The role of transportation on the employment of people with disabilities: a scoping review

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The impact of transportation on the employment of people with disabilities: a scoping review

Abstract

Although many barriers remain to the employment of people with disabilities, public transportation can play a key role for integration and retention of people with disabilities in employment. However, research is needed to better understand how public transportation influences access to work for people with disabilities. This study aims to identify public transportation-related barriers and facilitators to the employment of people living with disabilities. A scoping review approach was adopted, with a keyword search through six databases. Studies' characteristics, transportation barriers, and facilitators to employment of people with disabilities were extracted from the selected articles. The results were presented descriptively and narratively. In total, 74 studies were included. Barriers and facilitators were grouped under four themes: 1) public transportation, 2) employment, 3) personal factors, and 4) social network. This review highlights the key role of public transportation in accessing and maintaining employment for people with disabilities. It also reveals gaps in the literature and a need to investigate the issue through the lens of employers, public transportation services, and social environmental facilitators.

Keywords: public transportation, disability, employment, commuting, work, job

Main text

Introduction

The right to earn a living in a freely chosen employment is acknowledged in the Convention on the Rights of Persons with Disabilities (United Nations, 2007). Being employed promotes financial and social autonomy, health and quality of life, and has been identified as the best approach to alleviate poverty and to support social inclusion (Azevedo et al., 2013; Bartley et al., 2006; Gouvernement du Québec, 2019; Ra & Kim, 2016; Vancea & Utzet, 2017). People with disabilities (PWD) view employment as a significant form of self-worth (Saleh & Bruyère, 2018), although finding a job often necessitates a long and difficult journey. Indeed, PWD are less likely to be employed than individuals without a disability (Bureau of Labor Statistics, 2021; Lecerf, 2020; Morris et al., 2018; Turcotte, 2014). For example, in Canada, 59% of disabled adults aged between 25 and 64 years were employed, compared with an employment rate of 80% for adults living without a disability (Morris et al., 2018). Barriers encountered by PWD when seeking, obtaining or maintaining employment can be personal (e.g., competences, physical or cognitive abilities, financial difficulties) or environmental, pertaining to the physical (e.g., accessibility of the workplace) and social environment (e.g., lack of support, employers' negative attitudes) (Baker et al., 2018; Bonaccio et al., 2020; Gagnon et al., 2018). Public transportation has been identified as a recurrent barrier to the employment of PWD, and is essential for accessing and maintaining employment (Bjerkan et al., 2013; Kessler Foundation, 2015; Loprest & Maag, 2003; Sabella & Bezyak, 2019).

Although access to employment and transportation for PWD has been investigated extensively, these two dimensions have largely been addressed separately. In fact, collaboration between public transportation services and employment settings can be fruitful, for example, by promoting telework, or arranging work schedules better suited to the needs of PWD (Lindqvist & Lundälv, 2012). Barriers and facilitators to the employment of PWD related to transportation are still poorly understood. Strategies relying on the collaboration of employers, transportation providers, services providers, municipalities, and PWD may need to be put in place. To do so, it is important to simultaneously address and contextualise the issues related to access to public transportation and employment of PWD. Therefore, the aim of this scoping review is to summarise and disseminate existing knowledge about the influence of transportation on employment of PWD. Specifically, it seeks to identify transportation barriers and facilitators to the employment of PWD. Hence, in addition to laying out solutions that could be developed or implemented, the results of this scoping review could serve as groundwork for municipalities, employers, transportation providers, services providers or PWD wishing to improve PWD employment through public transportation.

Material and methods

This scoping review followed the framework suggested by Arksey and O'Malley (2005) and enhanced by Levac et al. (2010). To ensure rigour, this scoping review is presented following the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) (Tricco et al., 2018). Note that our research team was composed of a representative of a public transportation organization, a national employer, a community

organisation supporting the employability of PWD, a community organisation that promotes and defends the rights of people living with a motor disability, and academic researchers. Members of the research team held diverse expertise about disabilities, mobility, employment, public transportation, and research methods. Two members of the team were also individuals living with a disability.

Stage 1: Identifying the research question

The research team identified the following two research questions with a view to advancing knowledge and reflection about how public transportation solutions can help to promote the employment of PWD:

1. What transportation barriers to the employment of PWD have been reported in the literature?
2. What transportation facilitators to the employment of PWD have been reported in the literature?

In this scoping review, as proposed in the Human Development Model – Disability Production Process, disability is understood as the result of the interaction of personal and environmental factors (Fougeyrollas et al., 2018).

Stage 2: Identifying relevant studies

On November 12, 2020, a systematic keyword search was undertaken through six databases: Medline, Embase, CINAHL, PsycInfo, Web of Science and Scopus. The databases were

deliberately selected in order to approach our research questions from multiple perspectives; they cover domains ranging from health, biomedical, social and psychological sciences, to humanities, and technology. Our search strategy included keywords associated with the three key concepts of our research questions: transport (e.g., transport*, transit, commuting), employment (e.g., work, employment) and disability (e.g., disab*, limitation*, impair*, specific types of disabilities). The search strategy was created and reviewed by the research team, and tested and validated by a qualified university librarian specialised in paramedical science to ascertain the feasibility of the study. It is worth mentioning that the members of the research team, using a social disability model in their work, ensured that the search strategy was not limited to a medical conception of disability. The search strategy for Medline can be found in the supplementary material.

Stage 3: Study selection

Documents were included if they provided information on the influence of transportation on employment of PWD, were published after 1995 (for feasibility purposes), and were written in English or French (the languages understood by the research team). Grey literature, conference abstracts, dissertations, and commentaries were included if they corresponded to the eligibility criteria. Documents were excluded if they did not provide details on transportation of PWD, other than the identification of transport as a factor influencing their employment.

We adopted an iterative approach to the study selection process. First, the team met to discuss and set the eligibility criteria for the selection of articles. Second, two independent reviewers (AT and a research assistant) applied the eligibility criteria to the title and abstract of ~5% of the citations. The researchers then met to discuss the challenges and their uncertainties regarding study inclusion and refined or modified the eligibility criteria. The reviewers repeated

this process after screening ~25%, ~50% and 100% of the citations. If any changes were made, the reviewers ensured that the eligibility criteria were applied to all the citations. The reviewers subsequently performed a full-text review to ensure that the texts met the study criteria. If disagreement still occurred about a study inclusion after this process, a third reviewer (PA) was brought into the selection process.

Stage 4: Charting the data

A charting form was created and reviewed by the research team. It included the documents' characteristics (e.g., study location, design, participants), the transportation barriers and facilitators to employment of PWD.

Two independent reviewers (AT and MAC) extracted the data from ~10% of the selected documents to ensure rater agreement. They then met to discuss the results, ensured that their process was consistent and evaluated whether any change in the charting form was needed. Both reviewers agreed that no changes were needed, and they confirmed they had extracted similar information from the same articles. Therefore, AT and MAC extracted the data from ~75% and ~25% of the articles, respectively.

Stage 5: Collating, summarising, and reporting the results

A descriptive analysis was conducted on the document characteristics. Barriers and facilitators to promote employment of PWD through transportation were described narratively. The content of themes and sub-themes of the narration were presented to the research team and were improved

according to their comments. In addition, some members of the team participated in a meeting to finalise the results.

Stage 6: Consultation exercise

A consultation exercise took place throughout the conduct of this review. The research team was consulted to formulate the research questions (stage 1), and to review the keyword search (stage 2), the eligibility criteria (stage 3), and the data charting form (stage 4). In addition, two consultation exercises occurred during the analysis process, during which results were presented. They were followed by a discussion on the results and aimed to identify the gaps in the literature (stage 5 and 6).

Results

After the removal of duplicate records, 2772 citations were screened, 202 full-text documents were assessed for eligibility, and 74 documents were selected for inclusion in this review (see figure 1). Those documents consisted of 60 full text-articles and 13 grey literature documents (see Table 1). The documents were published between 1995 and 2020 in North America (n=59, 80%), Europe (n=8, 11%), Asia (n=3, 4%), Oceania (n=2, 3%), South America (n=1, 1%) and Africa (n=1, 1%). Included studies covered a range of disability types, such as physical, intellectual, mental health, sensory, or communicative disabilities (see Table 1). When participants were recruited in the included studies, they were either PWD (n=51, 69%), family members or caregivers (n=4, 5%), employers (n=3, 4%,), or co-workers (n=1, 1%). When the included studies provided information on the gender of the participants, the participants were on average 50% male and 52% female. One

study recruited one transgendered participant (Zyskowski et al., 2015), and two studies reported participants who did not identify their gender, for a total of one individual in one study (Zyskowski et al., 2015) and 14 in another (Silverman et al., 2019). Selected studies used a range of methods (see Table 1), but the survey (n=22, 30%) or qualitative methods (n=30, 41%) predominated. Four themes and eight sub-themes emerged from the selected documents. They consist of barriers and facilitators related to 1) transportation (1.1 service offer, 1.2 accessibility, 1.3 paratransit, 1.4 cost), 2) employment (2.1 employers, 2.2 job requirements and conditions, 2.3 workplace accessibility), 3) personal factors, and 4) social network. Table 1 describes the documents' characteristics and themes covered. Table 2 presents the barriers and facilitators associated with each of these themes and sub-themes.

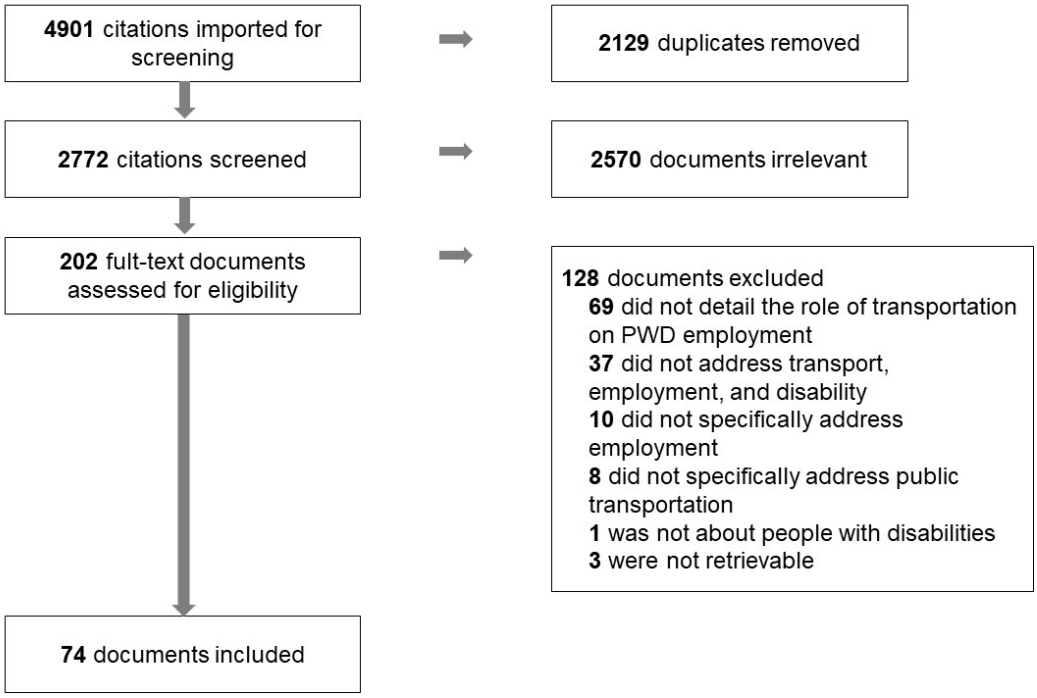

Figure 1. *PRISMA-ScR flow diagram for selected documents*

Table 1. Documents' characteristics and themes

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1				*2*			*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
Scientific article													
Adams et al. (2019)	United States	PWD, service providers, family members or caregivers (n=172)	Survey	Intellectual and developmental disabilities	✓								
Anand & Sevak (2017)	United States	PWD (n=2282)	Survey	Physical, psychiatric, sensory, intellectual, cognitive and other (unspecified) disabilities								✓	
Baanders et al. (2001)	Netherlands	PWD (n=556)	Survey	Chronic diseases						✓			
Balcazar et al. (2012)	United States	PWD (n=190)	Mixed Methods	Learning, emotional, cognitive disabilities, sensory impairments, other unspecified disabilities								✓	
Beatson et al. (2021)	Australia	PWD (n=200)	Survey	Cushing's syndrome, autism, amputation, bipolar, spinal cord injury, cerebral palsy, spina bifida, and hip dysplasia					✓			✓	✓

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1							*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
Bjerkan et al. (2013)	Norway	PWD (n=7)	Semi-structured Interviews	Mobility & visual impairments		✓			✓		✓	✓	
Bricout (2004)	United States	NA	NA	Spinal cord injury							✓		
Brucker & Rollins (2019)	United States	PWD (n= 151 543 722)	Survey	Unspecified								✓	
Cmar (2015)	United States	PWD (n~11,270)	Survey	Visual impairments								✓	
Cmar et al. (2018)	United States	PWD (n=327)	Survey	Visual impairments								✓	
Coelho et al. (2013)	Brazil	PWD (n=30)	Interviews and observations	Congenital impairments, acquired impairments in childhood or adulthood	✓	✓		✓			✓		
Coleman & Adams (2018)	United States	PWD, family members or caregivers (n=172)	Survey	Autism	✓							✓	
Conley (2003)	United States	Service providers (n=50)	Survey	Developmental disabilities	✓	✓		✓					
Crudden et al. (2005)	United States	PWD, service providers (n=43)	Focus group	Visual impairments	✓								

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1					*2*		*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
Crudden (2015)	United States	Service providers (n=6)	Focus group	Visual impairments	✓	✓						✓	
Crudden et al. (2015)	United States	PWD (n=492)	Survey	Visual impairments	✓	✓		✓				✓	✓
Crudden et al. (2017)	United States	PWD (n=48)	Pre-post with control group	Visual impairments			✓					✓	
Crudden & McBroom, (1999)	United States	PWD (n=174)	Survey	Visual impairments		✓			✓				✓
Feinberg (2011)	United States	PWD	Observations	Visual impairments with intellectual disabilties				✓					✓
Grisé et al. (2019)	Canada	NA	Methodological approach	Physicial disability		✓							
Hernandez et al. (2007)	United States	PWD (n=74)	Focus group	Unspecified		✓	✓					✓	
Inge et al. (2018)	United States	PWD (n=44)	Focus group	Spinal cord injury	✓	✓				✓	✓	✓	
Joseph & Robinson (2012)	United States	PWD (n=16)	Phenomenology	Visual impairments		✓							
Kitchin et al. (1998)	Ireland	PWD, service providers, family members or caregivers (n=23)	Focus groups	multiple sclerosis, cerebral palsy, spina bifida, epilepsy, rheumatoid arthritis, spinal injury, chronic pain			✓						

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1							*2*	*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*			
Kukla et al. (2016)	United States	Service providers (n=114)	Survey	Mental illness	✓								✓	
Lindqvist & Lundälv (2012)	Sweden	PWD (n=21)	Focus groups	Mobility impairment, neuropsychiatric conditions (stroke, aphasia, ADHD, Asperger's syndrome, hearing impairments, visual impariment	✓	✓				✓	✓			
Lindsay (2011)	Canada	PWD (n=2534)	Survey	Unspecified	✓	✓							✓	
Lindsay et al. (2015)	Canada	PWD, service providers, employers (n=49)	Interviews	Physical disabilities									✓	✓
Lindsay et al. (2017)	Canada	PWD, service providers (n=44)	Interviews	Spina bifida	✓	✓							✓	
Lindsay et al. (2021)	Canada	PWD (n=44)	Discussion forum	Physical disability	✓	✓							✓	
Loprest & Maag (2003)	United States	PWD (n > 16 000)	Survey	Unspecified	✓	✓					✓		✓	
Lubin & Deka (2012)	United States	PWD	Survey	Physical Disability	✓		✓							
Lukyanova et al. (2015)	United States	38 cases	Case file review	Most common : cognitive/intellectual disabilties, mental	✓									

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1				*2*			*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
				illness, hearing impairments									
Magill-Evans et al. (2008)	Canada	PWD (n=76)	Mixed methods	Cerebral Palsy and spina bifida	✓					✓			
Mancuso et al. (2000)	United States	PWD (n=22)	Interviews	Rheumatoid arthritis		✓					✓	✓	
McDonnall (2011)	United States	PWD (n=250)	Survey	Visual impairment								✓	
McNaughton et al. (2003)	United States	Employers, co-workers (n=14)	Questionnaire and interviews	Individuals using Augmentative and Alternative Communication		✓			✓			✓	
Molher et al. (2013)	Canada	NA	NA	Vision loss								✓	✓
Moon et al. (2014)	United States	NA	NA	Unspecified							✓		
Nagib & Wilton (2020)	Canada	NA	Examination of content of an online community	Unspecified								✓	
Newbigging & Laskey (1996)	Canada	PWD (n=1)	Case study	Brain injury								✓	
Noel et al. (2017)	United States	PWD (n=280)	Program Evaluation	Developmental and psychiatric disabilities	✓					✓			
Noreau et al. (1999)	Canada	PWD (n=418)	Cross-sectional study	Spinal cord injury								✓	

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1					*2*		*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
O'Neill & Dyson-Hudson (2020)	United States	NA	Review	Spinal cord injury			✓						
Park & Park (2021)	Republic of Korea	PWD, family members or caregivers (n=232)	Survey	Intellectual disabilities								✓	
Pebdani (2014)	United States	PWD (n=6227)	Longitudinal	Learning, developmental, emotional/behavioral, sensory, physical disabilities and other unspecified disabilities				✓					
Reid & Bray (1998)	New Zealand	PWD (n=14)	Mixed methods (Semi-structured interviews and survey)	Learning disabilities								✓	
Sabella & Bezyak (2019)	United States	PWD (n=3218)	Survey	Mobility disability, blindness/low vision, mental health disability, deafness/hard of hearing, communication disability, other and		✓						✓	

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1							*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
				unspecified disabilities									
Scheef et al. (2018)	United States	Service providers (n=75)	Mixed methods	Intellectual disabilities	✓								
Silverman et al. (2019)	United States	PWD (n=559)	Survey	Blindness	✓				✓	✓	✓		
Targett et al. (2004)	United States	NA	NA	Spinal cord injury	✓								
Törnbom et al. (2014)	Sweden	PWD (1983, n= 55; 2000, n= 28)	Longitudinal	Cerebral palsy and spina bifida with or without intellectual disability	✓								
Trygged (2012)	Sweden	PWD (n=10)	Semi-structured interviews	2 years post-stroke			✓						
Wehman et al. (1999)	United States	NA	Viewpoint	Spinal cord injury	✓							✓	
West et al. (1998)	United States	NA	Case studies	Unspecified	✓		✓	✓					
Wolffe (1999)	United States	Employers	Viewpoint	Visual impairments					✓				
Wolffe et al. (2013)	Nigeria	PWD (n=172)	Interviews	Visual impairments	✓					✓		✓	
Wong et al. (2020)	United States	Workers (n=373,521; among them 19,922 were PWD)	Survey	Unspecified								✓	
Zalewska et al. (2016)	United States	PWD (n=4110)	Longitudinal	Autism, intellectual disabilities,								✓	

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1				*2*			*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
				unspecified other disabilities									
Zhou et al. (2019)	Japan	2 cases	Case studies	Unspecified								✓	
Conference abstract													
Berbrayer (2015)	Canada	PWD (n=10)	Interviews	Cerebral Palsy			✓				✓		
Chen (2009)	Taiwan	PWD (n=6)	Post only	Cognitive impairments (head injury and mental illness)								✓	
Corcoran et al. (2005)	United Kingdom	PWD (n=40)	Interviews and focus group	Visual impairments	✓								
Fiedler & Indermuehle (1997)	United States	PWD (n=77)	Survey	Spinal cord injury	✓								
Zyskowski et al. (2015)	Canada	PWD, service providers	Mixed methods	Autism, blindness, severe social anxiety, serious health conditions, combined type ADHD. cognitive impairment, dyslexia/reading disability, blindness/low vision, motor/dexterity challenge, deafness/hard-of-hearing, other			✓				✓	✓	

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1					*2*		*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
				unspecified disabilities									
Governmental publication													
National Council on Disability (2011)	United States	NA	NA	Unspecified	✓	✓	✓	✓					
National Council on Disability (2007)	United States	NA	NA	Unspecified		✓				✓	✓	✓	
Web page													
Dembe (2015)	Canada	NA	NA	Unspecified	✓	✓					✓		
PhD Dissertation													
Marston (2002)	United States	PWD	Mixed methods	Visual impairement		✓							
Scheef (2016)	North America	Service providers	Mixed methods	Intellectual disabilities	✓								
Magazine articles													
Stegers (2008)	United States	NA	NA	Unspecified			✓						
Vogtle & Brooks (2005)	United States	NA	NA	Developmental disabilities			✓					✓	✓
Book chapters													
VanBergeijk et al. (2011)	United States	NA	NA	Autism	✓							✓	
Hine (2009)	United Kingdom	NA	NA	Unspecified	✓	✓							

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1				*2*			*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		

[a] The terminology used in this column is the one used by each document.
NA : non applicable

Table 2. *Summary of transportation barriers and facilitators to PWD employment*

Themes	Subthemes	Barriers	Facilitators
Public transportation	Service offer	Lack of transportation options	- Public transportation service close to home - Using other service providers - Grant to develop and promote transportation services - Carpooling
		Lack of transportation in rural setting	- Moving to urban area - Offering transportation services to more distant communities
		Transport unreliability	- More frequent transportation services
	Accessibility	Lack of accessible transportation and coordination in the transport chain Inaccessible route to bus stop Inaccessibility of bus, subways or train Inappropriate driver attitudes Drivers' lack of knowledge about how to assist PWD Drivers do not assist PWD Claimed accessibility is not enforced	- Transport chain that works smoothly - Accessible transportation stops near the work building - Accessible taxis - Efforts to provide reliable and accessible public transportation - Advocacy by rehabilitation professionals, PWD, and employers - Modifying and extending public transport route
	Paratransit	Cost	

Themes	Subthemes	Barriers	Facilitators
		Waiting list Restricted service areas Restricted business hours Eligibility criteria Pick-up time Long and unreliable travel time Inflexibility	- Most reliable transportation services for some people with visual impairments
	Cost	Fares too high	- Employers covering transportation cost - Offering transportation stipend - Lowering cost for public transportation - Providing free pass or vouchers for PWD
Employment	Employers	Employers' beliefs	- Address disability issues in the interview - Employers supporting PWD - Employers paying attention to accessibility issues
		Companies not opened to carpooling or not providing transportation for PWD	- Employers providing transportation or covering its cost
	Job requirements and conditions	Job requiring a driver's license Long-distance travel, multi-day travelling, or travelling during extended time period Companies operated buses that are not accessible Lack of flexible work conditions	- Immaterial work adjustments[3] - Flexible schedules - Accessibility in business traveling
	Workplace accessibility	Inaccessible workplace Inaccessible parking	- Telework - Working from satellite location

Themes	Subthemes	Barriers	Facilitators
			- Accessible parking
Personal factors		Inability to navigate the transportation system Lack of experience, comfort, and skill in public transportation use Not having control in choices of public transportation Mobility limitations and fatigue Feeling of insecurity Stress	- Cognitive strategies - Independence in transportation - Community travel skills - High level of self-efficiency in transportation - Positive independent behaviour of traveling to work - Perception of control through access to transport - Being risk adverse - Expected negative emotions with not travelling independently to work - Self-advocacy - Being independent in means of transportation - Training in travel skills - Mobile applications - Avoiding rush hours - Always having a back-up plan
Social network		Family discouraging use of public transportation Overprotection by parents	- Supportive network - Family and friends providing or helping with transportation

Public transportation-related barriers and facilitators

Transportation is a decisive factor in maintaining employment because it can influence the jobs for which PWD apply, and which are feasible to accept (Bjerkan et al., 2013; Crudden et al., 2015; Lindsay et al., 2021; Loprest & Maag, 2003; Lubin & Deka, 2012; O'Neill & Dyson-Hudson, 2020; Silverman et al., 2019). Therefore, exploration of transportation options to reach the workplace is part of the job-seeking process, can limit the job search to certain geographic areas and thus limit employment options (Bjerkan et al., 2013; Lindsay et al., 2021; Loprest & Maag, 2003; Silverman et al., 2019). Two studies from the United States reported that around 40% of PWD (n=310 in total, e.g. people with visual, motor, cognitive, developmental, communication, and sensory disabilities) turned down a job because of transportation difficulties (Crudden et al., 2015; Lubin & Deka, 2012). Moreover, 25% of the participants (n=80) left a job for the same reason (Lubin & Deka, 2012).

Service offer

A lack of transportation options impacts how PWD experience access to work life. They can find and obtain a job but may have no way to travel to it because of nonexistent or limited transportation options (Adams et al., 2019; Coelho et al., 2013; Conley, 2003; Hine, 2009; Loprest & Maag, 2003; Lukyanova et al., 2015; National Council on Disability, 2011; Scheef et al., 2018; Silverman et al., 2019). Travelling between different worksites or to visit clients was also reported as an impediment for visually impaired workers (Wolffe et al., 2013). For example, a study reported that 47% of individuals with visual impairments (n=125) worked full time if they had access to public transportation, compared with 39% for those who lacked access (n=24) (Cmar et al., 2018). Lack

of available public transportation options in rural or remote communities is a recurrent barrier for employment of PWD (Conley, 2003; Corcoran et al., 2005; Crudden, 2015; Crudden et al., 2005; Inge et al., 2018; Kukla et al., 2016; Lindsay, 2011; Lindsay et al., 2017; Magill-Evans et al., 2008; National Council on Disability, 2011; Scheef, 2016; Scheef et al., 2018; West et al., 1998). Transportation offers in rural areas seemed to be problematic in terms of routes and schedules. For example, they commonly offered limited service hours that ended early in the day (Corcoran et al., 2005; Crudden, 2015; National Council on Disability, 2011). Orientation and mobility providers, i.e. rehabilitation workers teaching persons with visual disabilities how to travel safely between different locations, raised another issue by mentioning that work opportunities seemed to be moving away from urban centres and that public transportation options were minimal in these areas (Crudden, 2015).

To counteract the lack of transportation options, some documents have reported that PWDs search for work placements that are accessible or near their home (Dembe, 2015; Kukla et al., 2016; Scheef et al., 2018; Targett et al., 2004). Lack of accessible transportation in rural or remote settings led some PWD to move to urban areas, where there are more transportation options (Crudden et al., 2005; Crudden & McBroom, 1999; Kukla et al., 2016). Having public transportation services close to home was identified as an important facilitator in the job search process for PWD who rely on public transportation to get around (Lubin & Deka, 2012). Another solution put forward to overcome this lack of service is to offer transportation services in more distant communities (Conley, 2003).

To compensate for the lack of public transportation, many studies have suggested alternative means of travel. Using private transportation to go to work was mentioned as a potential option for PWD, including travelling with friends, family members or counsellor, even though

these options might be expensive or unreliable when travelling to work (Coleman & Adams, 2018; Conley, 2003; Crudden, 2015; Dembe, 2015; Lukyanova et al., 2015; National Council on Disability, 2011). Carpooling to work was suggested for PWD, including individuals with autism, visual impairment, and spinal cord injury (Coelho et al., 2013; Coleman & Adams, 2018; Crudden, 2015; Crudden et al., 2005; Wehman et al., 1999; West et al., 1998). Orientation and mobility providers often directed their clients to a driver in their community who offered lower costs than cabs (Crudden, 2015; Crudden et al., 2005). Other transportation alternatives included using private shuttle services, particularly in areas such as airports, hotels, and car rental services (National Council on Disability, 2011); arranging travel with private providers used for other services or partner sources such as childcare centres or hospitals (Crudden, 2015; Crudden et al., 2015; Scheef, 2016; Wehman et al., 1999); and negotiating reduced fees with cab drivers (Crudden, 2015). Finally, the Job Access and Reverse Commute grant supports the development and promotion of transportation services in urban, suburban and rural areas in order to help welfare recipients and low-income individuals (including PWD) to access employment opportunities (National Council on Disability, 2011). The report mentioned that such funding was used to provide transport to PWD with non-traditional work schedules in certain communities.

Lack of transport reliability offered by the public transportation services was reported as a barrier to obtain and maintain employment notably because of the difficulties in arriving to work on time (Hine, 2009; Inge et al., 2018; Lindqvist & Lundälv, 2012; Lindsay et al., 2017, 2021; Magill-Evans et al., 2008; Scheef, 2016; Scheef et al., 2018; VanBergeijk et al., 2011). Long and unreliable travel times, and vehicles that did not arrive on time or were delayed, were also reported as barriers to employment for PWD (Coleman & Adams, 2018; Lubin & Deka, 2012; Törnbom et al., 2014). Other barriers related to transportation services were operating hours and schedules that

were limited or did not match the employment transportation needs (e.g., work schedules, atypical job hours), which could make it difficult for PWD to accept or maintain certain jobs (Crudden, 2015; Fiedler & Indermuehle, 1997; Hine, 2009; National Council on Disability, 2011; Noel et al., 2017). As a solution for these problems, Conley (2003) suggested more frequent transportation services.

Accessibility

Inaccessible public transportation systems and poor coordination of the transport chain have been identified as critical issues that affect the job-seeking processes of PWD (Bjerkan et al., 2013; Coelho et al., 2013; Grisé et al., 2019; Hine, 2009; Joseph & Robinson, 2012; Lindqvist & Lundälv, 2012; Lindsay et al., 2021; Loprest & Maag, 2003; McNaughton et al., 2003; Sabella & Bezyak, 2019). These issues are found to limit job options for PWD and deter them from applying for jobs (Bjerkan et al., 2013; Joseph & Robinson, 2012; Lindsay et al., 2021; Loprest & Maag, 2003). For example, one study reported that only 46% of the available jobs in Montreal and Toronto were accessible to wheelchair users because of poor accessibility of public transportation (Grisé et al., 2019).

An example of inaccessible public transportation is the lack of coordination in the transport chain. such as inaccessible routes to bus stops (Coelho et al., 2013; Conley, 2003; Dembe, 2015; Lindsay et al., 2017; Mancuso et al., 2000; Sabella & Bezyak, 2019). In contrast, an accessible transportation stop near the work building was identified as a facilitator to employment of PWD (Loprest & Maag, 2003). Inaccessibility of the bus, subways or train (Coelho et al., 2013; Grisé et al., 2019; Hernandez et al., 2007; Lindqvist & Lundälv, 2012; Marston, 2002; National Council on

Disability, 2007) is another obstacle. Public transportation drivers' knowledge, attitude and skills were also identified as potential transportation accessibility barriers encountered by PWD (Hernandez et al., 2007; National Council on Disability, 2007; Sabella & Bezyak, 2019). Drivers were reported as often lacking an appropriate attitude towards people who are deaf or hard of hearing, described as indifferent to the accommodation needs of PWD, and as potentially uncomfortable or not knowing how to assist them (Hernandez et al., 2007; National Council on Disability, 2007; Sabella & Bezyak, 2019). Claimed accessibility that is not enforced in real life was another reported barrier to the employment of PWD (McNaughton et al., 2003; National Council on Disability, 2011). For example, taxis might claim to be accessible, but the drivers may discriminate against specific PWD, such as those travelling with service animals (National Council on Disability, 2011).

Facilitators associated with transportation accessibility were a transport chain that worked smoothly (Lindqvist & Lundälv, 2012) and the presence of accessible taxis (National Council on Disability, 2007, 2011). Grisé et al. (2019) advocated for a more accessible subway in Montreal and to address the gaps between accessible stations' locations. They recommended that alternative transportation options (e.g., feeder bus service to accessible subway stations) be provided while accessibility of subway stations is addressed. They also advocated prioritising accessibility at stations that are far from other accessible stations. Accessible taxis were useful to provide an alternative to public transportation and paratransit. Taxis were another important element to consider during business travel (National Council on Disability, 2011). Many documents mentioned that more efforts and advocacy were needed to provide an extensive, flexible, reliable, accessible, and affordable public transportation system (Crudden, 2015; Crudden et al., 2005; Inge et al., 2018; Joseph & Robinson, 2012; Lindsay et al., 2011, 2017, 2021; McNaughton et al., 2003;

National Council on Disability, 2011). Rehabilitation professionals could advocate for improved transportation and change in policy (Joseph & Robinson, 2012), as could people experiencing transportation issues (Crudden & McBroom, 1999), and employers (Crudden et al., 2005). Further, it was proposed that employers should be involved in advocating for the "creation, modification, or expansion of transportation programs" and "use funds from grants to initiate transportation programs" (Crudden et al., 2005, p.12). Finally, Marston (2002) suggested examining the financial benefits that could be reaped if transportation accessibility was improved in addition to providing more employment opportunities for PWD.

Paratransit

Many employment barriers related to the paratransit system were reported. Paratransit often refers to a public transportation service adapted to the needs of PWD (e.g., door-to-door transportation with an adapted vehicle). Availability and cost of the service were identified as barriers to paratransit use (Kitchin et al., 1998; National Council on Disability, 2011; Stegers, 2008). For example, paratransit service might be restricted to specific geographic areas and business hours might be limited to weekdays (National Council on Disability, 2011; Stegers, 2008). These conditions made the paratransit inadequate for work trips and could limit its use by business travellers (Lubin & Deka, 2012; National Council on Disability, 2011). Another barrier to paratransit use was the eligibility criteria (e.g., working too much) along with the waiting list to access service (Crudden, 2015; Kitchin et al., 1998; Stegers, 2008; Trygged, 2012). In addition, the uncertainty of the paratransit pick-up time, the long and unreliable travel time, and number of stops along the route could make paratransit an unreliable option to travel to work (Berbrayer, 2015; Crudden, 2015; Hernandez et al., 2007; Lubin & Deka, 2012; National Council on Disability, 2011;

Zyskowski et al., 2015). For example, an employee might arrive too early or late to work (National Council on Disability, 2011; Zyskowski et al., 2015). Inadequate paratransit could also force workers to leave their job early because of a different scheduled time than the one required by the user (National Council on Disability, 2011). Moreover, inflexibility of paratransit, such as the need for advanced booking, does not meet the need for demand-responsive services that would facilitate access to jobs for PWD (Lubin & Deka, 2012; National Council on Disability, 2011; Vogtle & Brooks, 2005; West et al., 1998). Nonetheless, some participants living with visual impairments described paratransit as the most reliable way to get to work (Crudden, 2015). Other participants with visual impairments mentioned that they did not mind the sometimes longer travel time, as long as they arrived home eventually (Marston, 2002).

Cost

PWD reported how the financial aspect was a barrier to transportation and employment. Alternative means of transportation such as taxis or services for PWD were perceived as being too costly (National Council on Disability, 2011; West et al., 1998). In a study conducted with individuals with visual impairments, the cost of public transportation was considered too high (Coelho et al., 2013; Crudden et al., 2015).

Amongst facilitators, it was recommended that the employer cover travel costs for PWD (Conley, 2003), or that it offer a transportation stipend (Pebdani, 2014). One study reported that public buses represent an inexpensive way to commute to work for students with vision loss, and was offered as a potential solution (Feinberg, 2011). The primary solution to the financial resources barriers was to lower the cost of public transportation (Conley, 2003) and provide PWD with free

passes or vouchers through national funding (Coelho et al., 2013; National Council on Disability, 2011).

Employment related barriers and facilitators

Employers

Various studies have identified employers' beliefs about disability as a barrier to the employment of people living with visual impairments (Crudden & McBroom, 1999; Silverman et al., 2019; Wolffe, 1999). Prospective employers were worried about the influence of the candidates' transportation abilities on their capacity to travel to and from work, to be flexible, and to work overtime or to cover for a colleague because of the rigidity of their transportation arrangements (Wolffe, 1999). To reassure employers about the mobility ability of a potential employee, some employers suggested that PWD could address this issue in the interview (Wolffe, 1999). They argued that the interview was an opportunity to explain how the PWD candidate would reliably get to work and what they would do if an issue with their transportation arrangements arose. However, few people with mobility and visual impairments brought up the subject during the interview with the employer because they wanted to avoid emphasising their limitations to avoid being penalised in the race for employment (Bjerkan et al., 2013). In contrast, one participant described discussing their limitation in the interview as a very positive experience (Bjerkan et al., 2013).

Other barriers to work for PWD were companies that were not open to carpooling for blind individuals (Silverman et al., 2019), employers not allowing buses in the workplace's parking area, leaving people with visual impairments to navigate a busy parking lot (Crudden, 2015), and employers not providing transportation to their veteran employees living with mental illnesses

(Kukla et al., 2016). In contrast, employers involved in providing transportation to their workers, paying attention to accessibility when planning job-related tasks or social functions, and sometimes covering transportation costs, were found helpful to maintain employment of people with developmental disabilities, visual impairments, and those who used augmentative and alternative communication. (Conley, 2003; Crudden, 2015; Crudden & McBroom, 1999; McNaughton et al., 2003). Alternative communication includes all the ways that individuals communicate besides talking; ranging from no or low-tech strategies, such as writing and using gestures, to high-tech strategies, such as using a speech-generating device. Finally, support from the employer can make PWD feel like they could transition into the workforce and reinforced their intention to do so (Beatson et al., 2021).

Job requirements and conditions

PWD's work opportunities, including advancements, were restricted by jobs requiring a driver's license (Magill-Evans et al., 2008; Noel et al., 2017; Silverman et al., 2019); long distance travel, and travel that is frequent or lasting an extended period of time (Inge et al., 2018; Wolffe et al., 2013); inaccessible company-operated buses or transportation options (Wolffe et al., 2013); and lack of flexible work conditions (Lindqvist & Lundälv, 2012). Immaterial work adjustments such as altered work schedules and more breaks were frequently requested by people with chronic diseases (Baanders et al., 2001). Jobs with flexible schedules are more likely to attract PWD facing transportation problems (National Council on Disability, 2007).

Workplace accessibility

Workplaces that did not follow accessibility requirements were mentioned as a barrier to travel to work for PWD (Coelho et al., 2013). Moreover, the unavailability of accessible parking spaces at employment site was identified as a significant barrier to PWD employment (Berbrayer, 2015; Bjerkan et al., 2013; Lindqvist & Lundälv, 2012; Loprest & Maag, 2003; Mancuso et al., 2000).

Solutions mentioned to overcome physical barriers include allowing employees to work from a satellite location (Dembe, 2015) or from home (Bricout, 2004; Inge et al., 2018; Moon et al., 2014; National Council on Disability, 2007; Silverman et al., 2019; Zyskowski et al., 2015). Telework could facilitate PWD employment because it allows them to work without facing architectural or transportation barriers that they often encounter on their way to work (Bricout, 2004; Inge et al., 2018; Moon et al., 2014; National Council on Disability, 2007;-Silverman et al., 2019; Zyskowski et al., 2015).

Personal factors related barriers and facilitators

Personal capacities, attitudes, and behaviours of PWD influence their ability to use transportation in a work context. The complexity of the public transportation system is not aligned with the abilities of some PWD, which hinders their ability to navigate the system (Coleman & Adams, 2018; Inge et al., 2018; Lindsay et al., 2017, 2021; Loprest & Maag, 2003; McDonnall, 2011; National Council on Disability, 2007; Sabella & Bezyak, 2019; Vogtle & Brooks, 2005). Affective factors such as stress towards transportation, and a feeling of vulnerability, anxiety, and uncertainty, particularly in uncomfortable or unsafe areas, were also reported as barriers to employment (Crudden, 2015; Marston, 2002; Zyskowski et al., 2015). Specifically, lack of

experience, comfort with, and skills at using public transportation make it more difficult for youths with disability to access employment (Lindsay et al., 2017, 2021). People with cognitive impairments and autistic individuals may have difficulties navigating an unfixed-route system (Vogtle & Brooks, 2005) and managing transfers (National Council on Disability, 2007) Further, overstimulating environments, such as a crowded bus, or a busy train station (e.g., with many lights and noises), may impact autistic with heightened sensory sensitivities (Nagib & Wilton, 2020). Finally, personal physical challenges such as motor limitations and fatigue (National Council on Disability, 2007; Wolffe et al., 2013), compounded by inaccessibility issues in the transportation chain, may influence PWD's use of public transportation to go to work (Mancuso et al., 2000; National Council on Disability, 2007).

Abilities, attitudes, and behaviours of PWD were also found to facilitate transportation and employment in the analysed documents. Independence in transportation and travel abilities appears to favour employment (McDonnall, 2011; Zalewska et al., 2016). For youth with visual impairments, community travel skills were correlated with a higher probability of being employed after high school (Cmar, 2015; McDonnall, 2011). High level of self-efficacy in transportation was found to be associated with being employed full time in people with visual impairments (Cmar et al., 2018). Positive independent behaviour of travelling to work, the perception of control through access to transportation, being risk averse and expected negative emotions associated with not travelling to work independently were associated with the intention of commuting to work independently (Beatson et al., 2021). Self-advocacy was also reported to be beneficial in that the PWD could express their transportation-related strengths and needs at the workplace (Lindsay et al., 2021). Lastly, the ability to drive a car or to be independent in their means of transportation (i.e., walking, biking) was associated with a higher likelihood of employment for individuals with

mental illness, autism, spinal cord injury, and learning disabilities, and helped reduce motor limitations (Kukla et al., 2016; Noreau et al., 1999; Reid & Bray, 1998; Zalewska et al., 2016; Zhou et al., 2019).

Training PWD in travel skills is the primary solution found to overcome personal barriers (Balcazar et al., 2012; Beatson et al., 2021; Coleman & Adams, 2018; Crudden et al., 2015, 2017; Feinberg, 2011; Hernandez et al., 2007; Lindsay, 2011; Lindsay et al., 2015, 2021; Molher et al., 2013; Newbiggin & Laskey, 1996; Park & Park, 2021; VanBergeijk et al., 2011; Vogtle & Brooks, 2005; Wehman et al., 1999; Zalewska et al., 2016). Assessing individual travel skills is crucial (VanBergeijk et al., 2011), and should be addressed by multiple professionals, either at school (Lindsay et al., 2021; Zalewska et al., 2016) or in vocational rehabilitation services (Crudden et al., 2015; Lindsay, 2011). The training must encompass the cognitive skills needed to use public transportation (Park & Park, 2021), provide information regarding the available transport (Balcazar et al., 2012), consider the activity demands for work and be presented in an individualised education program (Vogtle & Brooks, 2005). Further, transportation training should address emotional support (Beatson et al., 2021; Crudden et al., 2017) and discuss potential barriers to transportation and employment (Hernandez et al., 2007). Other solutions to adapt the transportation task were offered by a few studies. The use of technology (i.e., mobile applications) could be beneficial for people with cognitive impairments by allowing them to be directed in the public transportation system (Chen, 2009). People with visual impairments were advised to avoid rush hour, therefore reducing the stress of using public transportation (Crudden, 2015). Moreover, cognitive strategies were deemed to be important because paratransit and assistive technology might not be reliable. For example, it was recommended that PWD always have a back-up plan (Bjerkan et al., 2013; Crudden, 2015; McNaughton et al., 2003; Wehman et al., 1999).

Social network-related barriers and facilitators

A social network supporting or discouraging the use of public transportation by PWD was another factor influencing the ability of PWD to travel to work. For example, families that discourage the use of public transportation were found to hinder independent transportation to work (Crudden, 2015; Lindsay et al., 2015). Both Crudden (2015) and Lindsay et al (2015) reported that some families of may be apprehensive towards public transportation or overprotective, which may limit PWD's independence or their ability to work. Conversely, having a supportive network of friends, family, and employers appears to facilitate transportation to work for PWD (Beatson et al., 2021; Molher et al., 2013).

Moreover, PWD were more likely to intend to travel to work independently if they perceived commuting as a social norm (Beatson et al., 2021). Finally, family and friends were identified as facilitators by potentially helping individuals with visual impairments with transportation (Crudden & McBroom, 1999) or providing them with rides to work (Molher et al., 2013). Support from the social circle also helps people with other types of disabilities (Vogtle & Brooks, 2005).

Discussion

This review confirms the crucial role of public transportation in choosing, accessing, and maintaining employment for PWD. It identifies transportation barriers and facilitators to the employment of PWD associated with public transportation (service offer, accessibility, paratransit, cost), employment (employers, job requirements and conditions, workplace accessibility), personal

factors, and the social network. This review clarifies how these barriers to accessibility also affect the work life of PWD, in that they can limit individuals' jobs choices and options, and how, consequently, implementation of multiple facilitators to public transportation access could facilitate these individuals' access to work. The implementation of these facilitators is crucial to the employment of PWD since around 40% of them have already turned down a job because of transportation difficulties (Crudden et al., 2015; Lubin & Deka, 202).

Our review identifies barriers and facilitators that were common among individuals living with various types of disabilities. For example, regardless of their disability type, all PWD seem to encounter challenges when navigating the transportation system. Providing training to improve travel skills is a recurrent suggestion in the literature to overcome this barrier. Further, some barriers and facilitators were reported for specific types of disabilities, which is consistent with findings from other studies (Bezyak et al., 2017, 2020). For example, individuals with psychiatric disabilities reported more difficulties when using public transportation to get to work than did respondents with other types of disabilities (Bezyak et al., 2020). Despite a few differences between disability types, facilitators reported in this scoping review could be used as a basis for developing solutions supporting employment of people with a range of disabilities.

Even if this study aimed to identify facilitators to support employment of PWD through transportation, several reported barriers remained with no specific solutions having been proposed. For example, no facilitators were provided to overcome paratransit barriers that hinder PWD employment, such as limited business hours, unreliable transportation time, and inflexibility. However, the literature on PWD employment and transport accessibility could provide solutions to some of these problems. Implementation of transportation accessibility guidelines and recommendations, such as provision of benches or low-floor buses, could help overcome some

barriers related to public transportation (Sze & Christensen, 2017). Another solution could be disability awareness training to improve driver and employer behaviours. Training public transportation drivers was part of the solution to increase public transportation usability by older people (Broome et al., 2013) and improve communication of paratransit drivers while interacting with passengers living with communication disabilities (Tessier et al., 2023). Further, disability training offered to human resources professionals can have multiple short-term effects (e.g., increased knowledge, intention to change professional practices); long-term evaluation found that 79% of the participants (n = 34) have taken at least one action toward PWD inclusion (Rudstam et al., 2013).

To summarise, most of the barriers identified in this review appear to be underpinned by an ableist society. Indeed, an ableist society privileges normative able-bodied individuals by

> creat[ing] space fit for normative citizens; encourag[ing] an institutional bias towards autonomous, independent bodies; and lend[ing] support to economic and material dependence on neoliberal and hyper-capitalist forms of production. (p.21, Goodley, 2014)

For example, our review demonstrates how most transportation barriers to the employment of PWD are obstacles linked to an ableist functioning and organisation of public transportation networks, making access and use difficult for PWD. Ableism, defined as "stereotyping, prejudice, discrimination, and social oppression toward [PWD]" (p.650, Bogart & Dunn, 2019), could also explain employers' and families' beliefs about the (in)capacity of PWD to travel to work, along with workplace (in)accessibility or job requirements (e.g., schedules) that do not meet the needs of all PWD. Moreover, when employers do not address how PWD (will) travel to work, they let them assume all the burden of navigating an ableist transit system, which can translate into inequitable access to work, i.e., putting the full onus on PWD employees for being able to access and maintain their job (Ross & Buliung, 2019). Therefore, working to fight ableism in society, even if not

mentioned as a facilitator in the analysed documents, could also constitute a solution to facilitate travel to work for PWD, thus addressing the underlying problem of most types of barriers reported in this review.

Gaps in the literature about the role of public transportation in PWD employment

Some gaps were identified in the location or methods used in the selected documents. Most of the documents were from North America (n=58, 78%). Therefore, the applicability of the results may be limited to this area, and there is a need to conduct more research in other countries. Further, most of the included studies used surveys or a qualitative method. More research using experimental designs are needed to fill this gap, in particular to test the effectiveness of the implementation of certain facilitators. Four principal gaps emerged from the results. First, there is a need to explore the perspectives of other stakeholders involved in issues surrounding PWD's travel to work, in particular those of employers and public transportation providers. Indeed, only three studies in this review examined employers' experiences, and none have looked at public transportation representatives.

Second, while only a few studies explored the employers' roles in PWD's travel to work, our results suggest that employers can play a significant role in facilitating their job travel and organisation. Employers have the power to accept flexible work schedules for employees living with a disability, to allow telework or to ensure that their workplace is accessible, all of which could potentially facilitate PWD's travel to work. Therefore, more research is needed to better understand how employers can improve work commutes for PWD.

Third, although barriers related to the social environment (e.g., lack of parental support, employers' beliefs about PWD) exist, the reviewed documents reported only a few concrete facilitators. Systemic solutions are needed to address the various transportation issues that impede the employability of PWD. The role of the social environment in access to public transportation and employment has been emphasised by this review and past research. For example, three out of the six most recurrent barriers to public transportation for PWD were related to drivers' characteristics (Bezyak et al., 2017). In addition, employers' attitudes and (mis)perception about disability is known to negatively impact PWD hiring (Baker et al., 2018; Burke et al., 2013; Kessler Foundation, 2015). Therefore, it would be relevant to further explore solutions that can facilitate travel to work, in relation to the social environment.

Limitations and future research

Because we wanted to focus this scoping review on public transportation and ensure its feasibility, our search strategy excluded keywords related to the driving of private automobiles. However, driving could also be a strategy that PWD use to travel to work; a future study could focus on driving to supplement the picture of the various travel-to-work issues outlined in this study. Another limitation of this review is that the participants of the analysed studies presented no gender diversity outside the binary (man/woman). Further, we did not report on participants' ethnocultural or sociocultural background, which precluded the analysis of crossovers and differences between diverse experiences of the role of public transportation in the commute to work. However, as described by the concept of intersectionality, people have unique experiences of discrimination and oppression, and everything that can marginalize an individual must be considered (e.g., race, class, gender). The applicability of our results to marginalised communities is uncertain; we can presume

that other transportation barriers and facilitators to PWD employment might have been described in a more diverse sample. Further, the results of this review are the synthesis of studies published before the COVID-19 pandemic. Hence, it possible that the pandemic generated new reflections and consideration about PWD's travel to work, particularly about the possibilities of telework, which broadened with the pandemic. However, telework is not a panacea and should not be considered as the only solution to overcome the transportation barriers to travel to work. Nor should it be used to avoid advancing the accessibility of workplaces and public transportation services. Another area that would need more investigating concerns facilitators to overcome transport and employment barriers reported in rural communities. This review did not identify specific solutions to such issues, apart from suggesting that PWD could move to urban areas, and that better transportation services could be provided in rural areas. Yet other solutions may exist in some communities. Finally, it would be interesting to know what obstacles workers without disabilities encounter when they travel to work via public transportation. Such data would allow us to distinguish between the importance of the role of public transportation in accessing and maintaining employment for PWD and among the general population.

Conclusions

This scoping review confirmed the crucial role of public transportation in employment of PWD. It found that public transportation influences overall work experience, including what jobs people with disabilities apply to, and which they accept and retain. One strength of this review is that it describes barriers and facilitators associated with public transportation, employment, personal factors, and the social network. Further, it identified specific solutions for overcoming the barriers

noted. Gaps in the literature were identified, indicating the need for further research to investigate the perspectives of employers and public transportation providers regarding the role of public transportation in PWD employment, to better understand the role of employers in this area, and to explore solutions related to the social environment.

Declaration of Interest

The authors report there are no competing interests to declare.

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Tables

Table 1. Documents' characteristics and themes

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1					*2*		*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
Scientific article													
Adams et al. (2019)	United States	PWD, service providers, family members or caregivers (n=172)	Survey	Intellectual and developmental disabilities	✓								
Anand & Sevak (2017)	United States	PWD (n=2282)	Survey	Physical, psychiatric, sensory, intellectual, cognitive and other (unspecified) disabilities								✓	
Baanders et al. (2001)	Netherlands	PWD (n=556)	Survey	Chronic diseases						✓			
Balcazar et al. (2012)	United States	PWD (n=190)	Mixed Methods	Learning, emotional, cognitive disabilities, sensory impairments, other unspecified disabilities								✓	
Beatson et al. (2021)	Australia	PWD (n=200)	Survey	Cushing's syndrome, autism, amputation, bipolar, spinal cord injury, cerebral palsy,					✓			✓	✓

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1				*2*			*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
				spina bifida, and hip dysplasia									
Bjerkan et al. (2013)	Norway	PWD (n=7)	Semi-structured Interviews	Mobility & visual impairments		✓			✓		✓	✓	
Bricout (2004)	United States	NA	NA	Spinal cord injury							✓		
Brucker & Rollins (2019)	United States	PWD (n= 151 543 722)	Survey	Unspecified								✓	
Cmar (2015)	United States	PWD (n~11,270)	Survey	Visual impairments								✓	
Cmar et al. (2018)	United States	PWD (n=327)	Survey	Visual impairments								✓	
Coelho et al. (2013)	Brazil	PWD (n=30)	Interviews and observations	Congenital impairments, acquired impairments in childhood or adulthood	✓	✓		✓			✓		
Coleman & Adams (2018)	United States	PWD, family members or caregivers (n=172)	Survey	Autism	✓							✓	
Conley (2003)	United States	Service providers (n=50)	Survey	Developmental disabilities	✓	✓		✓					
Crudden et al. (2005)	United States	PWD, service providers (n=43)	Focus group	Visual impairments	✓								

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1					*2*		*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
Crudden (2015)	United States	Service providers (n=6)	Focus group	Visual impairments	✓	✓						✓	
Crudden et al. (2015)	United States	PWD (n=492)	Survey	Visual impairments	✓	✓		✓				✓	✓
Crudden et al. (2017)	United States	PWD (n=48)	Pre-post with control group	Visual impairments			✓					✓	
Crudden & McBroom, (1999)	United States	PWD (n=174)	Survey	Visual impairments		✓			✓				✓
Feinberg (2011)	United States	PWD	Observations	Visual impairments with intellectual disabilties				✓					✓
Grisé et al. (2019)	Canada	NA	Methodological approach	Physicial disability		✓							
Hernandez et al. (2007)	United States	PWD (n=74)	Focus group	Unspecified		✓	✓					✓	
Inge et al. (2018)	United States	PWD (n=44)	Focus group	Spinal cord injury	✓	✓				✓	✓	✓	
Joseph & Robinson (2012)	United States	PWD (n=16)	Phenomenology	Visual impairments		✓							
Kitchin et al. (1998)	Ireland	PWD, service providers, family members or caregivers (n=23)	Focus groups	multiple sclerosis, cerebral palsy, spina bifida, epilepsy, rheumatoid arthritis, spinal injury, chronic pain			✓						

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1					*2*		*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
Kukla et al. (2016)	United States	Service providers (n=114)	Survey	Mental illness	✓							✓	
Lindqvist & Lundälv (2012)	Sweden	PWD (n=21)	Focus groups	Mobility impairment, neuropsychiatric conditions (stroke, aphasia, ADHD, Asperger's syndrome, hearing impairments, visual impariment	✓	✓				✓	✓		
Lindsay (2011)	Canada	PWD (n=2534)	Survey	Unspecified	✓	✓						✓	
Lindsay et al. (2015)	Canada	PWD, service providers, employers (n=49)	Interviews	Physical disabilities								✓	✓
Lindsay et al. (2017)	Canada	PWD, service providers (n=44)	Interviews	Spina bifida	✓	✓						✓	
Lindsay et al. (2021)	Canada	PWD (n=44)	Discussion forum	Physical disability	✓	✓						✓	
Loprest & Maag (2003)	United States	PWD (n > 16 000)	Survey	Unspecified	✓	✓					✓	✓	
Lubin & Deka (2012)	United States	PWD	Survey	Physical Disability	✓		✓						
Lukyanova et al. (2015)	United States	38 cases	Case file review	Most common : cognitive/intellectual disabilties, mental	✓								

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1				*2*			*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
				illness, hearing impairments									
Magill-Evans et al. (2008)	Canada	PWD (n=76)	Mixed methods	Cerebral Palsy and spina bifida	✓					✓			
Mancuso et al. (2000)	United States	PWD (n=22)	Interviews	Rheumatoid arthritis		✓					✓	✓	
McDonnall (2011)	United States	PWD (n=250)	Survey	Visual impairment								✓	
McNaughton et al. (2003)	United States	Employers, co-workers (n=14)	Questionnaire and interviews	Individuals using Augmentative and Alternative Communication		✓			✓			✓	
Molher et al. (2013)	Canada	NA	NA	Vision loss								✓	✓
Moon et al. (2014)	United States	NA	NA	Unspecified							✓		
Nagib & Wilton (2020)	Canada	NA	Examination of content of an online community	Unspecified								✓	
Newbigging & Laskey (1996)	Canada	PWD (n=1)	Case study	Brain injury								✓	
Noel et al. (2017)	United States	PWD (n=280)	Program Evaluation	Developmental and psychiatric disabilities	✓					✓			
Noreau et al. (1999)	Canada	PWD (n=418)	Cross-sectional study	Spinal cord injury								✓	

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1					*2*		*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
O'Neill & Dyson-Hudson (2020)	United States	NA	Review	Spinal cord injury			✓						
Park & Park (2021)	Republic of Korea	PWD, family members or caregivers (n=232)	Survey	Intellectual disabilities								✓	
Pebdani (2014)	United States	PWD (n=6227)	Longitudinal	Learning, developmental, emotional/behavioral, sensory, physical disabilities and other unspecified disabilities				✓					
Reid & Bray (1998)	New Zealand	PWD (n=14)	Mixed methods (Semi-structured interviews and survey)	Learning disabilities								✓	
Sabella & Bezyak (2019)	United States	PWD (n=3218)	Survey	Mobility disability, blindness/low vision, mental health disability, deafness/hard of hearing, communication disability, other and		✓						✓	

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1							*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
				unspecified disabilities									
Scheef et al. (2018)	United States	Service providers (n=75)	Mixed methods	Intellectual disabilities	✓								
Silverman et al. (2019)	United States	PWD (n=559)	Survey	Blindness	✓				✓	✓	✓		
Targett et al. (2004)	United States	NA	NA	Spinal cord injury	✓								
Törnbom et al. (2014)	Sweden	PWD (1983, n= 55; 2000, n= 28)	Longitudinal	Cerebral palsy and spina bifida with or without intellectual disability	✓								
Trygged (2012)	Sweden	PWD (n=10)	Semi-structured interviews	2 years post-stroke			✓						
Wehman et al. (1999)	United States	NA	Viewpoint	Spinal cord injury	✓							✓	
West et al. (1998)	United States	NA	Case studies	Unspecified	✓		✓	✓					
Wolffe (1999)	United States	Employers	Viewpoint	Visual impairments					✓				
Wolffe et al. (2013)	Nigeria	PWD (n=172)	Interviews	Visual impairments	✓					✓		✓	
Wong et al. (2020)	United States	Workers (n=373,521; among them 19,922 were PWD)	Survey	Unspecified								✓	
Zalewska et al. (2016)	United States	PWD (n=4110)	Longitudinal	Autism, intellectual disabilities,								✓	

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1					*2*		*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
				unspecified other disabilities									
Zhou et al. (2019)	Japan	2 cases	Case studies	Unspecified								✓	
Conference abstract													
Berbrayer (2015)	Canada	PWD (n=10)	Interviews	Cerebral Palsy			✓				✓		
Chen (2009)	Taiwan	PWD (n=6)	Post only	Cognitive impairments (head injury and mental illness)								✓	
Corcoran et al. (2005)	United Kingdom	PWD (n=40)	Interviews and focus group	Visual impairments	✓								
Fiedler & Indermuehle (1997)	United States	PWD (n=77)	Survey	Spinal cord injury	✓								
Zyskowski et al. (2015)	Canada	PWD, service providers	Mixed methods	Autism, blindness, severe social anxiety, serious health conditions, combined type ADHD. cognitive impairment, dyslexia/reading disability, blindness/low vision, motor/dexterity challenge, deafness/hard-of-hearing, other			✓				✓	✓	

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1					*2*		*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		
				unspecified disabilities									
Governmental publication													
National Council on Disability (2011)	United States	NA	NA	Unspecified	✓	✓	✓	✓					
National Council on Disability (2007)	United States	NA	NA	Unspecified		✓				✓	✓	✓	
Web page													
Dembe (2015)	Canada	NA	NA	Unspecified	✓	✓					✓		
PhD Dissertation													
Marston (2002)	United States	PWD	Mixed methods	Visual impairement		✓							
Scheef (2016)	North America	Service providers	Mixed methods	Intellectual disabilities	✓								
Magazine articles													
Stegers (2008)	United States	NA	NA	Unspecified			✓						
Vogtle & Brooks (2005)	United States	NA	NA	Developmental disabilities			✓					✓	✓
Book chapters													
VanBergeijk et al. (2011)	United States	NA	NA	Autism	✓							✓	
Hine (2009)	United Kingdom	NA	NA	Unspecified	✓	✓							

References	Study Location	Types and number of participants	Study Methods	Type of disability addressed[a]	Themes and sub-themes covered								
					1				*2*			*3*	*4*
					1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*		

[a] The terminology used in this column is the one used by each document.
NA : non applicable

Table 2. *Summary of transportation barriers and facilitators to PWD employment*

Themes	Subthemes	Barriers	Facilitators
Public transportation	Service offer	Lack of transportation options	- Public transportation service close to home - Using other service providers - Grant to develop and promote transportation services - Carpooling
		Lack of transportation in rural setting	- Moving to urban area - Offering transportation services to more distant communities
		Transport unreliability	- More frequent transportation services
	Accessibility	Lack of accessible transportation and coordination in the transport chain Inaccessible route to bus stop Inaccessibility of bus, subways or train Inappropriate driver attitudes Drivers' lack of knowledge about how to assist PWD Drivers do not assist PWD Claimed accessibility is not enforced	- Transport chain that works smoothly - Accessible transportation stops near the work building - Accessible taxis - Efforts to provide reliable and accessible public transportation - Advocacy by rehabilitation professionals, PWD, and employers - Modifying and extending public transport route
	Paratransit	Cost	

Themes	Subthemes	Barriers	Facilitators
		Waiting list Restricted service areas Restricted business hours Eligibility criteria Pick-up time Long and unreliable travel time Inflexibility	- Most reliable transportation services for some people with visual impairments
	Cost	Fares too high	- Employers covering transportation cost - Offering transportation stipend - Lowering cost for public transportation - Providing free pass or vouchers for PWD
Employment	Employers	Employers' beliefs	- Address disability issues in the interview - Employers supporting PWD - Employers paying attention to accessibility issues
		Companies not opened to carpooling or not providing transportation for PWD	- Employers providing transportation or covering its cost
	Job requirements and conditions	Job requiring a driver's license Long-distance travel, multi-day travelling, or travelling during extended time period Companies operated buses that are not accessible Lack of flexible work conditions	- Immaterial work adjustments[3] - Flexible schedules - Accessibility in business traveling
	Workplace accessibility	Inaccessible workplace Inaccessible parking	- Telework - Working from satellite location

Themes	Subthemes	Barriers	Facilitators
			- Accessible parking
Personal factors		Inability to navigate the transportation system Lack of experience, comfort, and skill in public transportation use Not having control in choices of public transportation Mobility limitations and fatigue Feeling of insecurity Stress	- Cognitive strategies - Independence in transportation - Community travel skills - High level of self-efficiency in transportation - Positive independent behaviour of traveling to work - Perception of control through access to transport - Being risk adverse - Expected negative emotions with not travelling independently to work - Self-advocacy - Being independent in means of transportation - Training in travel skills - Mobile applications - Avoiding rush hours - Always having a back-up plan
Social network		Family discouraging use of public transportation Overprotection by parents	- Supportive network - Family and friends providing or helping with transportation

Figure

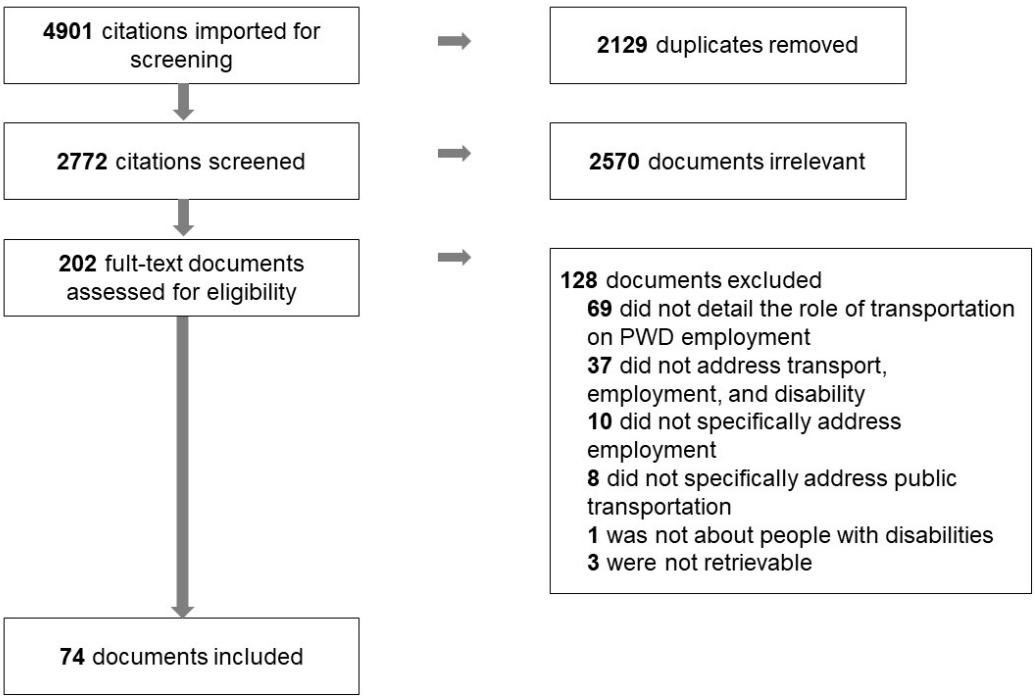

Figure 1. *PRISMA-ScR flow diagram for selected references*

Figure captions

Figure 1. *PRISMA-ScR flow diagram for selected references*