NAVIGATIONAL BARRIERS AND STRATEGIES: AN INTERPRETATIVE PHENOMENOLOGICAL STUDY OF VISUALLY IMPAIRED PEOPLE (VIP) IN PAKISTAN

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Abstract

This study explores the lived experiences of visually impaired people (VIP) in Pakistan by identifying the challenges they face during outdoor navigation and exploring the strategies they employ to overcome those navigation barriers. Nineteen participants were recruited through snowball sampling technique and in-depth interviews were conducted regarding their navigational experiences. The Interpretative Phenomenological Analysis (Smith & Osborn, 2015) highlights participants' emotional experiences and their perceptions of accessibility, along with the social, cultural and attitudinal barriers that affect their navigational experiences. The findings reveal that inadequate infrastructure, lack of mobility trainings, limited access to/familiarity with assistive technologies and societal attitudes not only influence mobility and independence of VIPs but also perpetuate discrimination and exclusion. By understanding the navigational challenges faced by VIPs, the study contributes to the development of more accessible and inclusive urban environments in Pakistan.

Keywords: *mobility, navigation, challenges, experiences, visually impaired, VIP*

Introduction

People with impairments and disabilities are always found dealing with difficulties and challenges, which manifest themselves in social, physical and communication related limitations (Jehangir et al., 2025; Batool et al., 2022; Batool et al., 2021; Naqvi, 2017). Individuals with visual impairments also face many physical, social as well as behavioral limitations while moving around in space (Batool et al., 2024). These constraints are seen to be related closely to their access to mobile devices, transportation and assistive technology (Wong, 2017). This affects their mobility experiences. This highlights the need for mobility training for people with vision impairments, besides choosing the right mobility aid (Williams et al., 2013). Assistance from strangers does not always prove fruitful – either they shout out directions or they explain things based upon their visual experiences unintentionally ignoring that they can't see. This 'unhelpful assistance' does not let visually impaired people focus on the cues they want to focus on and can be dangerous for them (Williams et al., 2014). Independent navigation also comes with its challenges – the first challenge is accessing printed material, and the second one is the stressors that are associated with efficient and safe navigation (Giudice & Legge, 2008).

The development of assistive technology or navigation systems that may guide visually impaired people during navigation has remained one of the greatest challenges over the last decades. Either devices do not meet user needs and other technical requirements, or visually

impaired people do not receive much guidance on how they can better access the technology available to them (Real & Araujo, 2019). Navigation in unfamiliar places in particular poses extreme challenges for people with visual impairments. To overcome this problem, Kunz et al. (2018) introduced the concept of virtual environment for visually impaired people. Virtual environment allows them to experience unfamiliar places by real walking while they are staying in a safe and controlled environment. Abstract training scenarios can be created which can then be applied in real life situations such as airports, train stations and so on. Thus, prior to exposing visually impaired people to the real world, they can be trained in navigation tasks using virtual reality. Virtual reality is advantageous for mobility training and for personalized orientation. To navigate in an unknown virtual environment, a virtual cane such as a mouse or keyboard is required. The first virtual reality system developed for visually impaired people to navigate was the HOMERE System.

Havik et al. (2012) found that shared spaces have certain characteristics that are a hindrance for people with visual impairment. For instance, shared spaces do not have kerb edges which are highly essential for orientation of visually impaired people. Kerb edges are important to identify whether a person is in a pedestrian area or in an area where cyclists or motorized traffic may be expected. The absence of traditional kerbs will be the greatest hindrance in the way of a visually impaired person. Moreover, in shared spaces traditional guidance cues are either absent or difficult. For example, many of the shared spaces have an irregular building line that had many side roads and openings which makes it difficult for the visually impaired people to use the line as a guidance. In most of the shared spaces, demarcation between the pedestrian zone and street are not sufficient, which again hinders the mobility of visually impaired people.

Walking inside public venues is different from travelling outside since many environmental indicators cannot be exploited and present their own set of challenges. The development of some technologies, such as wearable computers, indoor navigation systems, and accessible maps, has made it possible for these people to navigate freely. However, because additional information (barriers, obstacles, and accessibility, indoor landmarks and their estimated distance, smell, sounds, etc) is needed to complete the autonomous navigation gap, technologies like accessible maps or interior navigation systems are insufficient. Understanding the facts and actual problems that visually impaired people experience, as well as what behaviours and strategies they use to overcome any problems, is crucial to promoting indoor navigation and creating better use of technologies for them (Jeamwatthanachai et al., 2019).

To determine the characteristics of recent experiences in open spaces and the variables influencing quality open space experiences (QOSE), Siu et al. (2019) conducted a case-study in Hong Kong. The findings demonstrate that policymakers' statements on the status of QOL enhancement strategies are very different from the perspectives of visually impaired people. Notably, those with limited vision typically rely on their vision as their major source of information for guiding perception and activity within their environments. They also frequently have useful residual visual abilities. Given this dependency on vision for people with low vision, it is crucial to promote visual accessibility in order to create environments that permit the safe and effective movement of people with visual impairment (Creem-Regehr et al., 2021).

Visually impaired people also face problems when accessing the transport system. One of the barriers is their access to information. The reason they find it very challenging to plan a trip is because so far there isn't any single platform that contains all the information regarding their trip. Therefore, they need to switch between different information sources for planning a single trip. Hence, access to information is crucial to make their journey experiences better (Low et al., 2020). Moreover, successful pre-navigation relies heavily on cognitive mapping and recollection, which suggests that the audio-tactile map may be a more efficient approach than the tactile map combined with a vocal description (Griffin et al., 2020).

People with disabilities require assistance in the domains of their limitations and understanding and calculated assistance helps them improve their lives (Batool et al., 2022; Batool et al., 2021; Batool & Shehzad, 2018). Similarly, navigation experiences can be less challenging for visually impaired people if they have better orientation of the outdoor spaces. This can make them independent navigators. However, in Pakistan most of the visually impaired people need a human guide to go from one place to another. Visually impaired people are hardly seen navigating alone. There can be many reasons that make it hard for visually impaired people to accurately plan and follow a route. Therefore, an understanding and knowledge about their navigational experiences is crucial to improve the quality of their lives. Given this, the following are the objectives of the study:

1. To identify the navigational strategies of VIP in the outdoor navigations,
2. To explore the nature of the challenges VIP face in Pakistan during their real live outdoor navigations.

Methods

Data Collection and Analysis Procedures: A set of 9 to 17 interviews are sufficient for a qualitative study (Hennink & Kaiser, 2022), therefore the first author of the paper sent a formal request for an interview to 25 participants. The first and second authors successfully conducted 19 interviews. Out of the 19 participants, 11 were completely blind (B1 Category) while eight were partially visually impaired (B2 Category). The semi-structured interview comprised questions about age, education, use of assistive devices, degree of visual impairment, mobility training and navigation strategies and challenges. While selecting the participants it was made sure that they had experience of outdoor navigation. Considering the target population, we conducted the interviews in English and accepted the use of Urdu. We followed the procedure mentioned below:

Conduct of Interviews: We conducted interviews in both languages, with the interviewer and interviewees switching between the two languages as necessary. As a result, there was no requirement for translation throughout the data collection process for both languages. We have adopted this method to retain their original voice and to avoid censoring respondents' thoughts in any way. Out of 19, 12 participants chose to speak in Urdu while the other seven chose to speak in English. The interviews were audio recorded via ZOOM for analysis. On average, the interviews lasted for 15-20 minutes for each participant.

Transcription: We transcribed the spoken words in each language in writing (without translation) for analysis.

Coding: The first and the second author then studied the transcribed data finding patterns and themes in the data and giving each data item a code based on these patterns and themes. We employed the inductive approach that involves data driven thematic analysis without relying on any preconceived notions because the phenomenon under study is unique in its nature.

Hence, the data-driven Interpretative Phenomenological Analysis (Smith & Osborn, 2015) helped to get an insight into the detailed navigational experiences of VIP that they are living with.

Inter-coder Reliability: We then compared the coded data to find any differences or similar patterns in the coding and found 93% agreement. This directed us to complete the coding of the transcripts with the agreed-upon codes.

Findings on Challenges and Strategies of VIP

Language has always been a source of insight into the perspectives we hold (Batool et al., 2025; Zehra et al., 2017; Shaheen et al., 2018) and mental and experiential processes we go through (Noreen et al., 2024; Batool et al., 2024; Jan et al., 2023; Khawar et al., 2021; Khalfan et al., 2020). In the same way, the interpretative phenomenological analysis of interviews in the study helped finding following challenges and strategies visually impaired face while navigating.

Mobility Trainings

The very first thing asked from the participants was if they ever received mobility trainings in their life. To this question 12 out of the 19 participants responded 'no', and the reason reported was 'lack of awareness' regarding such trainings. Some of them mentioned that they never felt the need of receiving such trainings because they always commute with their family. Few of the participants mentioned that they prefer self-learning when it comes to mobility. Only 5 participants mentioned that they had received mobility trainings. They mentioned that most of the mobility trainings focus on 'how to use the white cane'. A few trainings focused on teaching the visually impaired people how to walk around in space and also the basic life skills. They were also introduced to some mobile applications such as Be My Eyes.

> I, I have received once, but it wasn't like, you know, like huge, uh, like it helped me a lot, a lot, but it wasn't like a proper like, you know, mobility, um, orientation kind of, uh, uh, program like, you know, like two months, three months away where you learn everything, how to live independent life. So, I came across by myself most of the things, uh, with my mind that how I can make my life more independent. (AA)
>
> Yeah, so the mobility training that I've attained, uh, has been offered by an institute named N I S C, which stands for National Institute for Special Education. It's a governmental institute and they, uh, specialize in mobility. And, um, courses pertaining to the independence of visual people with virtual impairment. And I have received my training in, um, precisely white cane using the white cane. So, it wasn't a generalized training for mobility, but more, um, wide gain. (HA)

Assistive Devices

The participants were asked about the kind of assistance they use when they navigate in outdoor spaces. A total of 14 participants indicated that they use white cane when they travel in outdoor spaces. Eight participants indicated that they use google map during outdoor navigations. Only one participant mentioned about the use of an online application called Be My Eyes which is an application made for the blind:

> Gadgets to bohot sa hn lakin is lia use ni kar patay q ka un ki price dollars mn hoti ha. 300, 400, 500 dollars to is lia wo affordable ni hoti. Ya ha ka apps hum use kartay hn mobility ka. Ya google map ho gya…. Is tarha ki chizayn ho gai. (AS)

This app allows the visually impaired users to video call volunteers available on the app who then guide them the way. Some of the participants mentioned that there are many gadgets available for visually impaired people, but they are not affordable. About the mobile application Be My Eyes, one participant mentioned that it is very helpful especially during independent navigation:

> Assitantive tool bhi koi bohat ziyada nahi use karti magar aik app hai par aik aap hai jis ka main bohat ziyada faida laity ho iss ka naam hai Be My Eyes …. Iss main yeh hota hai kay who aap ko connect kar daitay hai to koi bhi assistant or volunteer around the world, … aur agar main kahy bahir gai ho mukhe dhoop main nazar nahi ata tou main inko call karlaitay ho. tou who mujhe guide kartay hai iss main camera on hojata hai … (AN)

One of the participants indicated that although there are mobile applications, but they are not very reliable:

> Yeah. Yeah. I have dealt with, uh, in some apps, uh, but they are not reliable, reliable because, um, the image, um, recognition software, it takes a lot of time and when it do recognize the scene, so it is not reliable. (WR)

Estimation of Distance

Visually impaired people employ different strategies to estimate distance when they commute. The first major strategy indicated by 21% participants is 'counting footsteps.' When VIP visit a place especially for the first time, they try to count the footsteps needed to reach a certain place. They then try to remember the number of footsteps which help them later on in distance estimation.

> Ya phir mai footsteps bhi count krti hoon starting main jab mai kisi nehi jagah pr ja rhii hoon tu mjy dobara wahan pr jana prhy tu footsteps are helpful for me. (RB)

> … sometimes footsteps ka bhi idea hota hai. Kuch yaad rkhta hon kuch wesy hi mind me la-shaoouri tor p chal rha hota hai k han itna to me ne chal lia hai bs ab iskay bd left hona hai, to left hona hoga. Zaroori nhi hai k me 1 2 3 4 5 6 kar k hi yaad rkhon har cheez ko. Balkey vo aik mind me hota hai k itni der chala hon to left turn aa gya tha to ab itni der hogai hai to left hona hoga. Or sath google map b hai, aik chota dost sa us sy b idea mil jata hai. (AH)

Another important strategy for distance estimation is 'noting time.' Few participants indicated that they note the time needed to reach from one place to another. This helps them in estimating the distance. Majority of the participants also indicated that google map is extremely helpful for them when it comes to distance estimation. Through google map, they get an idea of how much distance they have covered and how much they still need to cover.

> Okay. Like, first I look up on the Google Maps first. (AA)

A few participants also indicated that they estimate the distance with the help of different landmarks. The landmarks they remember help them in distance estimation.

> So those landmarks are very useful to measure distance … So, uh, if you pay attention to the landmarks, then you know. While I go to the market, I have two speed breakers to pass through, and then I also take a turn and then I, um, have, uh, uh, a pole or a door or something to cross. So, I know that I have to go through these three landmarks and then I will arrive at my destination. Okay. So those landmarks are a good way to keep the distance in the mind, to measure the distance actually. (SL)

Two participants indicated that they do not have any strategy to estimate distance; they rely on their feelings or their other senses.

> Matlab Woh wahan pr aik timeline chal rhi Hoti hai. Lekin... Lekin jab hum travel kr rhay hotay Hain toh Jo, hamaray sath Jo bhi ho hum us se Puch lete Hain k is time pe agar yahan pohanchay Hain toh hum next time Kahan pohanchay... Matlab Jo hamari destiny hai, jab hum wahan pohanchein ge toh... Aik aik roughly estimate lagaya jata hai k jaisay sab lagatay Hain. Do se dhai ghantay mein hum Islamabad cross kr lein ge, Murree tak pohanch jayein ge, toh yeh roughly estimate hai, toh hum bhi phir aisay hi krtay hain. (SA)

Three participants indicated that they cannot estimate the distance themselves especially when they are in a new place. Therefore, they usually need to ask their guide or other people around them.

> New koi place ho to hum ni andaza laga patay q ka pata ni hota. Phir ksi sa help bhi leni parti ha ager koi ho ka kitna reh gya ha kitna door ha. (AS)

Orientation in familiar places
Regarding finding and maintaining orientations in familiar places, few participants responded that they create mind maps of the places they frequently visit; this mind map helps them find and maintain their orientation.

> Mere mind me us jagah ki na aik naqshah hota hai k me ye wala road tha jo is side sy us side ja rha tha, is road sy entrance is rukh p is building ki entrance thi. Or us sy enter ho k mere right-side p ye hai left side p ye hai. (AH)

> And again, that, uh, mapping, uh, involves experience. Uh, and the more frequent I visit that place and the more vivid that mapping would be. (TA)

Some participants responded that they rely greatly on their memory when it comes to finding and maintaining their orientation in familiar places. When they navigate in a place for the first time, they deeply analyze the place and then try to remember the information.

> Us mn ya hota ha ka ager shaher ha to us mn ziyada shops ka andaza ho jata ha. Yani ka ager koi phool wali shop ho gi to khushbo sa andaza ho jata ha. Or ager koi chok ho ga to wo bhi thori si garion ka rush sa humay pata chal jye ga ka yahn sa gari ja rahi ha wahn sa a rahi ha … Or phir wo hota ha ka humay yad hota ha ka kitnay kadam chal ka kadam to ni ginay hotay magar ya fasla sa hota ha ka ager thora sa chalayn ga to falan chiz aye gi. (AS)

> Jesa aap bol rahi hain wo jaga mere lie familiar hoti hai na tou mujhe uski har jaga pata hoti hai ke yahan pr itne stairs hain yahan par means door hai yahan pe open area hai tou jahan pr mein khari hoon gi tou for example mein kisi open area mein khari hoon aur mujhe jana hai… kisi roof pe jana hai matlab us building ke roof pe jana hai tou mujhe pata hoga mere right hand side pe stairs hon gi ya mere left hand side pe stairs hon gi, mein stairs ko follow karke apne destination tak jaa sakti hoon. (ZR)

In addition, the clues and landmarks are also helpful for few participants in finding and maintaining orientations in familiar places.

> Oh, in a familiar place, it might not be very difficult. Again, landmarks are there. Mm-hmm. , if there are any clues, clues, similar things that are there a certain time and then they are not. For example, if I have to go through a hallway that I go, uh, that I pass through like almost every day and night… (SL)

Orientation in unfamiliar places

Finding and maintaining orientation in unfamiliar places is very challenging for visually impaired people. Majority of the participants responded that in order to find and maintain their orientation in unfamiliar places, they need the help of a sighted guide.

> Wahn per ziyada ter sighted ka sahara lena parta ha. Dosray person sa. (AS)
> Uss time pe main ya tou kisi guide ka sahara lai laity ho because bilkul unfamiliar jagah pe main akelay nahi jati … agar outdoor jaga hai aur unfamiliar hai ko guide nahi hai tou main aisay jagah pe bilkul nahi ajati hai. (AN)
> And then always, you know, human guides are the best people to ask. You can ask other people for guidance. Mm-hmm. Yeah. So other people can help. (SL)

Only two participants responded that they rely on their other senses to explore the place and maintain their orientation.

> I could feel like I, like, you know, stepping into the room. So I'll get to know that how, how the floor is look like, how do, like, does it have like a wooden floor or like, is it a rock floor, is it a tile or what is it like in my room. So, um, so, so first thing, this is the thing that I remember on a new place. (AA)
> Isiliye mein phir na bht apni hand movement aur feel kr k mein chalti Hun phir. (SA)
>
> Acha blind loug jo hain na walls pe ziada focus kar rahe hote hain. Kiunke unhon ne apna jo path hai na us wall ko dekh ke banane hote hain like hum is wall se right turn karen ge tou hum us jaga pe phnch jain ge, acha yeh wall jahan pe khatam hogi wahan pe bilkul raasta hi khatam ho jai ga tou wo yeh cheez hoti hai tou mein us jaga ko araam araam se explore karoon gi like us mein walk karoon gi ke kitna matlab phir mein stairs dekhoon gi kitni stairs hain kitne steps hain. (ZR)

Two of the research participants also mentioned that they slow down their walking speed when they are in an unfamiliar place. They need to be very careful while navigating in new places.

> *Mein phir aik (.) aik (.) aik khaas andaaz mein chalti Hun k mujhe na koi problem na ho ya mein gir na jaun ya mujhe koi nuqsaan na ho. (SA)*
> *Agar mein kisi new jaga pe gayi hoon na tou wahan par meri ek tou yeh cheez hai ke meri speed chalne ki speed bht slow ho jai gi. (ZR)*

Limitations in Independent Mobility

The participants were asked about the things that make it difficult for them to travel or commute independently. Majority of the participants indicated that the greatest limitation to independent mobility is the lack of awareness among people. Sighted people do not have any awareness about how VIP should be treated. They do not know how to offer help to a visually impaired person and sometimes they come forward with unnecessary help. The guidance that people provide to VIP is not very helpful because they themselves are not aware of the needs of people with visual impairments. At times, they keep asking questions which bothers the VIP a lot since they get distracted.

> Sab sy bari jo difficulty hai vo (.) me kahun ga k lack of awareness hai. Kyon k logon k attitudes hotey hain, logon k behaviours hotey hain jo difficulties create krtey hain. … sab sy bara masla ye hai k logon ko pata nhi hai k visually impaired logon ko agr

> road p dekhein to kin kin cheezon ka khayal krna hai. Help offer krni hai to kesy krni hai, karni b hai ya nhi krni hai. (AH)

Moreover, there are people who sometimes misbehave with VIP. People get offended sometimes when VIP keep asking for guidance.

> Tou yahan par jab hum akelay travel kar rahay houn tou woh ulta aapkay na parents say pouchtay hain k aap ko inn loug ko nahi sambhaal saktay tou aap inko kiyun nikalnay detay hou ghar say bahir. Tou woh phir parents bhi iss dar ki wajah say humain bahir nahi nikaln ay detay k loug yeh kahen gay k aap loug inko sambhaal nahi saktay. Even cities main bhi kabhi yeh issue nahi howa kisi nay bhi yeh kabhi kaha. Lekin gaoun main jo hay zyada tar yeh issue hotay hain. (TR)

The second limitation to independent mobility indicated by the participants is the sense of insecurity or lack of comfort when they are navigating outdoors. They lack the confidence needed to move around alone. This is also because of the way people behave that they do not feel secure. Because most of the parents believe that their visually impaired child cannot navigate independently, so they do not let him go out of home alone. Some of the participants mentioned that they do not have any experience of travelling alone:

> Mera aesa koi experience nei hai akele bahar jane ka, jab bhi geyi hun family ke sath hi geyi hun. (TZ)

> I did travel alone once using Careem. Uh, although I had no bad experience, but still there's a lack of, you know, uh, comfort. There's a sense of insecurity, which is there when, when we travel, uh, alone. So maybe it was my first time. That's the reason I just felt it. Because I wasn't able to see, of course, so I was just lacking confidence. (RA)

Another major limitation to independent mobility is the infrastructure. Majority of the participants mentioned that the infrastructure in our country especially in villages in not accessible and friendly for VIP. The roads are broken, the boundaries are not clearly marked, no proper footpaths are made. Even if there are footpaths, you will always see vendors on them.

> Humaray yaha infrastructure bhi itna koi acha nahi hota matlab Islamabad ko dekhay tou yah ape tou roads hai, footpaths hai tou easy hai lekin jin jago main roads he nahi hai footpaths he nahi hai rastay main poles ajatay hai electricity kay poles ajatay hai. aur agar yeh kisi ko nazar nahi arahy tou obviously you can bump into it. (AN)

> Us ka hisab sy ka bohot si jagha pa footpath ha hi ni. Tou ager footpath ha bhi to wahn per jo ha us ka upper vendors waghra hote hain … bari bari buildings wahn par bhi koi system ni ha. (AS)

> Our, like roads are broken from here and there in the midways, like bumps come and we can just, we have to be very careful when navigating with the white cane with, we have to do a detailed navigation with the white cane and it, it, it makes it, it makes walking slower and uh, um, when inside the building. Definitely some, some buildings, um, have a very unusual infrastructure when it comes to staircase … they do not have the grills. So grills makes it a lot easier for us to climb up, but if they're not there mm-hmm. , uh, it's, it's a problem. (WS)

In addition, the noise coming from different places outdoors is also a great hindrance in independent mobility. Noise distracts them from focusing on their path. When the noise is too loud, VIP lose their orientation completely:

The noises when they're coming … What the sound of my white cane bumping into, uh, onto the ground. So, I'm unable to make sense of … what surface I'm walking on sometimes. And the noise also disables my perception of the surrounding because, echo, in some or the other way also contributes to how we, how we perceive, uh, space. (HA)

I tend to lose the sense of direction. Mm-hmm. if there is a lot of noise, for example, if a generator is running or um, uh, you know, cars, the noise of cars or buses or if there is a lot of, uh, you know, there are a lot of people around me talking in loud voices and saying whatever they have to say. So, I feel a little bit disoriented. I lose the sense of direction. (SL)

Social & Psychological Support by Society

At the end of the interview, the participants were asked about their opinion regarding the navigation trainings that should be provided to VIP to improve their orientation both in familiar and unfamiliar places. Majority of the participants were of the view that the first thing a visually impaired person needs to navigate is 'confidence'. They should have the confidence to go out alone and to face the world. So, visually impaired people should be given this confidence by the family members and by people in the society. Some of the participants mentioned that one of the greatest limitations in their independent mobility is that their families have not given them this confidence. They have always been made feel that they have a disability, so they cannot go out alone.

Secondly, visually impaired people should be taught how to use white cane and other assistive tools that may help them in independent navigation. Some of the research participants mentioned that they do not know how to properly use their white cane. Moreover, the participants were of the view that VIP should be taken to different places such as crowded markets, hilly areas, and so on to provide them real life trainings instead of just teaching them in a confined room. These practical trainings will be very helpful for them in independent navigation.

One participant highlighted the importance of training VIPs to use appropriate body gestures. This is important because when they get to interact with people around, they should know the kind of gestures that they should have. According to the participant, one of the reasons sighted people get offended with VIP is because they do not display the right body gestures when talking to them. So, this kind of training must be given to VIP to make them more confident.

Echolocation is an important strategy employed by VIP during navigation. Some of the participants mentioned that VIP should be taught how to make use of echolocation during indoor as well as outdoor navigations.

Discussion

In Pakistan, people with vision impairments face certain limitations to independent mobility. The greatest limitation is growing up listening to people who tell them that they are disable; hence, they cannot live independently. A visually impaired person, from a very young age is made to believe that he has to take guidance or assistance from other people. This is the reason that most of the visually impaired people lose their confidence of going out alone.

Another limitation is the lack of appropriate training centers to give mobility trainings to visually impaired people. Even if there are training institutes, they lack modern tools and equipment with the help of which the mobility experiences of VIP can be improved. The first kind of training visually impaired people need to receive in these training institutes is the use of white cane. White cane is very important for independent mobility of visually impaired people. Where researchers and AI experts have been introducing the idea of smart canes (Rahman et al., 2019), (Chaudary et al., 2023) to manage environmental obstacles well, many of the VIP in Pakistan still do not know how to hold, manage and use white cane properly. So, visually impaired people must be trained on how to use white cane efficiently (Attia & Asamoah, 2020).

Owing to the importance of other assistive gadgets, tools and even mobile applications globally (Nair et al., 2022), (Budrionis et al., 2022), (Kuriakose et al., 2022) the training institutes in Pakistan must also train VIP on how to operate different mobile applications (Saleem et al., 2019). This also hints towards the need of AI researchers in Pakistan to expand this line of research (Khan et al., 2023) for better navigational experiences of VIP in Pakistan and to create virtual environments where proper trainings can be given to VIP while sitting safely in a room (Kunz et al., 2018).

VIP in Pakistan also face infrastructural barriers which hinder their independent mobility to a greater extent. To enhance the mobility and walkability of people with visual impairments in urban spaces, the infrastructural barriers need to be minimized (Campisi et al., 2021). Moreover, the accessibility requirements for buildings and urban surroundings as well as the accessibility needs for the applications that offer information about them should also be considered to make the navigation and way finding experiences of VIPs effective (Prandi et al., 2021).

In addition, the lack of knowledge among sighted people regarding the spatial understanding of VIP is also a limitation to independent mobility. Since sighted people do not understand how visually impaired people see the world around them, they may not be able to guide them well. This is one of the reasons that hinders and influences the independent and safe mobility of VIP (Wong, 2017). Besides this, it could be dangerous when a sighted person with no knowledge and understanding tries to guide the person with visual impairment. Therefore, sighted people must have the knowledge and understanding of how visually impaired people navigate (Williams et al., 2014).

The most important of all, as a society, we need to behave well with people with visual impairments. Instead of discouraging them from independent mobility, we must make them feel that they are an important part of the society; hence, they deserve to live an independent life. We need to help them in every possible way to aid independent mobility. We should also try to learn how we can better guide them whenever they ask for any guidance regarding their destination.

Conclusion

Visual accessibility is essential for inclusive involvement in society. In Pakistan, this is a crucial challenge for visually impaired people (VIP). Therefore, their navigation experiences need to be evaluated for genuine solutions to improve the quality of their lives, their social inclusion and better prospects of their education and work. The present study has successfully highlighted spatial understanding of people with visual impairments. It has found various

strategies employed by visually impaired people. The study also found out the problems faced by visually impaired people during outdoors navigations. The government should ensure that the existing training institutes be equipped with modern equipment. Besides this, the government also needs to ensure that the assistive tools or gadgets available for VIP must be affordable for them. Moreover, the infrastructural barriers must be minimized. Roads must be properly constructed, and footpaths should be free of vendors. This way, government can play a vital role in making VIP feel inclusive in the society. Future research needs to be focused on the problems faced by VIP in indoor spaces, the use of AI in providing virtual trainings to people with vision impairments, and the efficiency and reliability of different assistive tools and gadgets used by visually impaired people.

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