

A PARTICIPATORY QUALITATIVE ANALYSIS OF BARRIERS OF PUBLIC TRANSPORT BY PERSONS WITH DISABILITIES FROM SEVEN EUROPEAN CITIES

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Abstract: Although there is literature published by a considerable number of scientific publications regarding disability and transport, the affected persons are only very rarely involved in the research. The paper presents the results of two qualitative studies conducted jointly with persons with different forms of disabilities: i) a social media content analysis and ii) peer-to-peer interviews with persons with disabilities ($N = 49$). The studies aimed to identify barriers that persons with access needs face during their trips with public transport. In line with a participatory approach, persons with disabilities from seven European cities were involved in conducting the research allowing for new interpretations of transport equity issues. Qualitative content analysis of both studies revealed barriers clustered into eight categories: regulations, public awareness and assistance, information provision and communication, infrastructure, vehicles, general service quality, stops and stations and emotional barriers. The two studies highlight important factors that influence disabled users' experiences of public transport. Upon reflection, the paper derives research hypotheses and demonstrates the value of involving people with disabilities in the analysis of disability research to derive in-depth insights about equity in transport.

Keywords: accessibility, barriers, inclusive transport, universal design, user research, qualitative research, participatory approach.

Introduction

The lack of fully accessible public transport vehicles and services prevents people with disabilities from participating equally in society. Transport is essential for accessing education, employment and health services, among others. Inaccessible transport thus creates social exclusion for people with disabilities and other vulnerable-to-exclusion groups of society. The relevance and urgency of improving accessibility in transport are further increased by the demographic change that implies a growing number of mobility-impaired elderly.

The paper adopts the social model of disability that defines disability as a social creation based on the relationship between people with different access needs and a disabling society and environment (Shakespeare, 2006). In transport, these disabling factors include the inaccessibility of vehicles, information, infrastructure, and services. Public transport agencies, transport operators, transport policy, and equal opportunities representatives have made efforts in proposing sustainable and inclusive transport solutions, including accessible forms of active and green transport. However, despite the effort made by the European Union with the EU charter of Fundamental Rights and specific legislations (e.g., EU Regulations No. 181/2011 on Bus Passengers, European Parliament, 2011), an acceptable level of public transport accessibility is still not achieved (Bezyak, Sabella, & Gattis, 2017; Park & Chowdhury, 2018). This applies especially to particular groups of persons with disabilities, e.g., people with mental and intellectual impairments (Wilson, 2003).

State of the Art in user research related to user needs for accessible public transport

For transport systems to be accessible to everyone, it is important to consider all barriers that people with disabilities may experience along the transport chain (Wilson, 2003). A survey study with nearly 1.000 participants from Great Britain provided insights into the perceived barriers in public transport for disabled people (Disabled Persons Transport Advisory Committee, 2002). The study found that a considerable number (40%) of respondents stated they did

not feel secure while travelling by public transport. The study further revealed that bus drivers are often perceived as not helpful, and the intention to travel by bus would be increased if the staff were better trained to deal with the access needs of travellers with disabilities (ibid.). A face-to-face survey with over 2.000 participants in Great Britain showed that the difficulties most commonly mentioned by persons with disabilities were getting to and into bus stops or stations (23 %) and on and off buses and trains (24 %, Grewal et al., 2002).

There are also literature reviews that provide an overview of the existing state of research and identify gaps in knowledge regarding disability and mobility barriers. A literature review by Wilson (2003) summarized barriers in public transport for users with disabilities in Great Britain. The review found that facilitating transport chains are a key issue for inclusive transport (Wilson, 2003). Furthermore, the authors emphasized the need for consulting persons with disability in the design and implementation of accessible transport systems (Wilson, 2003). Kett et al. (2020) presented a thematic review on the factors affecting the mobility opportunities of people with disabilities in middle-income and low-income countries. In their analysis, the authors emphasized that “one size will not fit all” (p.15), implying that transport planners need to listen carefully to a range of voices to understand the diverse needs and requirements. Although individuals might have the same nominal disability, people’s needs can be extremely different. This is why it is important to follow an individualized approach when looking for inclusive and accessible solutions in public transportation.

In this context, qualitative studies, like interviews, add to quantitative analyses by providing deep insights into the experiences, attitude and behaviour of persons with disabilities (Edén et al., 2006; Lomax et al., 2014). Grewal et al. (2002) conducted 35 individual depth interviews and seven discussion groups with disabled people. The study revealed that getting to work with public transport was perceived as challenging. Difficulties included the accessibility of busses and trains, a lack of adjusted pavements and limited access to train stations were mentioned as barriers (Grewal et al., 2002). In the context of inclusive city design, an interview study by Hanson (2004) found that accessible public toilets are often considered as a missing link in the

transport chain. In an interview study from New Zealand, bus drivers' attitude and unawareness of disabled users' needs was a common concern for both considered groups of users - visually impaired and physically impaired persons (Park & Chowdhury, 2018).

Despite the amount of empirical research regarding disability in mobility and public transport planning, the number of research projects that actively involve persons with disability in their research is rather small and “there is no denying that disabled people have largely been excluded from disability discourse” (Kitchin, 2000, p. 25). In an interview study, Kitchin (2000) asked 35 people with disabilities about their satisfaction with research and the possibilities of participating in research. Respondents articulated a need for inclusive, action-based research strategies and the wish that disabled people “are involved as consultants and partners not just as research subjects” (Kitchin, 2000, p. 25). Even though Kitchin's (2000) requests and Duckett and Pratt's (2001) recommendations for involving persons with disabilities in research are already twenty years old, only a limited number of research projects invited persons with disabilities to actively contribute to research (e.g., Liddiard et al., 2019), and these often do not go beyond the first rungs of Arnstein's (1969) *ladder of citizen participation*, like *information* or *consultation* (Bigby et al., 2014; Keeley et al., 2019). However, participatory research with non-scientific actors as co-researchers, described by the rungs of *partnership* or *delegated power* (Arnstein, 1969), facilitates the understanding of complex and often implicit issues, such as the perception of service quality of public transport. Participatory research is premised on the notion that people have unrivalled expertise in their own needs and requirements as experts about their own lives. Participatory research empowers a person to be not only an object of research but a subject who shapes the research agenda and methods. Participatory approaches enable people to assume a leading role in the research and thereby contribute with their expertise and experience to the identification of existing gaps and barriers in public transport. Furthermore, engaging affected persons in identifying research priorities as well as in designing and conducting research could improve the relevance and appropriateness of research findings as shown before (Wright et al., 2006).

Research needs

Even though the literature review revealed a great amount of empirical research regarding the assessment of public transport by users with disabilities, our understanding of the mindset, beliefs, and opinions of people with disabilities regarding inclusive mobility is still limited. Although the aim of improving accessibility of transport made its way into mainstream transport planning and policy-making (Geurs et al., 2012), these claims often fail in reality. One explanation is that the identification of the right measures to improve the accessibility of transport is challenging. Therefore, a way of thinking calls for starting a dialogue with vulnerable-to-exclusion citizens and involving hard-to-reach or excluded groups in transport planning (Lucas, 2012). The literature review revealed the need for integrating the affected persons in the research by participatory approaches (Ducket & Pratt, 2001; Kitchin, 2000). Accordingly, Wilson (2003, p.46) recommended: “Disabled people need to be consulted in the design, delivery, and implementation of accessible transport systems”. However, the participation of people with disability should exceed mere consultation but engage them in the research according to involvement in higher rungs of Arnstein’s ladders of citizen participation (Arnstein, 1969). The paper thus addresses the following research aims:

- To explore needs regarding the mobility of persons with different types of disabilities and access needs
- To conduct an analysis across different European cities
- To develop and apply a participatory approach to gain implicit knowledge by empathizing with people with disabilities

This paper integrates insights from two qualitative studies conducted in collaboration with disabled users on their perspectives on public transport systems as part of the European research project TRIPS. First, a social media content analysis performed by persons with disabilities to identify barriers the local community of disabled people have faced and commented on social media networks. Second, semi-structured interviews conducted by persons

with disabilities with their peers and then interpreted to provide more in-depth insight into the thoughts, attitudes, and beliefs related to public transportation of persons with disabilities.

The research project TRIPS

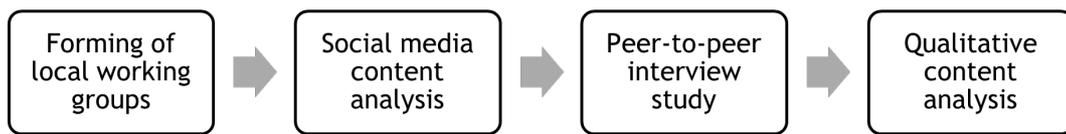
The EU-funded project TRIPS (TRansport Innovation for disabled People needs Satisfaction) aims to redress barriers to public transport accessibility for persons with disabilities. Building on the independent living philosophy (Charlton, 2000) underlying the declaration of Human Rights for Persons with Disabilities (United Nations, 2006), the project aims to empower citizens with disabilities in seven European cities (Bologna, Brussels, Cagliari, Lisbon, Sofia, Stockholm, and Zagreb) to take an active part in local transport planning and lead open innovation and co-design processes. Within the project, people with disabilities from the seven cities are co-creating capacity building activities (such as seminars, conferences, workshops, trainings, and webinars) and research methods and data collection (including surveys, interviews, and workshops). In the first phase of the project, existing barriers of public transport were identified and described. In the second phase, solutions (e.g., accessible mobility apps) were co-designed in workshops and evaluated in selected use cases in the seven cities in the third phase of the project. Finally, policy and regulatory recommendations were derived to drive accessible public transport innovations forward and establish user participation in transport planning.

Methods

Establishing the working groups in each of the seven project cities was the first step of the co-production process in the qualitative research. The working groups consist of 10-15 people. The working groups comprise a Local User Lead (LUL), the Core User Team (CUT) members, representatives of local transport providers, and city council and academics. The CUT members of the working groups face different access needs due to impairments and disabilities (e.g., wheelchair users, visually impaired individuals).

The studies took place between February and July 2020 at the beginning of the COVID-19 pandemic in Europe. Our methodology and methods respected social distancing rules. Social media content analysis was performed to identify public transport use barriers in the project cities. Furthermore, peer-to-peer, online interviews enriched social media content analysis with thoughts, experiences, and emotions driven by the current situation. Figure 1 visualizes the research process.

Figure 1: Research process. Source: authors



Social media content analysis

Social media content analysis uses user-generated social media data that serve as a barometer for monitoring changing attitudes toward newsworthy or controversial issues (Macnamara, 2005). Through social media, users can upload, share and comment on photos, videos, music, images, and texts to share ideas, feelings, opinions, and experiences with other members. Media analysis is a well-established research method for studying violence, racism, and other societal topics in TV (Macnamara, 2005). Social media content analysis has been used to study public opinion on topics like concerns and challenges related to introducing a new mobility offer such as an e-scooter system (Gössling, 2020). The method was chosen for different reasons. First, it has wide accessibility in all EU countries involved and its accessibility to LULs, the broad range of topics discussed, its online availability, and its up-to-date content. Furthermore, the method was intended to elicit regional and situation-specific insights. The search involved local social media channels, such as Facebook groups, which promised to identify specific barriers in the city. Figure 2 shows an exemplary post found on the social media platform Instagram from Sofia related to accessibility.

Figure 2. Exemplary Instagram post from Sofia, Bulgaria. Source: authors.



Procedure

The LULs of the seven cities were responsible for the social media analysis and online interviews. To ensure the same approach is followed across the cities, the TRIPS consortium made a practical step-by-step guideline to be followed for social media analysis and a semi-structured interview protocol with prompting guidelines for interviewers and held training meetings to ensure its understanding.

At least 30 media entries concerning topics such as accessibility of public transport, barriers or assistance services, were researched in each of the project cities. For the analysis, social media platforms, such as Twitter, Facebook, and Instagram, were scanned based on appropriate search terms, like disabled, mobility-impaired, wheelchair, visually impaired, blind, deaf, hearing impairment, public transport, bus, metro, subway, transit, mobility, and others. In contrast to other approaches, such as the one reported by Gössling (2020), only social media entries by private persons were selected for analysis; official journalistic reports or articles were not included in the analysis.

Peer-to-peer interview study

Based on the project's participatory approach, the interview study was conducted as a peer-to-peer study to involve the local working groups in research. Peer-to-peer studies are expected to improve access to participants, disrupt the power imbalance inherent in interview studies, and increase the comfort of the interviewees (Scannell et al., 2017). Peer-to-peer interview studies are a common method of qualitative social research in research domains like education on homophobia (Peters, 2003), disaster experiences (Scannell et al., 2017), and training (Schmidt, 2017). Whereas interview studies with trained researchers or professionals are common in research regarding persons with disabilities (Kitchin, 2000), peer-to-peer interviews have never been used to the best of the authors' knowledge.

Material

The interview study was conducted based on a semi-structured interview guideline that allowed for additional prompts and clarification as necessary and gave the opportunity to receive unanticipated answers (Liedberg & Henriksson, 2002). The guideline was co-created by the project team and LULs based on several iterative review loops. The interview guideline comprised 10 open questions, as well as sociodemographic questions. The questions were clustered around choice behaviour, barriers, and assistance. The list of questions can be found in the appendix.

Procedure

The interviews were conducted by the LULs of the seven cities. The LULs are disability activists in their countries and have a big network of users with different types of disability and different types of access needs. They used this network to invite people to take part in the project. The interviewers followed the ethical protocol established for the study and reviewed the informed consent with the interviewees, who then signed the consent. The interviews began with some general demographic questions (i.e., location of residence, age) and then moved into the four aforementioned topics.

Initially, the interviews were planned to be conducted face-to-face but due to the pandemic situation, they were conducted via phone or online video chat (e.g., Skype). The interviewers audio-recorded all interviews using the audio recording function of the video chat software. Professional translators translated all the recorded interviews from the native languages (Bulgarian,

Croatian, Dutch, French, Italian, Swedish, and Portuguese) from the audio format of recordings to written text. These transcripts were then imported into the software MAXQDA for data analysis.

Participants

The 49 interview partners came from the seven project cities. They were aged between 22 and 70 years, with an average age of 43.7 years (*SD* = 13.4 years). 21 participants were females and 28 males. Most of them reported having physical or sensory impairments. For an overview of the sociodemographic characteristics of the interview partners, see Appendix 1.

Data preparation and analysis

Both the social media content and the interviews were translated to English by the LULs and professional translators. The research partners then analysed the datasets following the inductive categorization process (Mayring, 2014) using the software MAXQDA (VERBI Software, 2019).

Results

Identified barriers from social media content analysis

More than 300 parts of the researched social media content were linked to existing barriers to public transport use. Figure 3 provides an overview of the subcategories that were built in the inductive categorization process. As shown here, eight subcategories revealed in the analysis with *infrastructure* (n = 85) and *public awareness and assistance* (n = 71) containing the most social media content related to barriers.

Figure 3. Overview over subcategories of the category barriers of the social media content analysis (line thickness and number in brackets mark the frequency of codes in the subcategory)

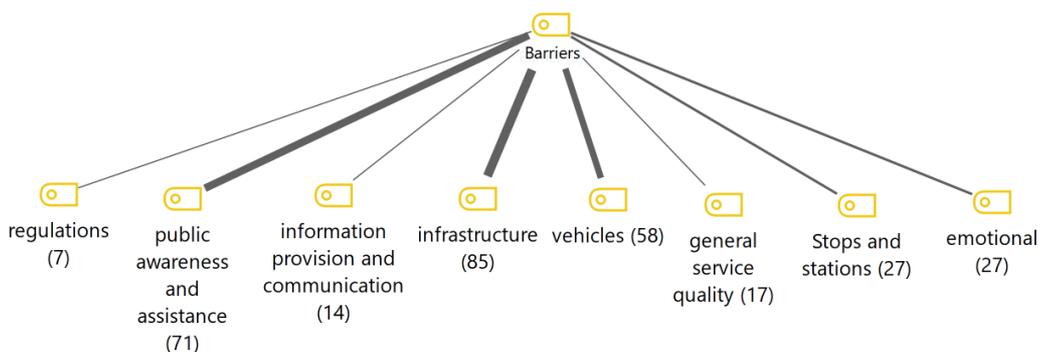


Figure 4 provides an alternative visualization of the data. The frequency of codes by city is shown. The size of the squares visualizes how often the specific

barrier was identified in the social media entries from the specific city. As shown here, some of the barriers, like staff behaviour, were mentioned in most of the cities, while others were only addressed in some of the cities.

Figure 4. Code matrix browser showing the frequency of codes by city



Identified barriers from interviews

Based on the interview guidelines, all text passages related to challenges people with disabilities face during their end-to-end trips were included in the analysis. These challenges were manifold, ranging from physical barriers, like missing ramps, to inaccessible information or impolite staff. Overall, more than 1.000 cases of barriers were identified in the interviews. As shown in figure 5, the identified barriers were clustered into eight subcategories.

Figure 5. Overview over subcategories of the category barriers of the interview study (line thickness and number in brackets mark the frequency of codes in the subcategory)

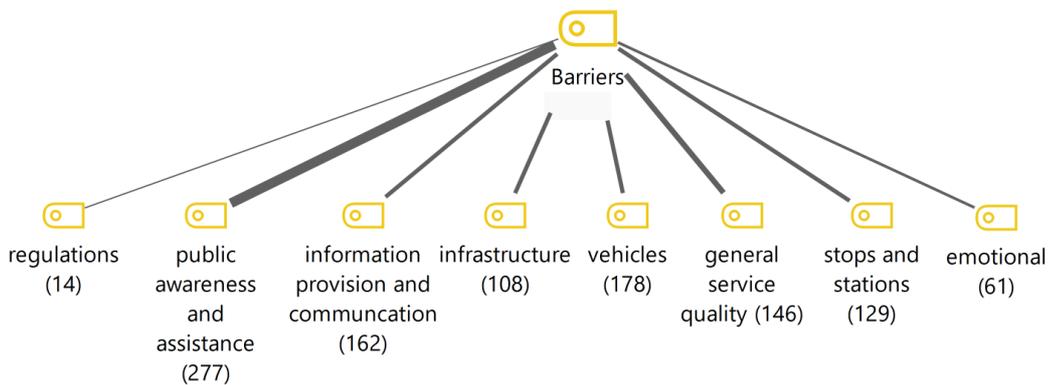


Figure 6. Code matrix browser showing the frequency of codes by city

Code System	Lisbon	Zagreb	Sofia	Stockholm	Brussels	Cagliari	Bologna
Barriers	■	■	■	■	■	■	■
regulations	■	■	■	■	■	■	■
public awareness and assistance	■	■	■	■	■	■	■
slow pace of improvements	■	■	■	■	■	■	■
lacking possibility for participation	■	■	■	■	■	■	■
behavior of staff	■	■	■	■	■	■	■
accompaniment	■	■	■	■	■	■	■
pre-registration	■	■	■	■	■	■	■
support by other passengers/persons (+)	■	■	■	■	■	■	■
information provision and communication	■	■	■	■	■	■	■
traffic lights and signaling	■	■	■	■	■	■	■
communication	■	■	■	■	■	■	■
information on transport service	■	■	■	■	■	■	■
request complaint handling	■	■	■	■	■	■	■
infrastructure	■	■	■	■	■	■	■
sidewalks	■	■	■	■	■	■	■
intersections	■	■	■	■	■	■	■
stairs and ramps	■	■	■	■	■	■	■
buildings	■	■	■	■	■	■	■
parking	■	■	■	■	■	■	■
elevators	■	■	■	■	■	■	■
toilets	■	■	■	■	■	■	■
surfaces	■	■	■	■	■	■	■
vehicles	■	■	■	■	■	■	■
get on and off	■	■	■	■	■	■	■
interaction with vehicles	■	■	■	■	■	■	■
not adapted to special needs	■	■	■	■	■	■	■
space	■	■	■	■	■	■	■
comfort	■	■	■	■	■	■	■
general service quality	■	■	■	■	■	■	■
safety	■	■	■	■	■	■	■
hygiene	■	■	■	■	■	■	■
operating times	■	■	■	■	■	■	■
availability of adapted transport	■	■	■	■	■	■	■
connectivity	■	■	■	■	■	■	■
price	■	■	■	■	■	■	■
stops and stations	■	■	■	■	■	■	■
information provision	■	■	■	■	■	■	■
accessibility of platforms	■	■	■	■	■	■	■
gaps at platforms	■	■	■	■	■	■	■
elevators, ramps and stairs	■	■	■	■	■	■	■
need for assistance	■	■	■	■	■	■	■
missing lighting	■	■	■	■	■	■	■
lack of protection	■	■	■	■	■	■	■
inaccessible toilets	■	■	■	■	■	■	■
emotional	■	■	■	■	■	■	■

In the following, each subcategory of barriers is shortly introduced, and examples from the social media content analysis and the interview study are presented.

Regulations

This category relates to institutional and legal barriers, and comprises a total of 14 entries from interviews and another 7 from social media content analysis.

Barriers related mostly to non-compliance with regulations: *“Precisely what I’m in the process of requesting, to try and stop this anarchy with everything, as there is great anarchy where works are concerned! In St Josse - one of the smallest communes in Brussels - it’s UN-BE-LIEVABLE when you see the quantity of discrepancies. From one pavement to another, even between two pavements opposite one-another, there are already differences.”* (Brussels_06). For Sofia, a comment on a website stated, *“There are good regulations, but they are not being implemented.”* (Website comment from Sofia). This was also associated with over-reliance on *self-monitoring*: *“The problem is that they [National Railway Company of Belgium] are their own monitoring organization. Meaning that they monitor their installations themselves. I believe that is a big problem”* (Brussels_03). Users also expressed disagreements on specific regulations: *“We also believe that those who have a permanent blindness or serious visual impairment should not have their permit to travel re-examined every 3 years.”* (Website comment from Stockholm)

Public awareness and assistance

This category comprised 277 interview passages and 71 posts from the social media content analysis and was the largest category of identified barriers. Four subcategories were identified: 1) support by other passengers and persons, 2) pre-registration, 3) behaviour of staff and 4) lack of opportunities for participation.

The subcategory *behaviour of staff* contained the most statements from users (n = 124 for interviews and n = 13 for the social media content). It was shown that users sometimes experience uncooperative behaviour of public transport staff. The experiences expressed in the interviews were supported in social media posts relating bus and taxi drivers: *“We as people with disabilities, who use wheelchairs, have a problem with ordering taxis and taxi drivers who are*

not very willing to help.” (blog entry from Zagreb). Social media entries pointed to barriers regarding inappropriate and sometimes even dangerous behaviour of public transport staff: *“A lady enters the 70’s and many, I believe, dragging her little shopping cart. The bus starts its march and the lady is almost projected to the bank and at some cost she manages to balance her shopping cart.”* (Instagram post from Lisbon). Such behaviours are sometimes attributed to a *lack of training*: *“it seems that many [bus drivers] do not have the right training on how to behave in front of disabled people in wheelchairs. Many do not even know how to open the bus platform”* (YouTube video from Cagliari).

Another frequent barrier named by the users was the need for a pre-registration of assistance and specialized transport services (n = 74 for interviews and n = 15 for social media content). In Lisbon, for example, the specialized van needs to be pre-ordered two days in advance: *“the vehicle has to be requested up to 48 hours in advance, which is discrimination and takes away our right to decide our life like any other citizen who often decides, at short notice, where he wants to go”* (Facebook post from Lisbon). The need for early registration is even more relevant for trips beyond the urban areas: *“When I need to go to Cagliari I have to call the ARST [local bus service] even 10 days before. But not always, for visits to the hospital and for private matters, I have the possibility to know in advance when I will need means and unfortunately, I always have to count on a plan B”* (Website comment from Cagliari). The pre-registration of services not also applies to specialized transport but also to ramps for accessing trains, which is assessed as a barrier: *“Using the train irritates me because I have to call in advance and inform them of my travelling times and dates, as well as routes so that they would have disability ramps ready for me”* (Lisbon_02).

Information provision and communication

The category information provision and communication comprises all the content that refers to barriers based on a lack of information or misleading communication. The category includes 162 text passages from interviews and another 14 from the social media content analysis. The barriers in this category were clustered into four subcodes: 1) request complaint handling, 2)

information on transport services, 3) communication and 4) traffic lights and signalling.

A statement from an interview showed that information is not always accessible due to the obligation of using technology, like a smartphone app, to access the information. People with hearing impairments expressed their concerns about non-accessible information: “I often fear that there is an audio warning that I do not hear.” (Lisbon_05). A lack of appropriate signals and information was also addressed in social media entries: “Many times - and there are many buses - they don't stop at the stops. This has already happened to me and to other people. I am visually impaired and cannot see enough to identify the bus, and my hearing impairment does not allow me to identify the sound of them either” (Facebook post from Lisbon) and “On the other hand, there is no signalization, there are no signs for the blind and deaf to at least know where to buy a ticket, where to get information when their train leaves” (blog entry from Zagreb). For persons with mental disabilities, misleading information was shown to act as a barrier for public transport use: “when you are to take a bus, they don't tell you which side of the street you're supposed to wait for the bus, because it could be the bus on the way back, or the bus on the way to the place you want to go, but you don't know which one of those stations is the one where you're supposed to wait for the bus. It's so unclear. And I think that for some people it is clear, for other people like myself, it is so unclear. That I have missed or taken the bus in other direction, many times” (Stockholm_7, Pos. 38).

Some of the identified barriers in the context of information were related to the request handling. It was shown that some of the interviewees and social media users are not satisfied with the request handling of public transport companies: “More than four months ago, Carris [transport company in Lisbon] received a request from a group of disabled citizens for clarification and improvement of the conditions of the new buses and coaches, which has so far received no consideration” (Facebook post from Lisbon).

Infrastructure

The category infrastructure included identified barriers linked to the construction measures like stairs and elevators, as well as elements of the

infrastructure like sidewalks and intersections. Most remarks from interview partners (n = 22) and social media users (n = 21) were assigned to the subcategory sidewalks. To name one example, an interview partner from Sofia states: *“As soon as I leave my building, I come across high curbs, holes, setts, and other physical barriers”* (Sofia_05). In social media, barriers concerning sidewalks are discussed as well: *“The city is a reflection of people's mentality. The same mentality that parks on the sidewalk because it is only 5 minutes and forces the person in a wheelchair to walk on the road. And then someone tells them they're doing something wrong...”* (Twitter post from Lisbon).

Barriers in the form of missing or broken ramps were mentioned in nearly every city. One interview partner also states that persons using wheelchairs have to help themselves to use the ramp: *“But the ramps are so bad that you have to carry a screwdriver. Some of us carry screwdrivers all the time because there is no other way to open the ramps”* (Sofia_01). An Instagram post from Sofia, showing stairs with a drive-up ramp commented *“Their brakes need to be in a very good condition”* (Instagram post from Sofia). Another frequently mentioned barrier was elevators that are out of order: *“Our elevators are out of order half the time, but hey that's ok, because we are within the standard”* (Website comment from Brussels).

Vehicles

The category *vehicles* comprises all interview statements that refer to barriers based on the inaccessibility of the vehicles. This category includes five subcodes: 1) comfort, 2) space, 3) specialized vehicles, 4) interaction with vehicle, and 5) getting on and off. The subcategory *getting on and off* included the most statements in the current category. This subcategory is strongly linked to the existence and functioning of ramps in the vehicles as shown in one exemplary statement: *“And the poor maintenance of the ramps which allow for people with disabilities to board the vehicles (the buses often drive around the city with ramps which are not in function), which then in turn makes me have to wait at the same bus stop with various buses stopping and passing by until a bus with a working ramp finally turns up and I can board it”* (Lisbon_02).

Regarding the space on vehicles dedicated to people with disabilities, several interview partners refer to the challenge of travelling with friends that use wheelchairs as well: *"Sometimes it is not possible to travel with more people with disabilities, with friends, more specifically, because the spaces are occupied, and this is an interesting question that should be given more attention to"* (Lisbon_03). A lack of space for wheelchairs on vehicles was also addressed in a Facebook post from Lisbon.

Barriers concerning the passengers' interaction with the vehicle were often related to buying or validating a ticket: *"Well, as I don't use a card, I have to buy a ticket from the driver, and I have to ask someone to help me with that and then to perforate the ticket because the perforators are positioned too high. If I use a card, I can just validate it myself in the vehicle"* (Sofia 05). Furthermore, other barriers were addressed, such as door openers: *"New public transport in Sofia is not accessible for blind people. The new buses, trams, and trolleybuses in Sofia proved to be difficult for the blind, as they could not find the button to open the doors."* (Website comment from Sofia).

Stops and stations

The category *stops and stations* includes all interview passages that refer to barriers that are based on a lack of accessibility of stops and stations of the public transport system. The category includes five subcodes: 1) lack of protection, 2) need for assistance, 3) information provision, and 4) accessibility of platforms.

The subcategory *accessibility of platforms* included statements related to gaps at platforms, missing or broken ramps, and elevators at the stations. The results revealed that ramps and elevators that are out of order is a recurrent barrier in all of the cities as represented in the following statement in the interview: *"In the latter, the problem is with the elevators, we need to use them to be able to get to the platforms, but there is a maintenance problem and the elevators are often broken and therefore cannot be used."* (Lisbon_06).

The users' need for assistance at stations and stops is mainly related to the broken ramps and elevators: *"[...] when I use the train, it is more complicated*

to use it than the bus or the metro. There should be security at the platforms. There should be workers that can help the disabled board the vehicles” (Lisbon_03). The need for assistance at stations is also caused by missing or non-accessible information: *“Once at the platform itself, my main barrier is the lack of written warnings, I often depend on other passengers to be able to understand the communication done via audio warnings.”* (Lisbon_05). The category of stops and stations also included users’ statements regarding a lack of protection and safety. In a Facebook post, a user expressed a lack of perceived safety at public transport stops: *“I feel afraid to be so often alone at night in unlit stop”* (Facebook post from Lisbon)

General service quality

The category *general service quality* included all interview statements and social media content that referred to the service quality of public transport. This category was clustered into five subcategories: 1) price, 2) connectivity, 3) availability of adapted transport, 4) safety, and 5) operating times.

Availability of adapted transport is the subcategory that comprises the most barriers in this category. A recurrently mentioned barrier of using specialized transport is the long pre-registration time: *“I’m aware of its existence but I have never used specialized transport. I am on their list, but if I want to use it, I have to book my trip many days in advance. That stops me from using it. Sometimes I just need transportation one day to the next, and no matter how organized I am, I can’t fit in their mechanism.”* (Sofia_01). Some of the interview partners complained about the limited availability of specialized transport: *“It is more difficult in the earlier hours of the morning. It is not possible to gain access to the door-to-door service in the hours before the rush hour. I have the same problem with access in the evening hours, any time after 8 PM.”* (Lisbon_04).

Another often mentioned barrier was related to the price of the service. The pricing system of specialized transport seems to be a barrier, especially in Lisbon, as shown in these two statements: *“And I do not have the right to get a bus pass, even though it is the same company that is in charge of the regular buses as well. So every day I pay four euros for the tickets.”* (Lisbon_01) and *“The door-to-door service refuses any kind of bus-pass, meaning that all the*

trips are paid for at the price of a single ticket per person (which means that nowadays I always have around 80 euros per month in small change at disposal so that someone could give the two euros to the driver for each of my return trips).” (Lisbon_02).

Emotional barriers

Emotional barriers refer to content from interviews and social media platforms based on social and psychological attitudes regarding the use of public transport, which can cause emotional reactions, such as feeling of insecurity, claustrophobia, or social anxiety.

Emotional barriers are commonly related to the behaviour of other passengers: *“A disabled in a wheelchair getting off the bus ... Old women start to complain that it's taking too long. Shit people !!!”* (Twitter tweet from Lisbon). Uncomfortable feelings regarding the behaviour of other people are also reflected in the following: *“It’s really not a nice feeling when outside someone has to constantly wear up and down. You just don’t feel welcome in that space then. However, we were persistent. As you find yourself in that position, you can’t understand how much that little step means that you can go in on your own without having to beg people, instruct people, and think about whether you’re difficult for them, how glad they are at all.”* (YouTube video from Zagreb). The fear of facing inappropriate behaviour of fellow travellers was also mentioned: *“Many times they do not wait for me to get off the bus. They put pressure on me to hurry up.”* (Cagliari_04).

For people with intellectual disabilities, mentioned barriers are related to over-crowded public transport: *“For me, it gets difficult to be in crowded trains. And then the sound, as I said, makes it impossible for me to continue to make a journey if I don’t have my headphones. And the problem is when I have headphones in the bus and the train, driver says: “Ok, everyone has to get off the train.” All of a sudden, the train just turns off, but I didn’t hear that, because I didn’t hear... [...] Those things that are scary. [...] It’s stressful for me. I need to know what’s going on. I need to know what’s the next step and what I’m supposed to do. Many times I find myself confused.”* (Stockholm_05).

In conclusion, the following statement summarizes the emotional barriers of many public transport users with disabilities: *“I simply do not want to draw attention, so I just make do with what I can”*. (Lisbon_03)

Discussion

Reflection on results

This study aimed to implement participatory methods of social media content analysis and peer-to-peer interviews to identify the barriers that people with different types of disabilities face every day while using public transportation. This research has provided valuable insights into the perception of people with disabilities from seven European cities. Despite the lively debate about the importance of having accessible and inclusive transport in all European countries, people with access needs still face many barriers while trying to use different means of public transportation in their cities.

First of all, the results have shown that the limited number of accessible public transport vehicles and services prevents people with various disabilities from actively participating in society. People with access needs perceive the current public transportation services to be limited in their availability and inflexible. As users noted, many services need to be booked several days in advance. Furthermore, there are no assistance or accessible transport at night, or early in the mornings, fewer choices when it comes to the transportation and the regular journey usually takes longer than it typically should. The following statement from an interview illustrates the basic needs of people with disabilities for equity in public transport: *“Listen, Ideally, we, the people with disabilities, would be able to use any sort of public transportation without any special requests, without having to ask anybody for anything, from helping us to board the vehicle to getting off, without calling anyone for anything and booking the ride in advance.”* (Lisbon_01)

The results have also revealed that when it comes to accessibility solutions, the access needs of people with intellectual disabilities or people with mental health issues are rarely put into consideration. They were underrepresented in social media, and their needs are rarely identified in scientific literature.

As our insights have shown, most of the investments in accessibility are funnelled to simple engineering solutions - adjustable ramps for wheelchair users or providing audio information for visually impaired people. Perhaps the stereotype that if person's disability or impairment is not visible, they do not have any access needs for public transportation is to be blamed for the phenomenon. Also, addressing mental health barriers will require investment in changing staff attitudes, organizational structures, and provided services, and not all service providers are aware of or either willing to implement these changes.

Yet, not all barriers refer to an inaccessible environment - social barriers, such as the rude behaviour of staff and other passengers towards people with disabilities, are equally important. People with disability still too often experience situations in which they feel uncomfortable due to the attitude and behaviour of other passengers, as well as the public transport staff.

Interestingly, the analyses revealed no noticeable differences between the considered cities. Apparently, people with disabilities from the seven cities experience similar barriers in their everyday mobility.

Besides the content of the analysis, the study also provided significant insights into the application of participatory research methods for addressing equity and accessibility issues, as had been requested by Kitchin (2000) and Duckett and Pratt (2001). Peer-to-peer interviews and the social media content analysis revealed powerful and time-efficient methods to identify barriers to public transport for people with disabilities. For a more detailed reflection on the participatory approaches see König et al. (in review).

Despite these strengths, our study has several limitations as well. An essential disadvantage of the peer-to-peer interviews is based on the heterogeneity of the interviewers that entails a reduced standardization of conducting the interviews. Another limitation was that both groups of people with intellectual disabilities and people with mental health issues were underrepresented in the research. As mentioned before, their access needs were very seldom discussed or mentioned in social media, and it was difficult to find people with these access needs who would like and could participate in the interviews. There might be various reasons for the latter: difficulties to speak or express

yourself, speech impairment, not willing to disclose the impairment, getting permission from their guardians, and others. Even though this study has provided some insights on the barriers faced by these users, further research is required on the topic to ensure that everyone's access needs are considered.

Derived hypotheses and insights

To set the direction for future research that considers our current insights on the barriers faced by these users, we outline the following insights and research hypotheses.

1. Mental health issues, sensory and intellectual impairments are underrepresented, while physical impairments (especially wheelchair users) are more likely to be presented in social media content that does not reflect compared to their representation in the overall population of persons with disabilities
2. Technologies and accessibility solutions that are supposed to make public transport more accessible are often not used properly, or broken, like elevators, escalators, or audio announcements on buses.
3. The behaviour of public transport staff (especially bus drivers) is often unaccommodating to the mobility needs of disabled users.
4. Social media users, as well as interviewees, emphasize the need for policy and transport providers to take the next steps in improving accessibility of public transport.
5. People with disabilities lack equal opportunities in their transport choices. Public transport has only a limited number of vehicles/services being accessible. In addition, specialized transport and assistance services, like ramps at stations, require long pre-order lead times.

6. Overcrowding is a practical barrier, especially for wheelchair users and persons with mental health issues, due to space limitations, difficulties in embarking, and sensory overstimulation.
7. Non-accessible information is still an important barrier for people with sensory impairments.
8. People with disabilities experience similar barriers in their everyday mobility, regardless of where they live.
9. Participatory approaches that involve people with disabilities in disability research make a valuable contribution to our in-depth knowledge about equity in transport and should be empowered more often to participate in the research that affects themselves.

Research questions and next steps

Besides the role of technological assistance systems for improving mobility, further studies should also address the question of how disabled people perceive the possibilities of user involvement in transport planning in their cities. Furthermore, in the light of emerging mobility systems, like shared e-scooters it is also interesting to study how people with disabilities perceive and assess new shared mobility systems, like e-scooter sharing regarding their accessibility. Furthermore, an open research question emerges from the cross-country comparison. Given regard to the finding that there are no noticeable differences between the cities, further research is needed to provide insights into commonalities and differences in the perception and attitude of persons with disabilities about accessibility of public transport with the help of more quantifiable methods.

The TRIPS project will continue until February 2023 and will bring forth more empirical findings and concrete solutions to make public transport more accessible for people with different access needs. The results of the two qualitative studies have informed the development of a questionnaire to gauge the broader disability community's attitudes and other vulnerable-to-exclusion

groups towards the accessibility of public transport and used as user research in the development of design concepts for new mobility systems or adaptations of emerging ones.

Conclusion

Although research has already addressed barriers of public transport use for people with disabilities, empirical studies are still missing that involve the concerned people in research to gain deeper insights. The research process included the formation of local working groups who performed a) a social media content analysis and b) a peer-to-peer interview study. The paper derives hypotheses and insights regarding the barriers that people with disabilities from seven European cities face when using public transport, based on reflections of two qualitative studies. The paper further demonstrates how participatory approaches that involve people with disabilities in accessibility research could make a valuable contribution to our in-depth knowledge about equity in transport.

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