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Understanding the assistive technology needs of people over 55: The future of mobility aids

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Understanding the assistive technology needs of people over 55: The future of mobility aids

Abstract

Objective: To understand mobility issues not adequately serviced by assistive technology (AT). **Methods:** A two-stage mixed-methods research project that forms the basis of future AT design and manufacture. Stage 1: a focus group comprising 46 participants (people aged 55 years or older with mobility issue/s) and their support networks. Stage 2: a sample of 413 people over 55 completed a purpose-designed survey informed by stage 1, regarding mobility issues and perceived desirability of suggested AT mobility aids. **Results:** Two core themes emerged: (a) functionality issues relating to existing AT designs and (b) identified mobility issues encountered during activities of daily living that could potentially be resolved by developing new AT. Importance was placed on certain features of AT mobility aids with cost, transportability and aesthetics being primary issues. **Conclusion:** Consulting end-users and their networks ensures valuable insight into how future AT can better address and target mobility needs.

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Understanding the assistive technology needs of people over 55: The future of mobility aids

Abstract

Objective: To understand mobility issues not adequately serviced by assistive technology.

Methods: A two-stage mixed methods research project that may form the basis for future assistive technology design and manufacture. Stage one included a focus group comprising 46 participants (people aged 55 years or older [Po55] with a mobility issue) and their support networks. A sample of 413 Po55 then completed a purpose-designed survey informed by stage one, regarding mobility issues and the perceived desirability of suggested assistive technology (AT) mobility aids (stage two).

Results: Stage 1 identified two core themes 1) issues relating to existing AT such as transportability and aesthetics and 2) mobility issues encountered during ADL that could potentially be resolved by the development of new AT such as manoeuvrability. Stage 2 explored the importance Po55 placed on certain attributes and features of AT mobility aids with cost, transportability and aesthetics being the main issues for end-users

Conclusion: Po55 and their support networks experience a range of mobility issues with existing AT. Consulting end-users and their networks ensures valuable insight into how future AT can better address mobility needs of Po55.

Key words: action research; aged care; assistive technology; end-users; mixed methods; mobility

Impact statement

A person-centred approach to engaging end-users and their support networks can inform the design of new product development [29] such as assistive technology (AT) mobility aids, targeting issues not adequately addressed with existing aids. Aged care practitioners can benefit from an understanding of mobility issues and the perceived difficulties associated with AT mobility aids.

Introduction

In 2013, one in four Australians were aged 55 years or over, and this proportion is predicted to rise to one in three by 2065 [1]. This increase will place greater demand on the community and Australia's aged and health care system, especially due to higher rates of age-related disabilities resulting from longer life expectancies [2]. In response to these anticipated challenges, the Australian Productivity Commission [2; p.XXIV] recommends "*the aged care system should aim to: promote the independence and wellness of older Australians and their continuing contribution to society.*"

Maintaining functional mobility is essential for living well, longer, as it is implicated in an individual's physical and psychological wellbeing [3, 4]. Functional mobility refers to "*the manner in which people are able to move around in the environment in order to participate in the activities of daily living and, move from place to place*" [5; p.130]. Remaining active maintains muscle strength, contributes to balance and functional ability, and decreases chronic health conditions [6, 7]. Being functionally mobile facilitates independence and enables regular social contact and access to support groups and services, decreasing the likelihood of loneliness and isolation [2, 8, 9]. Enhancing functional mobility is increasingly important as sedentary lifestyles, resulting in health complications, are on the rise [10].

Maintaining and increasing functional mobility can be enhanced through the use of AT [11, 12] like walking frames and sticks, wheelchairs, stair-chairs and mobility scooters. AT has been shown to positively support the changing needs of older people as their mobility declines, assisting continued domestic independence and social involvement [13]. Kylber *et al* undertook a study in Sweden which found that the provision of appropriate AT facilitated feelings of support and safety which assisted with the continuation of activities of daily living (ADLs)[14]. Asghar, Cang and Yu (2018) also assert that ATs are commonly used for the wellbeing of people with dementia [15]

Despite the existence of many useful AT, there is scope for improvement [16-18]. Currently, the process of designing and manufacturing AT involves minimal consultation with end-users and their support networks. Products are typically released into the market in response to technological innovation [8]. This process, which largely negates the end-user, can result in inappropriate and often complicated designs, rather than situation-based solutions [8, 19]. Person-centred AT designs have multiple advantages, like increased self-determination and locus of control [2]. Responding to the need for greater consultation with end-users and their

support networks, the aim of this study was to understand mobility issues not adequately serviced by current assistive technology as identified by those with lived, informal carer, and professional experience.

Project context

This paper reports on stage one and two of a project called Enabilise that aims to develop and potentially manufacture new AT that respond to the real need of people over 55 who have a mobility issue and/or use AT.

The focus on *people aged 55 years or older* (Po55) was a strategic decision. Studies on ‘older’ people normally encompass people 65 years and above, but in terms of functional mobility, ages 55 to 64 are also important. While the proportion of people in Australia who have mobility issues rises with age, people aged 55 to 64 years have high rates of mobility issues [1, 20]. By incorporating this age bracket in discussions on mobility support for older people, assistance can be provided as issues arise, slowing mobility deterioration [11].

Mixed methods approach

Recognising the need to empower older people with regard to needs, it was important they had substantial input from the beginning. In this study, support networks refer to those providing mobility support either informally (unpaid carers) or professionally (allied health professionals, managers of aged care facilities, and distributors and repairers of AT). Due to the complexity of this area of enquiry, a mixed methods approach was enacted, commencing with a focus group (qualitative), followed by a survey (quantitative). Lieber underscored how mixed methods approaches encapsulate rich stories and lived experience (qualitative), in addition to categories and patterns (quantitative) [21].

Methods

Focus groups

Potential participants were invited to attend a focus group of their choice in an accessible location and where lunch was provided. Five semi-structured focus groups were conducted to document the experiences of participants. These focus groups, conducted in Illawarra, NSW, Australia, generated more detailed insight into mobility issues as a result of deeper

conversation with participants and their opportunity to add detail to what they wanted to say. Focus groups comprised different cohorts: Po55 ($n = 12$) and their unpaid carers ($n = 2$); allied health professionals such as occupational therapists and physiotherapists ($n = 13$); aged care service providers, inclusive of managers and executive managers of residential care services, quality compliance, hospitality and learning development managers, and physiotherapist coordinators ($n = 13$); and distributors and repairers of AT ($n = 6$). Paid carers and AT manufacturers were invited to take part in focus groups, but no expressions of interest were received. Extensive effort was also exerted to recruit more Po55 with limited success, possibly due to the very fact they had functional mobility issues, making the journey to focus groups difficult.

The Po55 group consisted of four males and eight females with ages ranging from 55 to 90. Physical conditions affecting functional mobility included foot, knee and spinal problems, arthritis, diabetic neuropathy, Parkinson's disease, and neural and cognitive problems resulting in balance problems. While the majority of participants received a range of support for ADLs, a number identified that they managed independently. Five participants lived in independent living units within retirement villages, with the remainder living in houses in the community.

Survey

Following from focus group responses, a purpose-designed survey was administered to determine AT issues of priority for Po55. A sample of 413 Po55 (63.2% female) participated in the survey over the phone due to the recognised mobility issues of participants. Figure 1 shows sample characteristics for age: 10.4% described their mobility issue as extremely severe, while 23.7% of the sample indicating their mobile issue had a 'great deal' of impact on their everyday life. 36.1% of the sample reported using a walker; 62.9% a walking stick; 10.4% a manual wheelchair; and 10% a scooter.

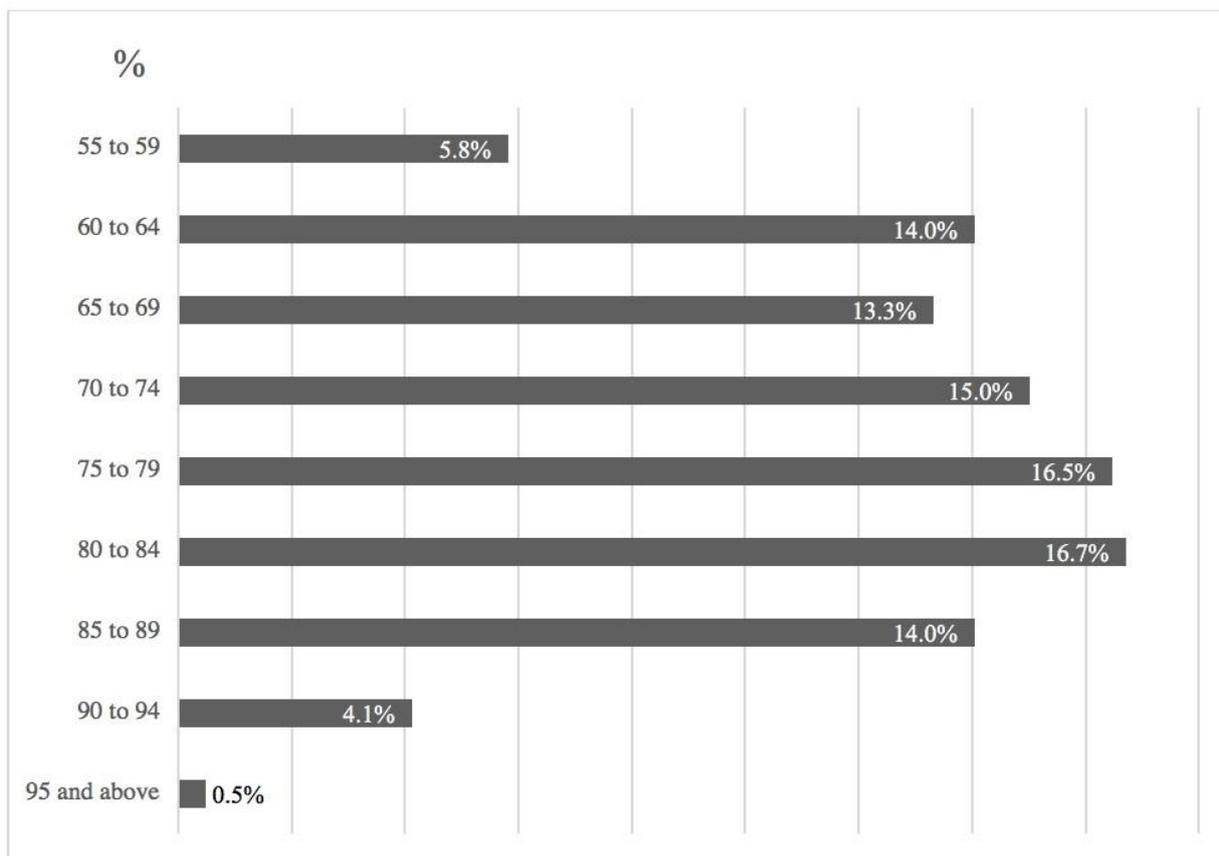


Figure 1. Sample Characteristics – age groups for survey participants ($n = 413$)

Procedures

Ethics approval was granted by the University of ****’s Human Research Ethics Committee (HE15/433) prior to any data collection. Participants were recruited using a range of strategies, including flyers, mail-outs, local media coverage, professional contacts and word-of-mouth. All focus groups, held in wheelchair-accessible venues, were conducted between May and June, 2015, and ran from 60 to 90 minutes. Lunch or afternoon tea was provided. Focus group interviews were audio-recorded and transcribed verbatim. Surveys were conducted between 28th July to 8th August. In order to maintain confidentiality, the names of participants were not incorporated into transcripts or survey responses.

Data Collection

Semi-structured questions used in focus groups provided an interview structure while enabling an open discussion on mobility. Questions were modified slightly for each stakeholder group

to ensure the aim of the research was met. All focus groups were facilitated by the same research team member for consistency.

Survey participants responded to a series of statements on four-point Likert scales (unimportant, neutral, important and can't say or not difficult, neutral, difficult and N/A or not desirable, neutral, desirable and can't say). Statements concerned the importance of equipment attributes (e.g. weight, price, and style); difficulty of use for various AT; and desirability and value of AT features. The survey concluded with an open-ended question inviting participants to suggest mobility product/s that would be of use to them, however the open-ended responses are the topic of another paper.

Data analysis

Focus group qualitative data was analysed using the content analysis method. This method provides “knowledge and understanding of the phenomenon under study” [28] and also enabled the research team to sift through large volumes of data in a systematic manner. Content analysis is a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding [22]. The advantage of content analysis is gaining direct information from study participants, as this study did, without imposing preconceived categories or theoretical perspectives [29]. The data management system, NVivo, facilitated the process of organising qualitative data.

The quantitative data collected was analysed using SPSS and Q. Multivariate analysis was run on the collected data to help understand variance across the different demographic groups. Frequencies, means and crosstabs were calculated and Chi-Square and ANOVA tests were used to determine the statistical significance of the results which are reported here.

Results

A two staged process incorporating qualitative and quantitative data collection and analysis revealed that end-users identified issues relating to existing AT such as transportability and aesthetics. End-user participants also raised mobility issues that they encountered during their activities of daily living that they felt could potentially be resolved by the development of new AT. One such issue was the lack of manoeuvrability of their AT. The importance that Po55

placed on certain attributes and features of AT mobility aids identified that they were mostly concerned with cost, transportability and aesthetics relating to their AT.

Focus groups

Two core themes emerged from focus group data analysis: 1) issues relating to existing AT and; 2) mobility issues encountered during ADL that could potentially be resolved by the development of new AT. These are now explored in greater detail.

Theme 1: Issues Relating to Existing AT

Participants identified the numerous issues with AT that they encountered regularly. These included difficulty manoeuvring walkers¹ and forearm support frames through doorways, beside beds, into bathrooms and up stairs; retrieving fallen walking sticks; and transporting wheelchairs and scooters.

Walkers, the most frequently discussed AT, identified a number of issues. The following participant experiences illustrate walker limitations with adverse outcomes:

I find quite often that these [rollators] are too heavy for people to put in their cars and take me places and that's a disappointment.

- Po55

They [Po55] can't actually get their walker in as far as the toilet ... So they've got to prop it at the door and furniture surf - handrail surf. Use the towel rails.

- Allied health professional

Transport of most AT was an issue. The larger and heavier the AT, the more difficult transportation became. Po55 who were reliant on scooters were found to be particularly disadvantaged as they were dependent on specialised taxis or cars for travel. Lighter options were desired and acknowledged by AT distributors.

Can he [a customer] get a wheelchair that's about 12 to 13 kilos in the car, compared to a chair that's, you know, one of the lightest in Australia, about 7 to 8 kilos?

¹ also known as wheelie walkers, rolling walkers, rollators, seat walkers and mobility walkers.

- AT distributor

Po55 were willing to pay more for AT with desirable features, such as lighter, sleeker designs. However, cost was generally a significant issue. One participant said when researching a scooter for himself “*of course, the main object was price*”. Compounding the issues of cost was the need to purchase new devices as needs changed. In response, an allied health participant proposed “[a technology] *that might be able to evolve with you. Grow with you. Grow old with you*”, to avoid the constant need to purchase AT.

Along with AT function and cost, aesthetics were also discussed. Participants acknowledged a resistance to the uptake of, or a negative psychological impact due to, the appearance of AT. Participants explained the appearance of AT was often “*old-fashioned*” or “*demoralising*”, “*gives the brand that they are disabled*”, as well as there being a “*depressing*” choice of colours.

Theme 2: Mobility issues encountered during ADL that could potentially be resolved by the development of new AT

In most cases, issues with ADLs arose when environmental barriers could not be overcome by existing AT and/or there were no known AT to compensate for physical limitations. Issues ranged from negotiating stairs, the inability to partake in and enjoy leisure activities, difficulties transferring to and from the car, and going shopping.

A number of Po55 expressed their desire for new AT that could accommodate their travel needs. Such technology would allow them to go on day trips without worry or to have a much desired holiday:

When I get there [a holiday], I've got to have a hospital bed and also a commode and a standing arrangement so that I can get from wheelchair to commode to, well, get my pants down and that sort of stuff.

- Po55

Well, I'm incontinent, which is not life threatening, but it's a nuisance. I've got to carry gear. Then you've got no room for luggage. The sleep apnoea machine takes up space.... Steps are a bit of trouble, but I like to think I try to be normal. I've forgotten what normal is.

- Po55

ADL were often restricted due to hurdles such as lifting the weight of lawn bowls or reaching a garden bed. Participants described how these limitations had significant implications in daily life:

I love gardening, bowls, walking and now I'm just stuck most of the time on four wheels and it gets very frustrating.

- Po55

Frequently occurring in discussions on ADL were falls. In focus groups with allied health professionals and aged care service providers, falls were seen as one of the greatest threats to the wellbeing of Po55. Toileting was seen as the primary falls-related ADL for a number of reasons:

They're in a hurry usually.

It's a wet environment. It's got nothing much to hold on. It's not as though you can table walk² in the bathroom. It's the trying to pull down the knickers and do it all and then the loss of balance.

- Focus group with aged care service providers

But then you'll have incontinence issues. So all of a sudden there's a rush to get from A to B. Of course, they do things without thinking or without the walker, as you were saying. So, leading to falls.

- Focus group with allied health professionals

While both focus groups recognised a range of existing AT aimed at addressing falls, both agreed further innovation was necessary.

² A term used to describe a reliance on the surrounding environment for balance and support. Also known as 'furniture surfing'.

Survey

Survey questions built upon findings from the focus groups. Figure 2 reveals participants responses regarding the importance of various AT equipment attributes.

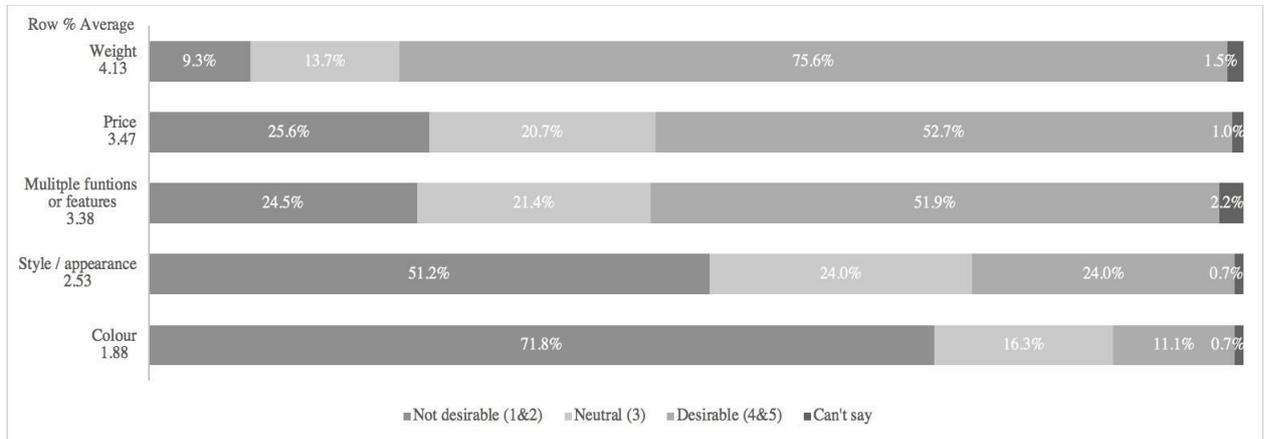


Figure 2. Importance of assistive technology equipment attributes for Po55 ($n = 404$)

Figure 3 conveys responses from participants regarding difficulty of everyday tasks for Po55 using AT.

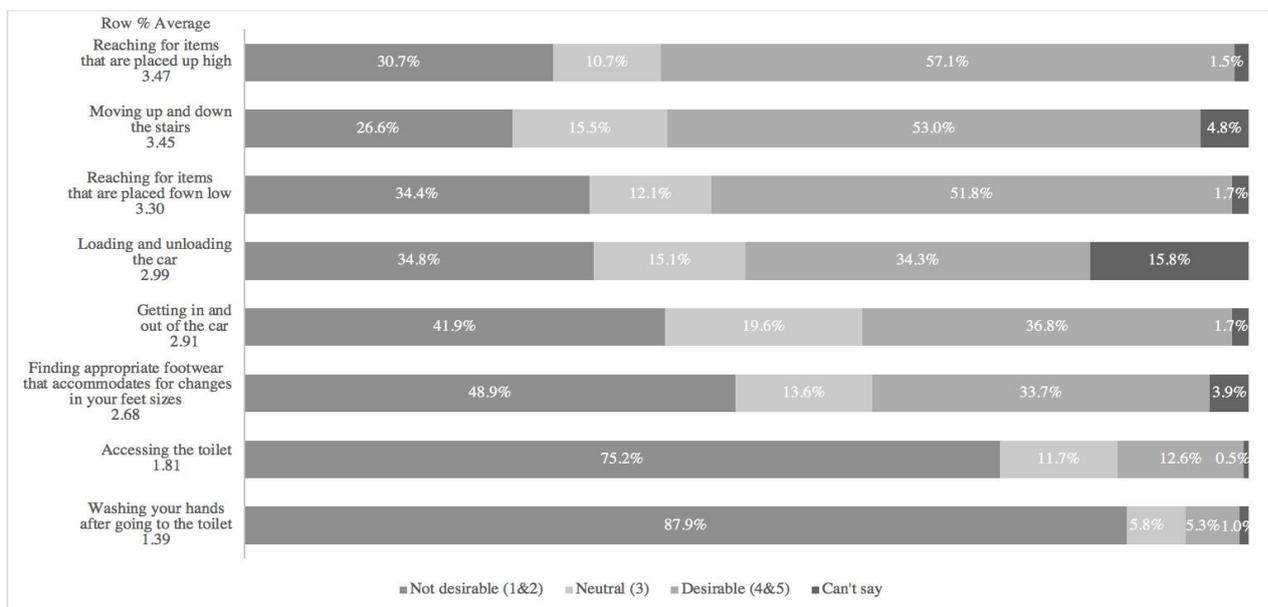


Figure 3. Difficulty of everyday tasks for Po55 using assistive technology ($n = 404$)

For participants who reported using a walker, Figure 4 represents how desirable certain features would be for them.

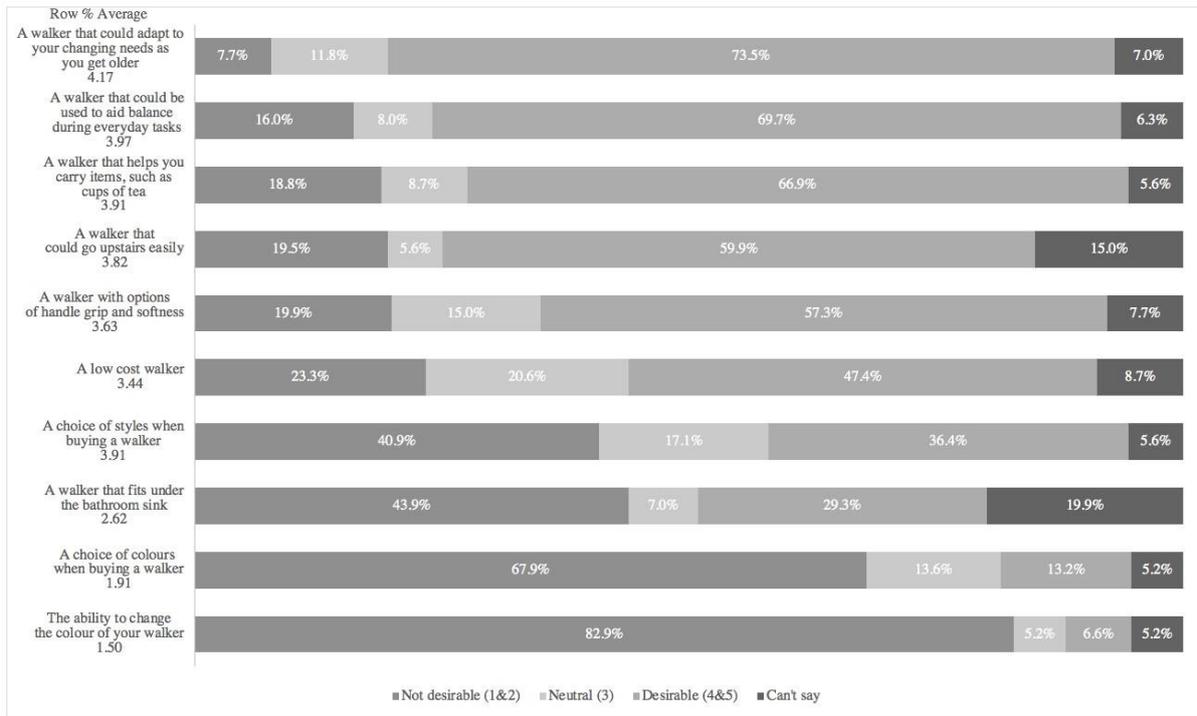


Figure 4. Desirability of walker features for Po55 (n = 148)

Similarly, Figure 5 demonstrates the desirability of walking stick features.

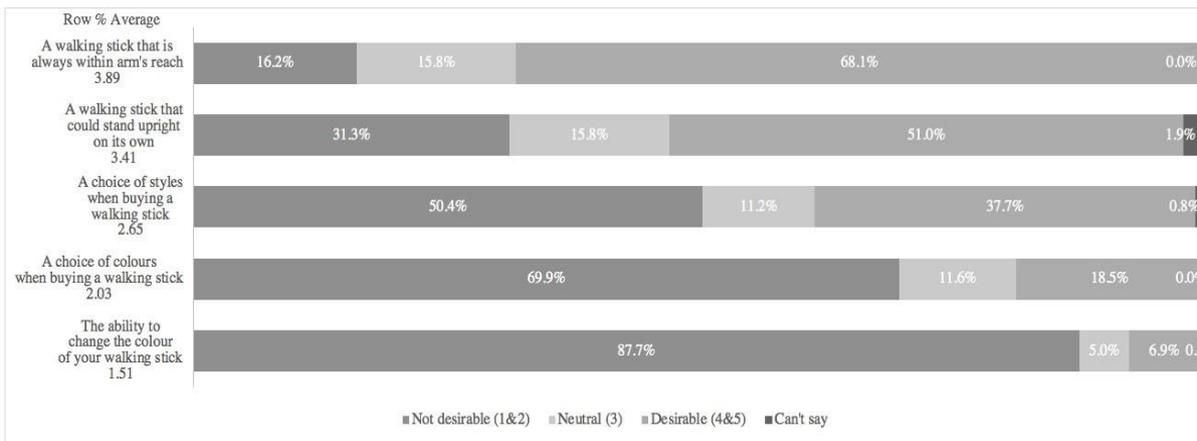


Figure 5. Desirability of walking stick features for Po55 (n = 259)

Regarding the desirability of wheelchair features, there were two features that majority of participants agreed were of great importance: the option of being able to adjust the handlebar to suit the person pushing the chair; and obtaining a low-cost wheelchair.

Discussion

This study gathered invaluable data from individuals with lived experience of mobility difficulties and their usage of AT, the support networks of those individuals, and from manufacturers of AT. Survey responses from participants with mobility issues and who use ATs, revealed difficulty with everyday tasks and the desirability of particular AT features. Common issues were revealed that should be considered when developing new devices. First, and perhaps expectantly, was *cost*. 52.7% of survey participants indicated that cost was an important consideration in their choice of AT, and most focus group participants noted cost as a barrier to accessing products. Participants recognised that, for new AT to make an impact in the everyday lives of a large number of people, cost must be kept to a minimum. Affordability of AT has been identified in other studies [23, 24].

AT transportability was a recurring problem. Focus group participants reported often forfeiting outings and being confined to their home, as AT was too difficult to load in and out of cars due to their weight, size, and awkward dimension. 75.6% of survey participants suggested that weight was an important attribute with 34.3% indicating it was difficult to load their AT in and out of the car. Ideally, any newly designed AT needs to be lightweight and compactable.

Aesthetics was also a commonly raised issue with participants reporting that they, or those they worked with, refused to use AT because of the way they looked. Negative impacts to personal image and identity were experienced, notably due to the perception of being aged and/or disabled. 24% of survey participants said the style and appearance of AT was important. For people who used walkers, 36.4% said they would like a choice of styles and 37.7% of walking stick users agreed that a choice of style would be desirable. Similarly, 46.5% of manual wheelchair users agreed it would be desirable to have a choice of styles.

Similar findings have been discussed in other studies [3, 25], where AT could actually be disabling due to the negative emotions surrounding the aesthetics of AT [11]. Resistance and negative emotions were often the outcome of ATs clinical look, a lack of colour and pattern choices because they reflected personal identity, and AT that looked similar to those used by parents and grandparents [see also 26].

Focus group findings identified difficulties encountered with ADL, even when AT were available. Over 50% of survey participants described difficulty reaching for items that were up high (57.1%) or low (51.8%) and moving up and down stairs (53%). 34.3% said loading and unloading, and getting in and out of the car was difficult (36.8%). Finding appropriate footwear to accommodate changes in feet size (33.7%) was difficult and 69.7% of survey participants who used walkers agreed it would be desirable to have a walker that could be used to aid balance.

Another common theme across focus group discussions, was the need to develop AT to promote the prevention and reduce the severity of falls. Falls are the primary cause for hip and wrist fractures and head injuries with three in ten people living independently, and one in two in long-term care, experiencing a fall every year [27]. As participants discussed the need for further developments in AT targeted at falls despite the high number of existing products.

Many of the key issues identified via focus groups and surveys are deep-seated, accepted issues of conventional AT designs. Most AT have undergone modifications over time, but according to participants, AT designs do not account for various environmental factors. Developing new AT that overcome longstanding problems would not only enhance the wellbeing of Po55, but also contribute to *“keeping down the costs to society in general”* [11, p. 336].

Given ageing populations globally, there is considerable justification and demand to expand end-user-based research into the field of AT. This paper reported on stage one and two of the Enablise project which sought to generate insight into unmet AT needs as identified by Po55 and their support networks. Results identified a range of needs relating to existing AT and ADL, and revealed the desirability of various AT features from the perspective of Po55. These results may inform the design of new products. The study has contributed to the growing body of knowledge in this area, particularly in regard to end-user engagement and valuing their lived experience to inform new product development. This research demonstrated that valuable insight into AT needs can be generated through consultation with people who have lived, informal carer, and professional experience.

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