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Barriers and strategies affecting the use of assistive devices for falls prevention among people with Parkinson's disease: a qualitative pilot study

Júlio Belo Fernandes^{1,5*}, Josefa Domingos¹, Sónia Fernandes^{1,5}, Noélia Ferreira¹, Ana Silva Almeida², Ana Chalaça², Natacha Sousa³, Isabel Santos⁴, Andreia Duarte² and Catarina Godinho^{1,5}

Abstract

Background As Parkinson's disease (PD) progresses, patients experience difficulties with gait and balance, requiring assistive devices to ensure fall prevention and safety. Despite the advantages provided by these aids, many people with PD do not adhere to their use.

Objective This study aims to explore the barriers to using assistive devices among people with PD and identify strategies to improve their adherence.

Methods We used a qualitative, exploratory, and descriptive research design. Individual semi-structured interviews were conducted from October 2021 to July 2022, with participants selected through convenience sampling. Thematic analysis was performed to analyze data.

Results Nineteen participants were interviewed, with the majority being male (63.2%) and a mean age of 72.3. This research identified several barriers to using assistive devices that were grouped under six broad themes and 14 subthemes. These themes included disease symptoms, physical limitations associated with holding the device, stigma, symbolism of the device, level of involvement of health professionals, and environmental factors. Concerning the strategies to improve adherence, they were grouped into themes that reflect different priority settings in the health sector. At the macro level, participants emphasized the significance of community education and intergenerational contact. At the meso level, participants highlighted the need for support groups, as well as prescription and training provided by health professionals. Finally, at the micro level, participants emphasized the importance of tailored care and shared decision-making.

Conclusion This study's findings offer insights on barriers and strategies reported by people with PD, improving assistive device utilization.

Keywords Parkinson's disease, Mobility limitation, Self-help devices, Postural balance, Gait, Accidental falls

*Correspondence: Júlio Belo Fernandes juliobelo01@gmail.com

¹Egas Moniz Center for Interdisciplinary Research (CiiEM), Egas Moniz School of Health & Science, Caparica, Almada 2829-511, Portugal ²Department of Nursing, Centro Hospitalar de Setúbal, Setúbal
 ²910-466, Portugal
 ³ARS LVT, ACES Lisboa Norte, UCC Integrar na Saúde - ECCI Benfica, Lisboa 1500-534, Portugal
 ⁴ARS LVT, ACES Arrábida, UCC Palmela, Palmela 2950-483, Portugal
 ⁵Nurs* Lab, Almada, PortugalMonte de Caparica, 2829-511



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Introduction

Parkinson's disease (PD) is marked by the gradual degeneration of dopaminergic neurons in the substantia nigra pars compacta [1, 2]. Pharmacological therapy, particularly levodopa administration, is currently the gold standard for managing PD symptoms. However, as the disease advances, the efficacy of this therapy diminishes, leaving the person to deal with several motor and nonmotor symptoms [3]. Motor symptoms are readily identifiable, including tremors, bradykinesia, rigidity, and postural instability. Non-motor symptoms are also prevalent and encompass a wide range of challenges, such as mood disturbances (e.g., depression and anxiety), cognitive impairment, sleep disturbances, and autonomic dysfunction (e.g., constipation and orthostatic hypotension) [3, 4].

With the progression of PD, individuals become more susceptible to gait and balance difficulties, increasing the likelihood of frequent falls. Previous studies conducted in various geographical locations such as the United States, China, Brazil, India, and Indonesia have estimated that 4 to 35% of older adults fall annually [5–9]. However, this incidence is significantly higher in people with PD, whereby 35 to 90% fall at least once per year, with a large percentage falling frequently [10].

Assistive devices such as canes, crutches, pyramids, walkers, and, more recently, walking poles primarily assist with mobility and reduce the likelihood of falls among people with PD [11–14]. Using such devices reduces the load exerted on the lower limbs and distributing this load on the upper limbs [13, 15]. In particular, in PD, assistive devices using visual and auditory cues showed additional benefits, decreasing the number of freezing episodes and increasing stride length [16].

Despite the benefits of assistive devices, some people refuse or abandon their use [17, 18]. To enhance adherence to assistive devices among people with PD, it is crucial to consider their attitudes and beliefs towards the use of assistive devices [19]. However, there is limited knowledge regarding the barriers this population faces and the strategies that can be implemented to improve adherence to the use of assistive devices. This study aims to fill this evidence gap by investigating the barriers to using assistive devices among people with PD and strategies to enhance their adherence.

Methods

Study design

We used a qualitative, exploratory, and descriptive research design for this study. The primary data collection method consisted of individual semi-structured interviews to explore barriers to using assistive devices in people with PD and identify the strategies to enhance their use. Braun, Clarke, Hayfield, and Terry's [20] framework for conducting thematic analysis was applied to this study. We followed the consolidated criteria for reporting qualitative research (COREQ) checklist [21] to ensure all items relevant to reporting qualitative research were included.

Participants and recruitment

The study population consisted of people with PD. The inclusion criteria were: a diagnosis of PD with a prescription of an assistive device by a healthcare professional and agreement to participate in the study. The sampling method selection was non-probabilistic by convenience. This sampling method enabled researchers to easily access a pool of potential participants who met specific inclusion criteria. These individuals are often more readily available for interviews, which was a crucial consideration given the constraints of time and resources typically associated with research projects [22, 23].

Recruitment took place between October 2021 to July 2022. The study was publicized via social networks (Facebook, Instagram, WhatsApp) and by snowballing personal networks.

To ensure data variability, we included all individuals available during the data collection period who met the inclusion criteria.

Ethics and procedures

The study protocol was approved by the Egas Moniz CRL Ethics Research Committee (ID: 1000/2021) according to the recommendation of the Declaration of Helsinki. Before the interviews, the first author provided a participant information sheet and a verbal explanation of the study. Then, participants provided written informed consent for their interviews to be audio-recorded and for data to be used in this study. None of the participants refused to take part. All data was stored in a private locked cabinet at the Egas Moniz CRL. Digital data was stored on a password-protected computer. After the verbatim transcription, all the recorded data was destroyed.

Data collection

The first author, JBF—a male professor with a PhD in Nursing, an experienced researcher, and a skilled interviewer. He was responsible for data collection through individual in-person interviews which took place in a private consultation room at the Egas Moniz School of Health & Science. This institution is the largest private educational institution in Portugal specializing in advanced studies in the health field. The interviewer had no prior relationship with the participants.

Only the interviewee and interviewer were present during the interviews to promote privacy and facilitate the establishment of a climate of trust. We developed and pilot-tested an interview guide to facilitate data collection. Our approach included a comprehensive literature review to identify prior interview guides and pertinent factors relevant to our research goals. We also sought expert input from healthcare professionals and researchers to refine and adapt the initial questions. We conducted item reduction to optimize the interview process, eliminating redundancy while maintaining clarity and relevance. Pilot testing involved colleagues and individuals with PD, helping us fine-tune question clarity and relevance for a comprehensive and efficient data collection process.

Examples of questions used included: "What are the factors that lead people with PD to adhere to the use of assistive devices/walking aids?", "Is there any factor that prevents you from using the assistive device?", "Give a specific example of a barrier to using a cane/ Nordic walking pole/ crutches/ Walker cane hybrid /walker?" "Name one aspect that leads people with PD to refuse to use assistive devices.", "How can health profession-als intervene to get people with PD to adhere to assistive devices?".

The mean interview duration was 44.52 min, ranging from 37 to 56 min. No repeat interviews were conducted, and no field notes were taken. All interviews were audio recorded, and the recordings were later transcribed in full, anonymized, and analyzed as textual data.

Before data collection, the researchers deliberated and established saturation as the point where no new barriers or facilitators were identified in more than three interviews.

Data analysis

To characterize the sample, we employed IBM SPSS Statistics software (Version 27.0, IBM Corp., Armonk, NY, USA). We conducted descriptive statistical analyses encompassing count, mean, standard deviation, minimum, and maximum values.

The analysis of the open-ended questions was done simultaneously with the data collection process. In the analysis process, two researchers (A.S.A. and S.F.) followed Braun, Clarke, Hayfield, and Terry's [20] procedures to identify themes of interest to achieve the study's aims.

Phase 1 - Familiarizing yourself with your data After each interview, the researchers listened to the recording

to familiarize themselves with the data. Then, they proceeded to transcribe the entire textual data. To anonymize data, a code consisting of the letter P (participant) and a number according to the order in which the interviews were conducted was assigned.

Phase 2 - Generating initial codes The text was divided into meaning units involving words and phrases that addressed the same theme. The codes of the meaning units were attributed using the participants' own words. Researchers reviewed the verbatim transcript independently and coded it using inductive thematic analysis to identify common themes. QDA Miner Lite database was used for coding.

Phase 3 - Searching for themes Through the coding process, common themes emerged, reflecting recurring patterns and subjects present in the data.

Phase 4 - Reviewing themes To enhance the rigor and reliability of the analysis, the researchers meticulously examined and discussed any discrepancies until agreement was obtained. Two other study team members (N.F. and C.G.) reviewed the participant quotes and matched each quote to one of the identified themes.

Phase 5 - Defining and naming themes The identified themes were subsequently defined and characterized, represented by descriptive labels that encapsulated their meanings.

Phase 6 - **Producing the report** Finally, the research team integrated the identified themes and corresponding participant quotes into a coherent narrative, comprehensively understanding the study findings.

The initial themes and organizing framework were shared with the participants for validation, allowing them to confirm or adjust the researchers' interpretations.

Results

A total of 19 interviews were conducted. Most participants were male (63.2%), with a mean age of 72.3 (SD = 5.17) (Table 1).

Barriers to the use of assistive devices

Barriers identified to using assistive devices were grouped into six themes and fourteen subthemes (Table 2). The

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		Frequency	Percent	Mean	Standard deviation	Minimum	Maximum
Sex	Female	7	36.8				
	Male	12	63.2				
Age (years)				С	5.1	64	81
Time since diagnose (years)				10.1	4,6	5	19

 Table 2
 Barriers to the use of assistive devices

Themes	Subthemes			
PD symptoms and complications	Dyskinesia and freezing			
	Cognitive abilities			
Physical limitations of holding the	Restricts use of an upper limb			
device	Gait modifications			
Stigma	Self stigma			
	Social stigma			
Symbolism of the device	Feelings of inferiority			
	Functional decline			
	Aging			
Level of involvement of health	Device prescription			
professionals	Training by health professionals			
Environmental factors	Uneven surfaces			
	Crowded environments			
	Wheather			

key themes and representative quotes are summarized in the text below.

PD symptoms and complications

Participants reported that motor symptoms and complications such as dyskinesia and freezing of gait influence adherence to the assistive device. As these motor fluctuations are changes in the ability to move, in addition to being uncontrolled and involuntary, occurring throughout the day, it made it difficult for people with PD to manage the use of the assistive device.

"PD symptoms are a major factor. They are unpredictable and very erratic. We can appear to be with muscle spasms or rapid jerking and a couple of minutes later experience a complete freeze. Of course, this is very disturbing if you need to use a cane or a crutch." (P3).

Participants also identified the person's cognitive abilities as influencing adherence. As the disease progresses, some people experienced mild cognitive impairment and found it challenging to plan and accomplish multitasking. These impairments limited the person's ability to use the device.

"It can be harder to use walking aids, especially when dividing attention between tasks. You can feel somehow distracted and disorganized. Sometimes this occurs in simple tasks like a conversation." (P14).

Physical limitations of holding the device

To use the assistive device, participants reported that the user needed to hold the device effectively, restricting the use of the upper limb for functions other than holding the device. This can also reduce arm movements, therefore influencing people with PD balance. "When carrying the cane, I feel limited in using my hand and arm to perform other functions. A good example is shopping. Grocery shopping can be tricky." (P6).

"I also sometimes think that when I carry the cane, there is a limitation of movement of the arm that leads to changes in balance." (P10).

In addition to the upper limb restriction, participants reported that the assistive device could imply a slower gait speed.

"If you need to move faster, the walking frame is not reasonable. I can use the cane and maintain a relatively fast speed. However, it is different from the movements I really wished to achieve." (P6).

Stigma

Participants described the presence of stigma as a factor that could influence adherence.

Participants express feelings of shame when needing to use assistive devices, as they perceive that individuals with mobility issues are not seen as "normal" by society. They feel that, in general, society holds prejudices and stereotypes towards users of assistive devices, which results in a lower social status for them. Experiences ranging from negative attention to discomfort and discrimination have been described.

"It is difficult to accept the need for these devices to maintain mobility. All of us who need to use some walking aid surely, in some situation, experienced the look people gave us or just the fact that society ignores you because you are a disabled person." (P18).

The symbolism of the assistive device

In addition to the stigma perpetuating the prejudice of lower social status, participants reported an association between using assistive devices and feelings of inferiority, functional decline, and aging. Participants verbalized that it was challenging to use these devices due to feelings of being "incapable," " handicapped," or even "old people." However, there seems to be a greater receptivity toward cane-type devices compared to walkers.

"It is not uncommon to hear them talk about being handicapped because they need a cane to walk without falling. But, in reality, we need these devices either because we are really old or disabled." (P15).

Level of involvement of health professionals

According to participants, prescribing the assistive device by a healthcare professional motivates the decision to adhere to its use. Moreover, the prescription offers a necessary justification that protects the user from the negative opinions of others. Participants' reports described how a healthcare professional prescription can be significant for people with PD to adhere to the assistive device.

"Of course, if the doctor tells people to use a frame, then they should use it. It is very important to follow the prescriptions they give us. I don't care what others think or say. If the health team thinks it's best for me, I will follow their advice." (P2).

The involvement of health professionals was not limited to the prescription of the assistive device but also involved teaching how to use and monitoring its ongoing use. These interventions allowed the person to adapt to the assistive device and provide a protective effect against stigma. People with PD felt that it matters since the health professional has invested time in educating the person.

"The physiotherapist has worked wonders. He took the time to teach me how to walk with a cane. He helped me adapt the way I walk to be safe. I don't care what anyone else thinks about these products. I need them to move safely." (P8).

Environmental factors

As the disease progresses, people with PD manifest gait disturbances. In addition to frozen gait, the gait lacks knee and foot flexion, making walking difficult on uneven surfaces and more challenging to perform the dual task of walking and using the assistive device to aid walking.

"I have difficulty on uneven surfaces. Pavements, curbs, and potholes in the middle of the road make it very difficult to take a pleasant walk. My body blocks; it freezes, making it difficult to take steps and manage using a cane, tripod, or other devices." (P13).

Besides the pavement condition, the participants consider that the weather and walking in crowded spaces or on busy streets made it difficult to use the assistive devices because they needed to concentrate on walking, navigating the room, and using the walking aid.

"When it rains, it is not fun. I have to concentrate on too many things. The cane, the surface, the rain, wind and hope not to freeze." (P5).

I avoid going to the supermarket on weekends and during rush hour. I find it easier to walk with the tripod when I have the space to move around freely. When the area is crowded, I get anxious, thinking about where the safest path is, will my body freeze,

Table 3 Stra	tegies to i	ncrease	adherence	to	assistive	devices
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Themes	Subthemes			
Macro level	Community Education			
	Intergenerational contact			
Meso level	Support groups			
	Prescription and training by health professionals			
Micro level	Tailored care			
	Shared decision-making			

and whether I will fall in front of everybody. Sometimes thinking, moving my legs, and coordinating using the tripod can be tricky." (P13).

Strategies to increase adherence to assistive devices

Participants articulated several strategies (Table 3) to improve the adherence of people with PD to assistive devices. These strategies included three different priority settings in the health sector, namely at the macro (national), meso (institutional), and micro (health professional-patient interaction) levels.

Macro level strategies

At a macro level, participants identified community education as a global strategy that should target the general population. This approach aims to promote a better understanding of the necessity and significance of assistive devices and foster empathy and preparedness among individuals when they encounter neurological disorders.

"Society must be educated about the subject to combat harmful or discriminatory attitudes. As a community, we all need to understand what PD means to patients, what we experience when the disease progresses, and the value that assistive devices stand for our safety." (P4).

In addition to community education, participants consider intergenerational contact to be valuable in better understanding people with different experiences.

"Putting people with PD in contact with younger people can allow them to build empathy and learn more about what Parkinson's is and what we experience. I believe this can be an effective way to combat any type of prejudice or negative attitudes." (P13).

Meso level strategies

At the meso level, participants reported the need for institutions to support the development of support groups for people with PD. Participants consider that attending a support group allowed people with similar experiences to share personal experiences and feelings. In addition, by following a support group, people with PD can improve their skills to cope with challenges and stay motivated to manage their chronic conditions. The support group setting fostered a sense of belonging, understanding, and encouragement, empowering people with PD to navigate challenges and improve their overall well-being.

"Interacting with people who have experienced the same problem helps. Community institutions should create or support groups of people with PD. In support groups, there is an identification with peers. In addition, we learn a lot about ourselves and coping strategies for the issues we face in everyday life." (P1).

In addition, as described previously, the involvement of health professionals can be vital to improving adherence to assistive devices for people with PD. These professionals should provide multidisciplinary care that is personalized for each person. This care should reflect the different interventions that each health professional will develop and ensures an effective continuity of care. Health professionals should follow patients through the different stages, from initial assessment, prescription, education, and training on using the assistive device, enabling people with PD to learn to use the assistive device safely.

"The healthcare team must emphasize the importance of using assistive devices. They should all be aligned so that your speech is assertive about the importance of a specific treatment for that patient." (P14).

"There should be continuity of care between doctors, physiotherapists, and nurses. For example, if a professional prescribes the assistive device, there should be an investment from the whole team so that the patient learns about the importance of using it, how to use the device, and then receive train how to use it safely." (P8).

Micro level strategies

Another strategy identified by participants to improve adherence to assistive devices was providing tailored care. Participants felt that it is essential for health professionals to understand the person's necessities, beliefs, and motivations to use or not use the assistive device. Based on this knowledge, health professionals could structure an effective personalized intervention to increase the person's adherence to the use of assistive devices.

"You need to understand what they believe. If somebody does not comply with something the doctor tells them, the only way to change that behavior is to know what influenced that decision. Then the health professionals must develop interventions to solve those identified problems." (P14). "My problem is not the same as the other patients; therefore, doctors and nurses must provide care that is aimed at my problems. The same intervention doesn't solve different problems." (P17).

In addition to providing tailored care, healthcare professionals should work with people with PD to decide on care. Sharing decision-making will enable people with PD to participate in their care and make informed choices actively. To provide this care, participants consider that health professionals should explain the treatment options and inform people with PD about the different assistive devices, their aims, and their benefits to support them in deciding what assistive device to choose.

"My physiotherapist explained to me the differences between the different devices. Then, he helped me to choose what was best suit my needs. The final decision was mine. This was perfect. I felt involved in the whole decision-making process. I think it helped me realize that I have to use a cane to keep it safe while walking." (P6).

Discussion

This study offers comprehensive insights into the barriers faced by people with PD when utilizing assistive devices while identifying strategies to enhance their utilization from the affected individual's perspective. Assistive devices serve a crucial purpose in enhancing the independence, mobility, fall prevention, and overall quality of life of people with PD who experience difficulties with gait, balance, and falls. Understanding and addressing these barriers can significantly improve the effectiveness and impact of assistive devices in the lives of people with PD, ultimately promoting their independence and well-being.

While assistive devices enable people with PD to enhance their balance and mobility, thus reducing the risk of accidental falls [11, 12], it is essential to note that their use typically requires the utilization of one or both upper limbs to operate the assistive device, potentially impeding the performance of specific daily tasks. Additionally, participants reported slower gait speed when using an assistive device, impacting overall functioning. This is in line with findings from previous studies that revealed a decreased number of steps, shorter stride length, and an overall lower gait speed when using a cane or a walker than when walking without any assistive device [24–26].

Participants also reported that environmental factors such as uneven surfaces, weather, and crowded environments could be barriers to using the assistive device. It is known that even small changes in the surface can put people at risk for slips, trips, and falls [27]. These tripping hazards can make pathways challenging and dangerous for people with PD.

Notably, these assistive devices may not provide optimal assistance when turning, which can be a challenge for people with PD [28]. This difficulty is expressed in the high number of falls, up to five times higher than in age-matched older adults, and they frequently fall while turning [29]. Turning requires intricate coordination of movements, and the rigid or fixed nature of some assistive devices may limit the ability to execute smooth and efficient turns [30]. This limitation can result in difficulties navigating tight spaces, making quick directional changes, or adapting to dynamic environments. As a result, alternative strategies or additional support may be necessary to address turning challenges effectively in people with PD.

Navigating busy environments can also provoke additional challenges in PD. When walking outdoors on irregular surfaces or crowded spaces, people with PD must multitask to navigate the terrain, handle their assistive device, and decide their intended path.

Furthermore, when walking outdoors, individuals with PD are more susceptible to experiencing stigma. Stigma can impact individuals based on perceived differences or deviations from societal norms [31].

Participants identified barriers associated with psychological and social factors. Stigma leads to the development of an environment of shame, fear, and social isolation, with a clear impact on people's lives [32]. In the population under study, the need to use an assistive device was considered the differentiating characteristic that led to the development of social stigma. Previous studies also identified ambivalent feelings about using assistive devices due to the possible social stigma [33] and identified it as a barrier to participation in rehabilitation and fall prevention programs [34].

Another barrier identified by the participants pertained to the symbolic representation of assistive devices. Participants attributed a negative symbolism to these devices, associating them with a prejudiced notion of lower social status, increased dependence, and functional decline. The participants' reports also revealed a reluctance to accept the necessity of using assistive devices, resulting in delayed seeking support for daily activities. Previous studies identified that to avoid being considered an older person with mobility impairments, participants avoid using assistive devices and resort to other objects, such as umbrellas, to support walking [35]. This behavior can be based on fear of being institutionalized due to their physical limitations [36].Regarding the involvement of healthcare professionals, previous studies have highlighted a significant percentage of patients acquiring assistive devices without undergoing assessment or receiving prescriptions from healthcare experts. Nonetheless, these individuals were aware that seeking assistance from professionals could assist them in selecting an appropriate assistive device tailored to their specific needs [35, 37]. Numerous assistive devices exist to support safe walking, but the selection process should be based on the individual's clinical condition and capabilities. Moreover, adherence to the prescribed assistive device is crucial to ensure patients receive proper training on its correct and safe usage [38].

The findings of this study highlight the urgent requirement to develop strategies that effectively address and mitigate the impact of the identified barriers. However, given the multifaceted nature of these barriers, formulating effective strategies can be inherently complex. Consequently, the participants' reports encompassed a range of strategies aimed at different healthcare settings and system levels (macro, meso, and micro).

Participants emphasized the importance of community education and intergenerational contact to raise social awareness about the challenges individuals face using assistive devices, fostering empathy and understanding of aging, neurological disorders, and the value of such assistive devices. This approach aims to reduce stigma, debunk associated myths, and eliminate negative symbolism [39–41]. Additionally, participants recognized the need for health institution-backed support groups, enabling people with PD to share experiences, provide mutual support, and enhance coping skills and motivation in managing their chronic condition.

In addition, health professionals should be alerted of the influence that the prescription and training of assistive devices can have on the adherence of people with PD to these aids and should be enabled to conduct clinical follow-ups of people with PD, with continuous attention to their adaptation to assistive devices [42].

Finally, participants identified the need for health professionals to tailor the care provided to people with PD and allow them to share decision-making. It is widely recognized that strategies cannot be universally applied due to each patient's unique needs and preferences [43]. However, a growing body of evidence suggests that personalized care is associated with favorable clinical outcomes and higher levels of patient satisfaction [44]. Therefore, health professionals must embrace a patientcentered approach and tailor the care provided to people with PD, promoting better outcomes and enhancing patient satisfaction.

Limitations

This study is not without limitations. First, the selection bias may be present given that the sample was recruited via social networks. This recruitment method may not capture the perspectives of individuals who are not active on these platforms. Second, we also acknowledge the possibility of social desirability bias, as participants' reports may present themselves or their experiences in a manner they perceive as socially acceptable, leading to a divergence between the reported information and participants' actual experiences. To minimize this bias, we have implemented practices recommended by Bergen and Labonté [45]. Accordingly, researchers ensured that all participants were thoroughly informed about the study's particulars, encompassing confidentiality and anonymity procedures, data usage, and dissemination of research findings. Interviews were conducted in a private setting, away from the hearing range of others. If the interviewer detected indications of responses influenced by social desirability biases, they maintained a nonconfrontational and respectful attitude. To encourage more authentic responses, the interviewer provided contextual information when framing questions, acknowledged participants' diverse perspectives, utilized indirect inquiries, and requested specific examples to elucidate their responses. In addition, as data were identified from the reports of various participants, it is unlikely that this bias occurred.

Conclusion

This study offers valuable insights into the complex barriers that influence the utilization of assistive devices, emphasizing the need to develop strategies to mitigate or eliminate their impact. To effectively enhance adherence to assistive devices, healthcare policymakers and administrators must prioritize the perspectives of assistive device users and consider their experiences in addressing these barriers. This study will contribute to filling in knowledge gaps related to understanding people's needs.

Supplementary Information

The online version contains supplementary material available at https://doi.or g/10.1186/s12877-025-06022-4.

Supplementary Material 1

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Author contributions

J.B.F.: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Writing and Reviewing. J.D.: Conceptualization; Formal analysis; Investigation; Methodology; Writing and Reviewing. S.F.: Data curation; Formal analysis; Methodology; Investigation; Methodology; Writing and Reviewing N.F.: Data curation; Investigation; Methodology; Writing and Reviewing. A.S.A.: Data curation; Investigation; Writing and Reviewing. A.C.: Formal analysis; Investigation; Writing and Reviewing. N.S.: Formal analysis; Investigation; Writing and Reviewing. N.S.: Formal analysis; Investigation; Writing and Reviewing. N.S.: Formal analysis; Writing and Reviewing. I.S.: Formal analysis; Investigation; Writing and Reviewing. A.D.: Formal analysis; Investigation; Writing and Reviewing. Conceptualization; Methodology; Writing and Project administration; Reviewing and Editing. All authors have read and agreed to the published version of the manuscript.

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Data availability

The datasets analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study protocol was approved by the Egas Moniz CRL Ethics Research Committee (ID: 1000/2021).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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