Investigating the barriers in a typical journey by public transport users with disabilities

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ABSTRACT

Accessibility to public transport is increasingly recognized as a critical element in the livelihoods of people with disabilities. Although there have been advancements to better cater for the needs of people with disabilities, budgetary constraints mean that every issue cannot be addressed. There are still many barriers restricting independent travel for this group of people. Social exclusion is often a result of their inability to use or access a public transport system. The present study investigates the barriers in a typical journey chain and provides the similarities and differences in the key barriers perceived by people with physical and visual impairments. Participants volunteered from cities in New Zealand. A semi-structured interview was conducted with a sample of people with disabilities. Bus driver's attitude and unawareness of disabled users' needs was a common concern for both groups. The main barriers for physically impaired users were related to the urban environment, terminals and stops, services, and quality of footpaths. In comparison, the main barriers for visually impaired users were poor presentation of information, and obstructions on footpaths. Based on the findings, the study provides recommendations for policy makers. Future research studies are encouraged to adopt the accessible journey chain when investigating barriers to riding public transport.

Keywords: disability, visually impaired, physically impaired, social exclusion, public transport

1. Introduction

People with disabilities continue to be amongst the most marginalized groups in society. They are typically unable to enjoy the freedom of mobility as able-bodied individuals. With mobility being one of the preconditions for participating in society, people with disabilities are often excluded, to the extent that some are unable to perform day-to-day journeys. Accessibility to public transport is increasingly recognized as having a significant impact upon their livelihoods. Barrier-free access to public transport can transform their lives from one of isolation and dependency to one of social integration and independence (United Nations, 2007).

Majority of the literature has focused separately on segments of a public transport journey when investigating the barriers faced by people with disabilities. Broadly, they were either on the built environment (Jenkins, Yuen, & Vogtle, 2015; Rosenberg, Huang, Simonovich, & Belza, 2013) or public transport (Soltani, Sham, Awang, & Yaman, 2012; Velho, Holloway, Symonds, & Balmer, 2016). For people with disabilities, any barriers in the built environment can prevent them from using public transport in the first place. A limited number of published literature examined barriers in respect to the whole public transport journey (Ahmad, 2015; Gallagher, Hart, O'Brien, Stevenson, & Jackson, 2011; Carlsson, 2004; Sundling, Berglund, Nilsson, Emardson, & Pendrill, 2014). The limitations of these studies include, focusing on one type of disability, or the elderly (whose disability was associated with age). For example, Ahmad (2015) focused on physical disabilities in a rural context; while Gallagher et al. (2011) investigated barriers for people with visual impairments in the rural and urban context.

It is evident that there is limited literature concerning the whole journey chain which investigates the similarities and differences in barriers perceived between different disability types. Given the variety of disabilities, this study focuses on the two most common ones, physical and visual impairment. The present study addresses this knowledge gap by adopting the "accessible journey chain" concept. The aim is to identify the key barriers in typical public transport journeys undertaken by people with disabilities. The case study is in New Zealand. Around 18% of the country's population is estimated to have a physical or vision impairment (Statistics New Zealand, 2014a). The next section of the paper discusses key findings from relevant published material.

2. Literature Review

This section provides a summary of the existing literature on the barriers to mobility for people with disabilities. It focuses on studies which include participants with physical and/or visual impairments using public transport. The review is categorized into three key areas: the accessible journey chain; the effects of urban environment on mobility; and public transport services.

2.1. The accessible journey chain

The ability to use public transport, independently, is an expression of autonomy and facilitates social interactions (Asplund, Wallin, & Jonsson, 2012). Frye (1996) proposed the concept that a journey chain is made up of elements which are linked together. Based on this concept, Zhang (2011) grouped these elements into four phases to highlight the out-of-vehicle and in-vehicle phases, which can be broadly grouped as the 'Built Environment' and 'Public Transport' respectively, as depicted in Figure 1. In addition, two more elements in the journey chain, 'Set off from Origin' and 'Walk to Destination' were added to highlight the out-of-vehicle phase more completely. The link between every element must be seamless for the whole journey to be easily completed by the user. This is referred to as the 'accessible journey chain'. The journey always starts with information because people with disabilities need to be certain that the entire journey is accessible before they set out on a trip. Typically, they cannot adapt easily to the barriers encountered. Sufficient information is required to make an informed decision as to whether it is worth taking public transport or should they seek alternative modes (Stage 1 in Figure 1). The journey physically begins as soon as they step out onto the built environment (Stage 2 and 3 in Figure 1) which then transitions into the public transport network (Stages 4 – 7 in Figure 1) and back again (Stage 8 and 9 in Figure 1). Every element in the chain feeds back into the information used when undertaking the next journey, and therefore, completing the cycle (Frye, 1996).

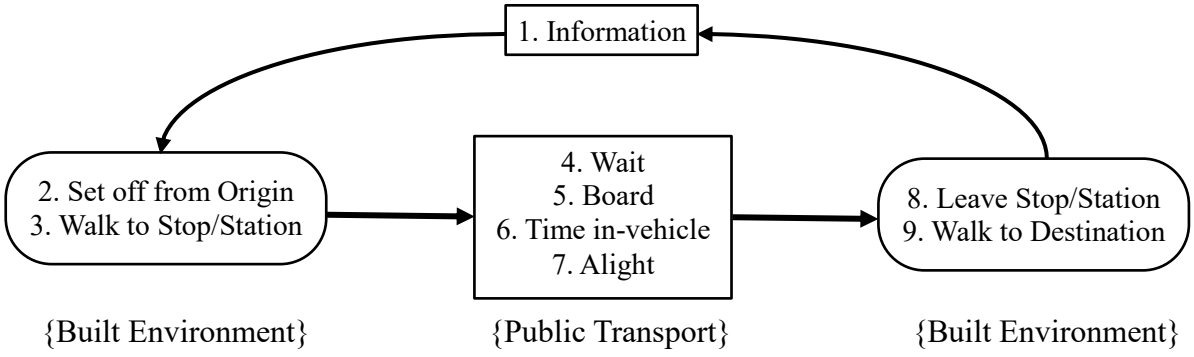

Figure 1: The accessible journey chain adapted from ((Zhang, 2011)

The level of planning required for these individuals to make a seamless journey is not always considered in mainstream transport planning (Maynard, 2009). As such, this group of individuals make fewer journeys on average, travel shorter distances, and by a more limited number of modes. They often need to rely on family members or other shuttle services when public transport services are inaccessible (Deka, 2014).

2.2. Barriers in the built environment

The built environment has a significant impact on the ease of journeys made by people with disabilities. The challenges of accessibility in a public transport journey start as soon as the user leaves their home, making it difficult to use the mode in the first place. For example, the lack of and poor quality footpaths such as uneven surfaces due to cracks were identified as a common issue (Gallagher et al., 2011; Jenkins et al., 2015; Rosenberg et al., 2013). It creates risk for falling for those with visual impairment, and makes maneuvering difficult for those with physical impairment relying on walkers and wheelchairs. In addition, poor quality, steep, and lack of curb ramps exacerbates the issue as they cannot leave the footpath to cross the road (Bromley, Matthews, & Thomas, 2007; Meyers, Anderson, Miller, Shipp, & Hoenig, 2002; Rosenberg et al., 2013). Lack of lighting can hide potential trip hazards to travel safely and makes reading signs difficult for those with low vision (Rosenberg et al., 2013). Other barriers include lack of crossings, especially on busy roads, lack of audio announcements at crossings (Bromley et al., 2007; Wu, Li, & Li, 2017), and to a lesser extent, background noise that masks audible information (Jenkins et al., 2015). Unexpected obstacles on footpaths can have a deterring effect on journey experiences, to the extent that some are unable to complete their journey. Construction works were highlighted to be one of the major issues, ranging from the placement of signage and cones, to the total blockage of a footpath. This causes some travelers to return home if feasible alternatives are not available (Burdett & Pomeroy, 2011; Gallagher et al., 2011).

2.3. Barriers in riding public transport by disabled users

The physical aspect of accessibility is often a problem from the perspective of physical and sensory disabled persons. Long distances to public transport stops (Jansuwan, Christensen, & Chen, 2013; Jensen, Iwarsson, & Stahl, 2002) and the lack of feasible alternative routes to terminal entrances were highlighted as barriers (Maynard, 2009). Issues pertaining to public transport facilities include lack of shelter, poor lighting and safety (Ahmad, 2015; Crudden, McDonnall, & Hierholzer, 2015). Asplund et al. (2012) indicated that with all means of transport, physical constraints when boarding, moving around on-board and disembarking have been perceived as the most common barriers, correlating to a higher chance of an accident due to inadequate design, and especially steps in buses (Gallagher et al., 2011). The platform infrastructure, such as gaps and/or non-level access between platforms and buses/trains was highlighted as a common barrier for those with physical impairment as wheelchairs and walkers cannot access the vehicle (Karekla, Fujiyama, & Tyler, 2011; Soltani et al., 2012). For the visually impaired, poor information in the form of unavailability of audio announcements and suitable timetables were identified as barriers. The location of priority seats in the vehicle, close to both the driver and door is very important (Gallagher et al., 2011). Visually impaired

travelers rely on drivers to announce the stops for them where audio announcements are not available. Variations in the internal layout of buses can also make it very difficult for them to find a seat, as they rely on memory to navigate (Gallagher et al., 2011).

2.4. Research need

It is evident from the review that people with physical and visual impairments face many barriers when traveling independently by public transport. However, the barriers are segregated and there is limited knowledge about their importance relative to the whole journey. This study addresses this gap by examining public transport journeys using the concept of the "accessible journey chain". It investigates a typical journey from an origin to a destination, from the users' perspective. This approach allows critical aspects of the journey chain, which can prevent or discourage an individual from using public transport, to be examined for those with physical and visual impairments. The findings are expected to provide decision makers with a deeper insight into how trips are made by people with disabilities.

3. DESCRIPTION OF CASE STUDY AND DATA COLLECTION

3.1. Description of study area

The present study was undertaken primarily in Auckland (66% of the participants), New Zealand. The other proportions of the participants included those who live in Dunedin (25%), Wellington (3%), Christchurch (3%), and Whanganui (3%). Auckland is New Zealand's largest and most cosmopolitan city with a population of 1.6 million. The median age of those living in Auckland is 35 years. The median household income is $76,500 per annum, which is the highest across the country (Statistics New Zealand, 2014b). Auckland's public transport system is composed of bus, train and ferry.

In 2008, the government produced a document called the Requirements for Urban Buses in New Zealand (RUB) with the purpose of standardizing bus requirements across regional councils. In 2013, the Regional Public Transport Plan (RPTP) was produced. This plan aims to provide commuters in Auckland with a sustainable transport system that is inclusive, safe, integrated, and affordable. In August 2016, a new integrated ticketing system called AT HOP was implemented. This electronic ticketing system does not require additional purchase of tickets when making transfers. A new mobile application that provides real-time information for navigation also became available. Around 91% of the buses are low floor buses with the ability to kneel to meet the curb and have manual wheelchair ramps fitted. Seats near the front of the buses are designated for the elderly and those are access-challenged. Certain buses have audio announcements. The electric trains are equipped with automatic ramps, located on the central carriage doors to allow for wheelchair access between the platform and the vehicle. The trains are fitted with audio and visual announcements. Most ferries allow for wheelchair access on board. All three modes allow for guide dogs to accompany passengers (Auckland Transport, 2017).

Auckland has the most developed public transport system in the country. Wellington offers buses, ferries, train and cable cars for commuters; Christchurch provides buses and ferries only. In Wellington, 71% of the vehicles support accessibility features and certain trains are fitted with a public-address system, automatic station information announcements, and information displays. In Dunedin and Whanganui, commuters primarily use buses. Some of the newer vehicles are fitted with accessible features such as priority seating areas, low floor with the ability to kneel, and wheelchair ramps to support accessibility. In Auckland, majority of the vehicles meet the level of service as set out in the RUB. However, in the other cities, the level of service is not met to the same extent. Often these guidelines are difficult to implement due to budgetary constraints. This has caused authorities to implement selected accessibility features that are suitable for the local surrounding.

3.2. Sampling strategy

The data collection was carried out using the snowball sampling method. For participants to be eligible, they either had to be a current public transport user or have used it in the past. Organizations representing disability groups were contacted to invite their members who fit the criteria to participate. Email addresses and phone numbers were provided to organizations so that potential participants could directly contact the

interviewers. Once an individual participated, they were asked to invite other people they know. This approach ensured potential participants of the research through personal endorsements. The goal was to recruit a minimum of 12 participants, for each disability type, as this was when thematic saturation of information occurred; thereby, ensuring validity of the data (Guest, Bunce, & Johnson, 2006).

3.3. Semi-structured interviews

Semi-structured interviews were undertaken with each participant. This approach allows in-depth contextual and relevant data to be attained from the target population (Yin, 2013). The list of questions prepared for the interviews create a sense of consistency as well as a form of structure. The interview maintains a conversational tone, such that participants have the freedom to express their views and the opportunity to explore issues that are important to them (Bryman & Bell, 2015). Topical trajectories may be followed in the conversation when appropriate; when an opportunity is given for clarification; when additional questions are required for clarifications; and when new ideas emerge.

The purpose of the interview questions was to uncover the major barriers in a typical journey and their impacts on the participants. The interviews were designed to take approximately between 30 minutes – 1 hour, which were audio-recorded with permission from the participants. To prevent bias, the questions during the semi-structured interviews were straight forward and were not asked with any positive or negative tone. The questions were on: (a) purpose and frequency of trip, (b) the barriers they face in a typical public transport journey, (c) the consequence of the barriers on their perceived well-being, and (d) socio-demographic characteristics.

3.4. Transcribing and coding in NVivo

The qualitative data analysis software *NVivo (Version 11)* was used to categorize the transcribed data. The transcripts were lightly edited by removing false starts (incomplete sentences), repetition (repeated words and sentences), stutters, and non-relevant contents to make the transcripts cleaner and easier to read by the software, while still capturing relevant information.

The process of thematic analysis, as described by Braun and Clarke (2006) was followed. This involved a process of coding across the entire data set and then collating the codes into themes. Each transcript was read where relevant words, phrases, and sentences were coded. A code was considered relevant if it was: (a) repeated in several places, (b) new and (c) explicitly stated by the participant as being important or relevant to literature. Themes from within the data were identified using an inductive approach, where the themes were strongly linked to the data collected. Therefore, no predetermined coding frame was used. Instead, it was developed as the data was coded and subsequently applied to all transcripts.

4. Results

4.1. Description of participants

A total of 32 participants were involved in this study. Of the 32, 15 participants were physically impaired (PI), including 10 wheelchair users and 5 who used walkers, crutches or walking sticks. The remaining 17 participants were visually impaired (VI), including 6 with total blindness and 11 with partial vision, to varying degrees. Table 1 presents the socio-demographic characteristics of the participants. The majority of participants were female, 67% in the PI group and 71% in the VI group. Around 40% of participants in the PI group were in the age range between 65 and 74; while 47% of the participants in the VI group were in the lower age range (between 45 and 64). Majority of the participants identified themselves as NZ European with around 73% and 71% in the PI and VI group, respectively. PI participants were predominantly from Auckland (87%); while 47% of VI participants were from Auckland followed by 35% from Dunedin (a smaller city located in the South Island). All of the participants lived in suburban areas.

PI participants ranged from wheelchair users, due to accidents or having a genetic condition from birth, to using various aids such as walkers, crutches or walking sticks. VI participants ranged from low vision, to varying degrees, due to different conditions that affected their vision such as Retinitis Pigmentosa, Macular Degeneration, and Hemianopsia to total blindness. The dataset also included those who required the use of a cane and guide dogs. Many participants, particularly in the high age bands, described having

additional minor difficulties due to age related conditions such as slight hearing loss, slower reactions, and poor balance. However, the participants did not consider these health issues as the main cause of their difficulties in a typical public transport journey.

4.2. Trip information

All 32 participants involved in this study currently use or have used public transport independently in the past, with the exception of one participant who used it with the accompaniment of another person. Nine participants used public transport less than once a week, 10 participants used it 1 to 3 times a week, and 12 participants were frequent users, using it more than 3 times a week. Some of the PI participants mentioned owning a car for short journeys and using public transport for longer journeys (typically those greater than 30 minutes). The main purposes of the trips by frequent users were mostly associated with work and educational purposes. For non-frequent users, the main purpose of their trips were recreational and leisure, which included, exercise, visiting the Blind Foundation, the library, and attending events. Appointments, such as medical and banking-related, education, shopping, visiting friends and family, and work were the second most common journeys.

Table 1: Socio-demographic characteristics

Socio-economic characteristics	Number	
Gender	**PI**	**VI**
Male	5 (33%)	5 (29%)
Female	10 (67%)	12 (71%)
Age-range		
15-24	2 (13%)	1 (6%)
25-44	3 (20%)	2 (12%)
45-64	3 (20%)	8 (47%)
65-74	6 (40%)	2 (12%)
75-84	1 (7%)	3 (18%)
85+	-	1 (6%)
Ethnicity		
European	2 (13%)	4 (23%)
NZ European	11 (73%)	12 (71%)
Mixed European	-	1 (6%)
Chinese European	1 (7%)	-
Australian/Aboriginal	1 (7%)	-
City		
Auckland	13 (87%)	8 (47%)
Dunedin	2 (13%)	6 (35%)
Christchurch	-	1 (6%)
Wellington	-	1 (6%)
Whanganui	-	1 (6%)

4.3. Barriers in a typical whole journey-chain

The major barriers are divided into two broad categories: (a) the built environment to and from the public transport stop/terminal and (b) public transport service, as illustrated in Figure 1. Table 2 and 3 provides detailed descriptions of the barriers faced by both PI and VI users. Participants named multiple elements which are related to each of the barriers. These barriers were mostly associated with buses as the train services did not require any interaction with the driver and the train stations had better accessibility features for people with disabilities. Issues that did not fall into these two categories were either wet weather or other.

The most frequently mentioned barriers for PI users were the urban environment (steep gradients, alignment of curbs, poor crossing facilities etc.), design of terminals and stops (e.g. lack of shelters, steep ramps, inadequate access to toilets etc.). Poor quality footpaths (e.g. cracking of pavements, obstructions etc.) and services (poor connectivity, reliability, transfer times etc.) were mentioned equal times. The participants mentioned that the service coverage was inadequate and also that the distance to the terminals/stops, in conjunction with poor quality footpaths, reduced ease of accessibility. Bus driver's attitude and awareness of their needs, obstructions on footpaths and information (e.g. poor presentation of information, lack of real time information etc.) were mentioned as the main barriers. Bus driver's attitude and unawareness of disabled users' needs was a common concern for both groups. It was a bigger concern for VI participants, shown in Table 3. This finding shows the difference in needs between the two groups. Depending on the level of their visual disability, some of the participants were unable to see a bus approaching and therefore could not flag the driver to stop. This caused major impedance to complete their journey at a reasonable time. For PI users, many of the drivers would refuse to put a ramp for them to board. Other key barriers faced by VI users include footpaths (obstructions, poor street lighting and lack of footpath etc.) and information (poor presentation, lack of information, lack of audio announcements etc.).

Table 2: Description of barriers faced by PI participants

	Barriers	No. of times mentioned	Elements (number of times mentioned)
Built Environment	Distance To/From Stop/Station	5	Proximity from origin to stop/station, or stop/station to destination (5)
	Footpaths	**9**	Poor pavements; tree roots protruding on footpaths and driveways (3); uneven surfaces (2); undulations; cross-fall on pavements; cobbles
	Urban Environment	**18**	Hills (4); steep and dangerous curb or curb cuts (5); steep gradients (3); tactiles (2); poor intersections; crossing side roads; safety/security of journey to train station; cross buttons that cannot be reached at intersections
	Construction	1	Plastic walkways around construction sites
	Parking at terminals	5	Lack of accessible parking at stations (5)
	Wet Weather	3	Issues caused by wet weather such as the inability to hold an umbrella while using a mobility aid (2) and slipping on buses
Public Transport	Service	**9**	Poor connectivity; infrequent services; late weekend public transport start times; inadequate accessible intracity and intercity bus services; reliability of buses; transfers; time duration as well as on and off points of a journey
	Terminals and Stops	**11**	Lack of shelters (2); steep gradient ramps at terminals/stations (3); lack of lifts at stations (2); inadequate access to toilets at stations; inadequate number of toilets at stations; inadequate number of tag off zones at train stations; gap between platform and train
	Bus Driver Attitude and Unawareness	8	Poor driver attitude and unawareness (7); buses not stopping
	In-Vehicle Facilities	8	Narrow buses with inadequate space (4); buses which are too steep to get off; steps on buses; inadequate wheelchair restraints on buses; inability of buses to kneel down

Participants were asked to prioritize their top three issues that will bring the greatest improvements to their mobility. Figure 2 presents the answers that could be grouped into common factors. It shows the commonalities and differences of these critical issues between PI and VI users. The numbers in the parenthesis provide the number of PI and VI participants who mentioned them. Both groups mentioned addressing the issues associated with driver training on the needs of people with disabilities, connectivity of the network, and vehicle facilities (e.g. location of stop button, consistency in vehicle design, space for wheelchairs etc.).

For PI users, they suggested improvements on the operation of the public transport services, in terms of greater frequency and operating hours. The terminal facilities that were desired are ease of boarding, slow gradient ramps, adequate toilets and shelters. Availability of accessible car parks at terminals was also important to PI users as many had the ability to drive and would prefer to drive for the first and last mile of their public transport journey. The importance of information for VI users is clearly seen from their top three issues to be addressed, especially at terminals such as having good signage and real-time information. Audio announcements in vehicles were a critical service they desired from operators.

Table 3: Description of barriers faced by VI participants

	Barriers	No. of times mentioned	Elements (number of times mentioned)
Built Environment	Distance To/From Stop/Station	3	Proximity from origin to stop/station, or stop/station to destination (3)
	Footpaths	**12**	Obstructions in footpaths from recycling bins, cars and low hanging branches (5); undulating footpaths (2); poor street lighting; lack of footpaths
	Construction	4	Footpath closures; cones obstructing footpath; removal of tactile and noise
	Crossings	3	Audio not working for crossings (2); lack of pedestrian crossings
Public Transport	Information	**13**	Poor presentation of information (5) such as contrast, small print and content of bus routes; lack of information to choose correct bus from multiple buses (3); lack of real time information (2); lack of audio announcements on buses; ticketing machines (2)
	Service	1	No direct bus route to destination
	Terminals and Stops	2	Lack of shelters on bus stops; poor paths to bus stops
	Bus Driver's Attitude and Unawareness	**18**	Buses not stopping despite people waiting at stops and not turning up (8); driver forgetting to stop (5) the bus; poor driver attitude and unawareness (4); driver language barrier
	In-Vehicle Facilities	6	Steps on buses; seats too close; faulty stop button; lack of bright colour to indicate edge; bus buzzers not in same place; hop card reader not beeping loudly
	Other	3	Lack of national standard for consistency in design like buttons; paying extra for transfer of multimodal public transport; lack of knowledge around white canes

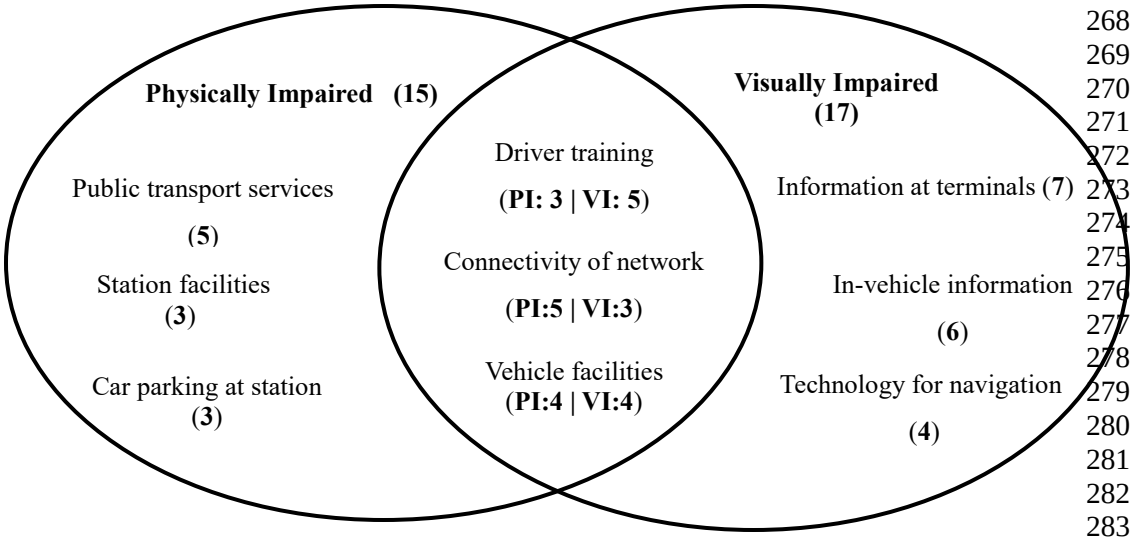

Figure 2: Similarities and differences of key issues between PI and VI users

5. Discussion

The findings revealed commonalities and differences in the barriers perceived by those with visual and physical impairments. Both groups discussed the importance of addressing issues related to driver training on the needs of people with disabilities, connectivity of the network, vehicle facilities (e.g. location of stop button, consistency in vehicle design, space for wheelchairs etc.) and quality of footpaths to ease their travel. For vehicle facilities, participants suggested that keeping the design of the vehicles (both interior and exterior) similar can help them feel more confident to travel independently. Participants also discussed that better services (more frequent and reliable) that support public transport multi-modal travel will assist them in reaching more destinations. During the interviews, the participants discussed the unsupportive behavior from bus drivers and how this had a negative impact on their experience. Many of the VI participants discussed that bus drivers pass them by without stopping and some spoke rudely to them. PI users discussed that drivers were reluctant to make the additional effort to place the ramp for boarding. It requires a great deal of effort, from planning the trip to overcoming obstacles on the way, for people with disabilities to reach the bus stop. Driver interaction is particularly important for vulnerable users because they form a link between the built environment and public transport during the boarding/alighting process. Well-trained workers can significantly improve the journey experience and encourage people with disabilities to travel independently. Many of the participants discussed their desire to be more independent and to interact more with society.

According to New Zealand's Land Transport Management Act (2003), regional councils must consider the needs of people who are transport disadvantaged, which includes people with disabilities, in preparing regional plans. Several guidelines such as the RTS 14 Guidelines for Facilities for Blind and Vision Impaired Pedestrians and the Auckland Transport Code of Practice (ATCOP) have various policies in place for assisting the transport disadvantaged. However, the findings from this study indicate that more focus is required to regulate these policies. An issue with these documents is that they do not offer sufficient guidance for detailed design. It is recommended to collate various relevant standards into one document for disability design and to liaise with stakeholders, who are experts in the area, during the design and planning stage, whether it is for a new or retrofitting existing infrastructure. For example, the RTS 14 is a best practice guideline for visually impaired pedestrians. It provides in-depth guidance for designers by integrating relevant pieces of information from external sources and documents them together. Although it is stated in the RTS 14 that "*all new pedestrian facilities shall be designed and installed with features detailed in this guideline*", it also states that "*the use of this document is not compulsory in New Zealand*". As a result, to

save costs, designers are likely to continue to meet bare minimal standards and omit essential elements required for accessibility by those with disabilities.

Limitations of this study included the underrepresentation of males, with 33% and 29% of the participants being male in the PI and VI group, respectively. Due to the unique set of individual needs, without a larger sample of different disabilities, the key issues found cannot reflect that of the whole population. One of the main limitations of the snowballing sampling method is that similar patterns can arise among the participants. However, for this study, majority of the participants were volunteers from the disability organizations and only a few were from referral.

6. Conclusion

The aim of the present study was to identify and prioritize the key barriers in a typical public transport journey by those with visual and physical impairments. The study adopted the concept of an "accessible journey chain". A semi-structured interview was conducted, which included a total of 32 participants consisting of 15 physically impaired (PI) and 17 visually impaired (VI) participants. They were asked about their experiences for a typical journey using public transport from an origin (usually home) to a destination. A common barrier for both groups was bus driver's attitude and unawareness of their needs. VI users were more concerned about the interactions they had with bus drivers. As such, well-trained drivers can help people with disabilities feel more confident to use public transport. It is recommended that public transport operators liaise more closely with key stakeholders in the disability community to review and revise current training practices to offer better educational trainings to their drivers on the needs of visually and physically impaired users**.** Participants also discussed that better services to support public transport multi-modal journeys and consistency in vehicle design will help them travel more independently.

The findings of the study highlight the importance of interacting with the disabled community and investigating the whole journey (from an origin to a destination). There are several reasons why such studies need to be undertaken more often. Firstly, people with disabilities have unique needs within the group itself. Different disabilities produce different barriers, as was shown in the findings. PI users had a different set of barriers to VI users. There are also some commonalities among the barriers and addressing these common barriers will ease the journey experience for a wider group. Secondly, it is the responsibility of transport practitioners to provide a safe transport system for all. Mobility and inclusion into the community are some of the basic human needs. This study provided some insights into the consequences of these barriers. People with disabilities are considered as vulnerable members of the community. Hearing their needs will make them feel more included in the society and less isolated.

The research method used for this study can be replicated in other countries to find key barriers that are unique to their disability community. Decision makers are encouraged to interact with the disability communities to understand their mobility needs, especially when implementing infrastructure. A transport network is only efficient when designed from a holistic point of view and for all users.

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