended that research involves people with day-to-day experience of the issues, such as users of wheeled mobility. Jamal and Paez (2023), in their review of demographic and socio-economic differences in how COVID-19 affected individual travel in the Global South, commented that none of the studies they found considered people with disabilities.

Few studies of travel issues for people with hearing impairment exist. Prescott et al. (2020) suggest that they use visual cues but there is a lack of knowledge of the needs of people with aural and other invisible disabilities. Studies are also needed of how the rural environment affects travel by people with disabilities (Shen et al., 2023).

The UNCRPD highlights the importance of transport to help people with disabilities access the same goods, services, and people as everyone else. Barriers can be avoided or overcome with accessibility policies integrated within the transport planning process. Taking a universal design approach benefits everyone.

CRediT authorship contribution statement

Jennifer S. Mindell: Writing – review & editing, Writing – original draft, Project administration, Investigation, Conceptualization. **Roger L. Mackett:** Writing – review & editing, Investigation, Conceptualization. **Steve Yaffe:** Writing – review & editing, Investigation. **Sewa Amin:** Writing – review & editing, Investigation.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

We thank John Taylor for his contributions to the book chapter that reported the original literature review, and the anonymous reviewers for their helpful suggestions.

Data availability

No data was used for the research described in the article.

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