

Empathy in the design of assistive devices for older adults: An exploratory study with Portuguese women

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Abstract: Assistive Devices (AD) aim to enhance the autonomy of their users, among whom are older adults. However, older adults often have negative feelings towards these products, such as the fear of dependence, which in turn influence their acceptance and use. These feelings can result from the use of design approaches that focus merely on users' physical abilities. This article argues for the importance of re-thinking approaches to the design of AD by focusing on a holistic and empathic view of older people. It also seeks to contribute to a richer understanding of what independence and dependence means to older people. This article describes an exploratory study with eleven older women, living in two distinct contexts in the north of Portugal – rural and urban. The qualitative data that emerged from this research were used to develop five empirical personas, to provide a readily usable and useful tool for design.

Keywords: Inclusive Design; Ageing, Stigma; Personas

1. Introduction

Population ageing is one of the great challenges of the 21st century, generating cross-cutting challenges in all sectors of society (WHO, 2021). In Portugal, it is predicted that the number of people aged 65 and over will increase significantly until 2080 (INE, 2020). Within this age group, women represent a greater proportion (21%) than men (16%) (Veloso, 2015). This creates unique and rewarding opportunities for Design.

A study by Fisk et al. (2009) concluded that over 50% of problems reported by older people could be solved through design, while a further 47% of problems could be mitigated through design. Nevertheless, older adults continue to experience the consequences of a lack of effort to understand and embrace their needs during the design process.

An example of this are Assistive Devices (AD), which ostensibly aim to support older people's independence. However, older people's attitudes show that this goal is far from being



achieved. The literature indicates that many needs are not met by AD and that feelings of stigma are a significant issue, which contribute to a reluctance in accepting and using these products (Spinelli et al., 2018). Seeking to pinpoint the main barriers to the adoption of AD by older adults, a study by Yusif et al. (2016) identified difficulty in use, feeling they are not necessary, stigma and, interestingly, fear of dependence, among others. This failure has been attributed to the use of methodologies based on a purely medical model (Bispo, 2018), resulting in products that perpetuate negative stereotypes about ageing. A sensitive understanding of ageing is still not embedded within the field of AD, despite equality and inclusion being prominent societal aspirations (Spinelli et al., 2020). Motivated by this paradox, the research described herein sought to contribute to improving the design and user experience of AD for older adults.

Gaining a holistic understanding of older adults is the way to overcome these problems (Chen, 2020; Spinelli et al., 2018; Yusif et al., 2016). Pursuant to Clarkson and Coleman (2015), good design requires thoughtful decisions throughout the process and must be based on a deep understanding of users' needs. Our aim was to understand the real needs and experiences of this population in this context, while also unpacking what independence and dependence means to them. This study is detailed in Section 3, with results reported in Section 4 and discussed in Section 5. We then developed five empirically derived personas described in Section 6, as tools to support designers in developing AD that are desirable to older adults. Section 7 concludes the paper, summarizing our contributions. We begin with a review of available perspectives on dependence and independence for older adults, in the following section.

2. Related work

Remaining independent for as long as possible is assumed as a key goal for people as they get older. The use of AD, which purport but seemingly fail to foster feelings of independence in older adults, offer a context in which to explore what independence means to these users. A chapter in Clarkson et al. (2013), written by Marion Bieber, provides a personal account of the challenges faced by an octogenarian and how these influenced their independence in performing instrumental activities of daily living (IADL), such as getting dressed, bathing, reading, writing and using transport. Although this association is indisputable, the concept of independence appears to be more complex.

Secker et al. (2003) critique the fact that independence and dependence are often viewed as opposites, where one is seen as the absence of the other. These authors found that older people can seek help from others without that negatively influencing their feeling of independence. Independence appears to be highly subjective, influenced by factors such as choice, social utility, and autonomy. It is also highly variable, influenced by time and lived experiences (Secker et al., 2003). In a study by Ball et al. (2004), the participants did not consider themselves dependent or independent, revealing that these feelings varied across areas of their lives, that they were subject to change according to different factors, and that

independence can be redefined over time. Based on this, Rabiee (2013) conducted a study with 50 older people and people with disabilities, which explored the relationship between choices made and subjective feelings of independence. The results indicated that independence is highly conditional, relative, and subjective, demonstrating that for some people it may mean the ability to do tasks alone and for others it may mean being in control of their lives and feeling able to make their own decisions.

Other similar studies (Hillcoat-Nalletamby, 2014; Plath, 2008; Schwanen et al., 2012) demonstrated the multidimensional nature of the concept of independence, which comprises physical and psychological elements. Plath (2008) conducted a study in Australia and identified five predominant discourses about independence in people over the age of 65. Being self-sufficient, influenced by physical and mental capacity, being able to make decisions, and having personal and external resources were the most cited examples. Others included social status and self-esteem, fostered by social relationships. A larger scale study sought patterns of meaning of independence for older people in three different contexts, in order to find differences and similarities in interpretations (Hillcoat-Nalletamby, 2014). Accepting available help, doing tasks alone, having resources (financial, family, friends), and maintaining physical and mental health, influenced by the desire to remain self-sufficient, one's own identity, confidence, ability to decide and choose were common interpretations of independence in the three contexts.

Another pertinent issue are the coping strategies used by older people to promote independence. Gignac et al. (2000) investigated the adaptations used by older people and their relationship with feelings of independence. The results revealed that they were actively using a variety of adaptations – namely selection, optimization, compensation and help from other people – in ADL and IADL. Surprisingly, these adaptations had a negative impact on older people's feelings of independence. In some cases, the authors found that the adaptation strategies used did not have this effect, yet no positive results were reported.

3. Methods

3.1 Participants

Participant recruitment focused on people aged 65 and over, with one or more long-term health conditions, and who had experience of using AD. The sample purposely included those who lived in rural and urban contexts. Participants were recruited through known networks and, subsequently, through snowball sampling. Although women were not exclusively the focus of this research, it was only women who expressed an interest in participating and who met the study criteria (one man responded to our invitation but did not meet all study requirements). In total, eleven women aged 66 to 89 participated in this study. Their main characteristics are described in Table 1, using pseudonyms.

Table 1 Summary of participant characteristics.

Pseudonym	Age	Employment	Marital status	Living arrangements	Health conditions
Lúcia	84	Nurse (Retired)	Widowed	Urban context Living with children	Parkinson's disease
Júlia	89	Teacher (Retired)	Widowed	Urban context Living with grandchildren and nephews, in her home	Polymyalgia rheu- matica (PMR)
Isaura	78	Teacher (Retired)	Married	Urban context Living with husband	Arthrosis Osteoporosis Lupus Hip necrosis
Laura	84	Homemaker	Widowed	Urban context Living with daughter	Arthrosis
Ester	70	Homemaker	Married	Rural context Living with husband	Herniated disc Arthrosis
Alice	83	Homemaker	Widowed	Rural context Living with son	Osteoporosis
Glória	84	Homemaker	Widowed	Rural context Living with daughter and grandchildren	Previous stroke Arthrosis
Fátima	66	Homemaker	Widowed	Rural context Living alone	Arthrosis
Ana	67	Homemaker	Married	Rural context Living with husband	Arthrosis
Filomena	72	Homemaker	Divorced	Rural context Living alone	Osteophytosis Arthrosis
Madalena	68	Homemaker	Widowed	Rural context Living alone	Arthrosis

3.2 Data collection

This study had an exploratory purpose and followed User-Centred Design (UCD) recommendations (ISO 9241-210, 2019), using a combination of two methods to obtain rich qualitative

data. Data collection comprised two stages. First, we used cultural probes. This is a technique pioneered by Gaver et al. (1999), which has been used to gain empathy with participants in order to explore new design opportunities (Mattelmäki, 2006). Sleswijk Visser (2009) notes that this method can help generate a holistic view of human experiences. Our probe kit included activities inspired Burrows (2013) and Burrows et al. (2015), and was informed by the insights provided by Thoring et al. (2013). After a pilot study, the final probe kit comprised three activities, designed to be accessible, to allow participants to express themselves freely and decide in which order to carry out the activities (Figure 1).



Figure 1 Overview of the final probe kit. From left to right, this picture shows a letter of thanks for participating in the study, pens and pencils for completing the activities, the three activities, the explanatory sheet, a tote bag and an A4 envelope where the activities were kept.

The first activity invited participants to reflect on the meanings they attributed to independence and dependence. The second activity intended to allow participants to share details about their health and physical conditions, and to facilitate subsequent conversations on this topic. The third activity involved various questions about ADL and feelings of independence and dependence, which could be documented through photographs or another form of recording.

The second stage of data collection comprised a semi-structured interview, with each participant in their own home. This interview was conducted after the completed probe kits were returned and the researcher had familiarized herself with the responses generated. Further

details on the procedure and interview questions can be freely accessed at: [<http://repositorium.sdum.uminho.pt/handle/1822/75774>]. The interview allowed probe responses to be discussed, to better understand them, and to further explore the issues raised.

3.3 Data analysis

All materials were photographed and transcribed, as appropriate, and pseudonyms were assigned. The data were analysed thematically (Braun & Clarke, 2006) through an affinity diagram, using Lucidchart. While most of the codes were generated inductively, some a priori ones were assigned in line with the study objectives. Data analysis meetings were held with all authors to arrive at the final themes, which are described in the following section.

4. Findings

Three main themes emerged across all identified sub-themes. 'Factors that promote feelings of independence' and 'Factors that promote feelings of dependence' were identified a priori, and the theme 'Neutral factors' was generated inductively. Figure 2 provides a map of the identified themes and sub-themes, detailed below and illustrated with participant quotes translated from Portuguese by the authors.

Factors that promote:	Perform tasks alone	Receiving help	Help other people	Difficulties in performing tasks	Do it less often	Stopped doing	Coping strategies
							Perform leisure activities
INDEPENDENCE	X		X				X
NEUTRAL	X	X	X	X	X		
DEPENDENCE		X		X	X	X	

Factors that promote:	Coping strategies					
	Perform activities for the community/others	Adaptations with common consumer products	Exercise the body	Protective strategy to avoid pain or discomfort	Modify the task	Plan the task to avoid problems
INDEPENDENCE	X	X	X			X
NEUTRAL				X	X	X
DEPENDENCE						

Factors that promote:	Coping strategies						
	Manage the completion of tasks	Use rest periods	Adapt the house	Use AD	Resort to services	Use technology to communicate	Reciprocal actions
INDEPENDENCE	X	X	X	X	X	X	X
NEUTRAL				X	X	X	
DEPENDENCE				X			

Figure 2 Thematic map. The a priori themes are in light grey, and the inductive themes are in darker grey.

4.1 Factors that promote feelings of independence

Performing tasks alone created feelings of independence in all participants. Self-care tasks evoked a greater preference for being performed alone, regardless of age or other demographic factors. This was noted even when this task implied a lot of effort and there were risks involved:

“I’m very dependent and it’s very good when I can get up on my own [...] but then my arms and legs hurt a lot... from making an effort. [...] I get up every night. And at night to go to the bathroom and come back... that’s how I fell [laughs].” (Lúcia, interview)

Promoting autonomy and confidence were the main benefits, but maintaining one’s sense of self, having a sense of accomplishment, maintaining freedom and control, and avoiding being a burden to others were also associated with the desire to carry out ADL alone.

Helping others also had several benefits, such as increasing self-esteem, minimizing the feeling of being a burden, encouraging learning and socializing, and maintaining one’s sense of

self and purpose. The tasks that participants said they liked to help others with – which included helping with planting in the garden, and teaching or helping with household chores – differed according to the type of benefit they sought to obtain. The results suggested that participants with greater physical limitations were more willing and eager to help others, compared to participants whose physical condition was less affected.

Participants revealed a high degree of resilience, demonstrated through the various efforts they made to generate coping strategies. All participants used some coping strategy, albeit in different levels, and these were very diverse. The type of strategy was influenced by the meanings attributed to independence and included optimization and compensation strategies (see Figure 2). For example, one participant enjoyed doing crossword puzzles and word puzzles for the purpose of preserving her mental abilities. Another participant spent most of her days making blankets to donate to a parish near where she lived and was able, which helped to promote her self-esteem and social position:

“I make these blankets for the parish, which donate them to poor children who are born in São João [hospital], in the maternity ward. [...] I feel that I am doing good for myself and for others. [...] I feel that I'm useful.” (Laura, interview)

Only one participant showed a low level of resilience and, therefore, fewer coping strategies were used. Interestingly, she was the participant who least reported feelings of independence.

4.2 Neutral factors

Some behaviours mentioned by the participants did not interfere with feelings of independence and dependence, showing that situations that might apparently cause dependence did not necessarily generate this feeling at an individual level. For example, in some cases, receiving help did not promote feelings of dependence. More efficiency in the task, help offered and help available if needed were some of the reasons given. One participant always had someone with her for safety and as a precaution, particularly when she went outside to garden, as she had already experienced dangerous situations. In this case, receiving help did not mean using it and allowed the task to be carried out. Other important attributes to inhibiting feelings of dependence were feeling in control and having power, spousal support, and the ability to decide and choose:

“I have the good sense to know the help I need and to know to use it... [laughs] [...] I have a solution for the situation.” (Isaura, interview)

In some cases, helping other people did not create feelings of independence, because they were able to experience feelings that promoted independence in other ways, so helping others was not so important. Two participants reported difficulty performing tasks due to their physical condition, but they still continued to perform them in the same way. This inhibited feelings of dependence, even when there was more effort involved. A lack of motivation to perform tasks and personal preferences were perceived as psychological factors that could supersede other factors. Doing tasks less frequently was mentioned by two participants who

indicated that this did not promote feelings of dependence, as was it had with other participants. One such participant, when asked how she felt about cooking less frequently, said:

“Oh, I cope well. I cope well. I have never liked cooking.” (Júlia, interview)

Some coping strategies were shown to not promote feelings of independence but served to neutralize feelings of dependence. These included protection strategies, task planning and management, and using services and resources to compensate for physical abilities. One participant stated that she read a lot and used to take notes on what she read by hand. The examples showed that psychological factors can be more important than physical factors.

4.3 Factors that promote feelings of dependence

All participants reported difficulty in performing some tasks, even though on different scales, and this revealed differences in behaviour. Younger participants, who were more active in household chores, were more likely to value autonomy and demonstrated persistence. For participants with a more limited physical condition, less positive attitudes were shown even for basic tasks, owing to the loss of personal identity. Still, they focused on and valued what they still managed to do:

“We have limitations, but we have skills. I can still read, talk, call people... catch up with my daughters, [...] grandchildren, great-grandchildren and find out what’s going on... call people on their birthday... communicate.” (Júlia, interview)

Older participants reported performing tasks less frequently due to physical conditions and their home environment. The latter was only mentioned by participants who lived in a rural context. One participant explained the impact that moving to her children’s home had on her, although she had adapted and focused on the positives. Activities that participants stopped doing included household chores and manual hobbies. More notable events were mentioned by two participants. This included not driving, which was associated with a loss of freedom.

The Covid-19 pandemic introduced additional barriers. Participants from the rural context valued activities that involved interaction and socialization more compared to participants from the urban context. This loss affected their sense of purpose and belonging, and also their freedom. In more extreme cases, it led to increased loneliness and boredom. Attributes that prevailed in the participants from rural contexts, regardless of age, were frailty and sadness for not being able to do things as before, including household tasks. Participants from urban contexts had a more positive attitude. The variation in psychological attributes, which had implications for feelings of dependence, could be explained by personal experience and life context.

When receiving help, whoever gave the help mattered only in situations where receiving help had an impact on participants’ feelings of independence. One participant did not want to accept help from a friend, preferring help from her daughters. Familiarity with those who provided help influenced the participants’ choices, alleviating feelings of dependence:

“The other day when I went to change the beds and my husband didn’t help, I told a neighbour and she said straight away that she would come help me if I had asked, but it’s hard for me to ask. [...] I like being independent. If I do it, I’m more satisfied [...] in relation to outsiders. When my daughters are here, there’s no problem [...]” (Ana, interview)

Older participants were more positive in this regard, showing acceptance, humbleness, and an overcoming attitude. Having a positive outlook was more difficult when it came to intimate self-care activities. Knowing that help was willingly given minimized the feeling of being a burden.

4.4 Use of AD as a coping strategy

We intentionally did not reference AD in the probe kits to elicit genuine responses about them if they were mentioned. One participant mentioned examples in the probes that involved using AD and another mentioned it spontaneously during the interview. AD were used by older participants, who had more limited physical conditions. Participants who had more AD had better socioeconomic conditions. However, this was not the main factor for others, with different conditions, to not use AD. Three participants said that using AD promoted their independence, safety, and mobility, because they encouraged physical independence.

AD that had benefits other than physical ones were favoured by participants. One participant stated that an adjustable armchair was her favourite product because it encouraged socialization and a sense of belonging, psychological attributes that the participant valued. It also created a sense of control and choice, because she was able to adjust the armchair through its remote control:

“When I’m really tired, I can be here, I don’t need go to bed and I can be here with everyone [...], continue the conversation or watch a news programme and comment on that news programme with others. If not, I would have to go to my room [...] and be alone.” (Júlia, interview)

Even when the benefits of AD were acknowledged, the participants preferred to use everyday consumer products whenever possible. AD benefits were only recognized after they were acquired and used. Stigma inhibited the participants from wanting to purchase the products and family played a key role in acquiring the AD. Most participants felt that using AD promoted or would promote the feeling of dependence. Some had AD, but rarely used them and others didn’t have any at all. The reasons given here were perceived lack of need, perceived lack of safety, poor functionality, and ergonomic aspects of the product. The stigma associated with AD was an element present in the speeches of many participants:

“I do need crutches, but I haven’t bought any yet because what are people going to think when they see me with them!” (Filomena, interview)

One participant who did not yet use AD, kept some at home and stated that they would not promote dependence. However, her responses suggested negative connotations associated with the use of AD. The examples shared throughout the study reinforced the association

between AD and the idea of physical decline and dependence, which is why participants tended to prefer other solutions such as everyday consumer products, family help, or resorting to surgery and physiotherapy. One participant highlighted that AD promote physical independence, but generally neglect psychological aspects also associated with independence:

“They always have an affect [on my feelings of dependence]... If I need them... But it’s for the sake of my independence [laughs]. It means I don’t need to call someone.”
(Júlia, interview)

5. Discussion

Independence and dependence were explored from older people’s point of view. As far as we know, this is the first study to focus specifically on Portuguese women, over 65 years old, from rural and urban contexts, thus contributing a unique perspective to extant literature. Overall, the results confirmed the findings of Plath (2008) that the ability to perform IADL by themselves is crucial for older women. However, we identified other interpretations of independence and dependence, such as freedom, control, and choice, which reflect the multidimensional nature of these concepts and demonstrate that psychological factors play a significant role (Ball et al., 2004; Hillcoat-Nalletamby, 2014; Plath, 2008; Rabiee, 2013; Schwanen et al., 2012).

These concepts were not absolute and so both could be experienced to different degrees. Older women who felt more dependent in one area of life could feel more independent in another, in line with Rabiee (2013). Supporting the findings of Secker et al. (2003), independence and dependence among our participants were highly subjective, influenced by psychological and, to a lesser extent, social factors. We also found that these feelings could vary over time (Ball et al., 2004; Rabiee, 2013). Younger participants, with fewer physical limitations, tended to value their autonomy and ability to do everything by themselves. On the other hand, older participants with a more limited physical condition redirected their focus towards what they were still able to do. Thus, being able to make decisions, having control and power, having self-esteem and social status became important aspects for maintaining feelings of independence. External factors, such as the Covid-19 pandemic, may influence feelings of independence even if things appear unchanged.

Resilience was a strong theme, regardless of other factors (MacLeod et al., 2016; Siltanen et al., 2020), which was apparent in the number of coping strategies used. This study confirmed that using coping strategies had positive effects for the women in the study, contrary to Gignac et al. (2000). The reasons for this difference were not evident in this study, but it is likely that life experience had some influence. AD were the only coping strategy that created feelings of dependence for most participants, in concurrence with Yusif (2016). This confirmed that even though AD may offer benefits related to mobility, in general they ignore and compromise other benefits (Chen, 2020). Based on our findings, we argue that psychological factors are extremely important for older women’s feelings of independence.

The results reported have important implications for AD design. Our study demonstrated the importance of rigorously understanding the concepts of independence and dependence, allowing designers to incorporate and manipulate relevant features to improve the user experience of their target audience. The benefits sought from coping strategies can be useful to inform better ways of overcoming emotional barriers to the use of AD and support more desirable and inclusive solutions.

6. Personas

Personas are archetypal representations of users that can be used within a UCD process (Maguire, 2001). They are frequently used as a tool to generate empathy with diverse users, communicating their everyday experiences and needs in a manageable format. But a lack of a solid empirical basis and of consistent development techniques can raise questions about the reliability and usefulness of using this tool (Fuglerud et al., 2020; Portigal, 2008). To avoid such pitfalls, we applied the persona development method developed by Goodwin (2009) to systematically and transparently translate the findings from our study.

6.1 Persona development

Seventeen behavioural attributes were derived from our study results (see Figure 2, Section 4). These behavioural attributes are listed in Table 2.

Table 2 Connection between the behavioural attributes used to develop the personas and the themes arising from the data analysis.

Behavioural attributes	Study subthemes and themes
Amount of AD they own Frequency of use of AD Benefits of using AD Feelings of independence using AD Motivation to acquire the AD they own	Use AD – Coping strategies
Frequency of performing daily tasks themselves Motivation to perform daily tasks themselves	Perform tasks alone (Factors that promote feelings of independence)
Frequency of help with daily tasks Attitude towards the need for help	Receiving help (Neutral factors & Factors that promote feelings of dependence)
Motivation to help other people	Help other people (Neutral factors & Factors that promote feelings of dependence)

Level of difficulty in daily tasks	Difficulties in performing tasks (Factors that promote feelings of dependence)
Number of daily tasks that are done less frequently	Do it less often (Factors that promote feelings of dependence)
Number of daily tasks that left to do Attitude to changes daily routine	Stopped doing (Factors that promote feelings of dependence)
Resilient attitude to promote independence	Coping strategies (Neutral factors & Factors that promote feelings of dependence)
Self-perception of level of independence	Based on all data analysis

We represented these attributes as continua between two opposing values. We added the participants to these continua one by one, using blue for women from a rural context and red for women from an urban context. This process allowed behavioural patterns to be identified, in a visual and iterative way. We identified strong patterns with continuous circles and more tenuous patterns with dotted circles, as shown in Figure 3. Two or more participants appearing close together on at least six variables were indicative of a pattern, but outliers were considered equally interesting as they can help ensure a wider range of users are considered (Goodwin, 2009).

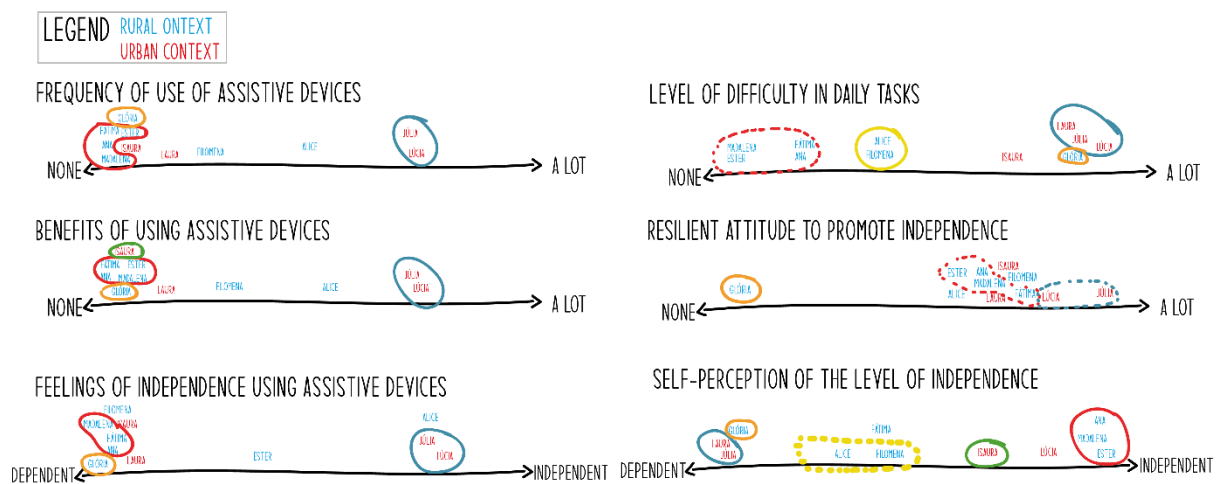


Figure 3 Mapping participants along the behavioural attributes.

Three significant patterns and two outliers emerged. We defined each persona's goals, in line with the focus of this study, and included other characteristics of interest, such as age and physical condition. We then developed the material for communicating the personas and their respective narratives, as shown in Figure 4.



Figure 4 One example of the personas developed.

6.2 Five empirical personas for designing AD

We developed five empirically derived personas in total. Table 3 summarises the main characteristics of the remaining four personas, in addition to the one presented in Figure 4. All five personas can be freely accessed at: [<http://repositorium.sdum.uminho.pt/handle/1822/75774>].

Table 3 Summary of the remaining persona characteristics.

<p>Maria Fernandes 85 years old Had a stroke and has osteoporosis and arthrosis Rural context</p>	<p>Factors that promote feelings of independence Maintaining autonomy Maintaining her own identity Motivation for using AD She used her walking stick when she meets her friends. Her walking stick supported her on the way to the bus stop. Without it, she couldn't go out safely. Barriers to using AD She no longer feels safe, even when using the walking stick. She gets a lot of pain in her feet.</p>
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She felt sad when using it, so she decided not to use it anymore.

Rosa Matos

64 years old

Has a hernia and arthrosis

Rural context

Factors that promote feelings of independence

Maintaining autonomy

Maintaining feelings of freedom and control

Ability to make decisions

Maintaining her own identity

Motivation for using AD

She had surgery on her knee and needed to use crutches to move around.

She's been through very tough things in life, so if necessary, she'll use AD.

Prefers to use AD rather than one day be completely unable to do anything.

Barriers to using AD

She feels she doesn't need AD yet.

She finds it hard to walk down the path to catch the bus, but she takes it slower and more carefully. She prefers this approach.

She doesn't want to use AD because she fears they will affect her independence.

Elisa Gonçalves

75 years old

Has osteoporosis and osteophytosis

Rural context

Factors that promote feelings of independence

Maintaining feelings of freedom and control

Ability to make decisions

Maintaining her own identity

Maintaining a sense of purpose

Maintaining a feeling of belonging

Focusing on and valuing what she is still able to do

Motivation for using AD

She used her walking stick when taking long walks through various cities across the country.

Now she only uses it to walk the dogs.

She feels safer.

Barriers to using AD

She is thinking of buying crutches, but she is worried about what people will think of her when they see her using them.

She hopes to have surgery and to get better.

Teresa Lima

77 years old

Has lupus, osteoporosis and arthrosis

Urban context

Factors that promote feelings of independence

Maintaining feelings of freedom and control

Ability to make decisions

Maintaining her own identity

Focusing on and valuing what she is still able to do

Motivation for using AD

She would be able to walk alone, without fear of falling.

Her husband encourages her to buy a walking stick, so she would be able to walk alone in the street.

If she didn't have her husband, she would have to buy one.

Barriers to using AD

She feels that her husband is her "walking stick" and therefore she does not feel the need to use AD.

When she has difficulty with a task, she prefers to use everyday consumer products to support her.

She feels there is stigma attached to people who use AD and doesn't want to be seen that way.

She hopes to have surgery on her hip and to not need AD afterwards.

7. Conclusion

This article offers insights into the feelings of independence and dependence of older women in Portugal in relation to AD and their role in ADL. The combination of cultural probes and follow-up interviews was particularly effective in achieving rich, user-sensitive data and enhancing empathy between the researcher and participants. It is important to communicate these results in a manageable and useful format, so we developed five empirically derived personas. Design and development teams do not always have the resources to conduct such in-depth research. We therefore offer these personas as a tool to inform the design of desirable and inclusive AD solutions. Furthermore, in the context of the ongoing Covid-19 pandemic, personas are a safe way to gain empathy for a population that may be particularly vulnerable but who must nevertheless be considered throughout the design process. Building on this work, we see great opportunity to develop a design toolkit where these personas are used in conjunction with specific examples of AD and use case scenarios, to inform a more empathic approach to designing desirable AD for older people.

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