Barriers and Facilitators to Mobile Phone Use for People with Aphasia

Carole-Ann Greig, Renée Harper, Tanya Hirst, Tami Howe, and Bronwyn Davidson

Purpose: Mobile phone use increases social participation. People with the communication disorder of aphasia are disadvantaged in the use of information and communication technology such as mobile phones and are reported to be more socially isolated than their peers. The World Health Organization's International Classification of Functioning, Disability and Health provides a framework to address the impact of environmental factors on individual participation. The aim of this preliminary study was to identify the barriers and facilitators to mobile phone use for people with aphasia. **Method:** A qualitative descriptive study involving two phases was conducted: (1) semi-structured interviews with 6 individuals with aphasia who owned or expressed a desire to own a mobile phone; (2) structured observations of key scenarios identified in the interviews of 3 participants who were sampled from the interview study. **Results:** Results identified 18 barriers and 9 facilitators to mobile phone use. Key barriers and facilitators were identified in the areas of design and features, written support and training, and communicative partners. **Conclusion:** Mobile phone use can be problematic for people with aphasia. Intervention needs to address the barriers and utilise the facilitators to mobile phone use for this population. Further research is required to inform policy and intervention programs to ensure that people with aphasia have access to this technology. **Key words:** *aphasia, barriers, cell phone, facilitators, ICF, mobile phone, technology*

"It's [learning to use a mobile phone] something that we really have to do because …the way that the world's going …technology is just going so much ahead."

—Interview study participant with aphasia

Information and communication technology (ICT) is rapidly becoming fundamental to everyday life. Moreover, the United Nations has declared that ICT usage is critical in the development of international economic and social rights.[1] Mobile phones, one form of ICT, have become an essential part of communication in the 21st century, with worldwide usage currently estimated to be around 2.5 billion people.[2] Mobile phones are now used for leisure, business, and social networking,[3] and the technology has infiltrated all age groups, from preadolescents[4] to older people.[5] However, a "digital divide"[6] exists between those who use mobile phones and those who do not. Aphasia is a communication disability, which results in difficulties in auditory comprehension, verbal expression, reading, and/or writing and often impacts negatively on a person's social communication. Adults with aphasia are therefore likely to be disadvantaged in their use of mobile phone technology.

Mobile phones play an important role in everyday life participation in two key areas. First, mobile phone use can facilitate social participation.[3] Wei and Lo[3] found that Taiwanese students used their mobile phones to create and maintain social networks. Furthermore, in a large-scale study by

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Mann and colleagues,[5] 67% of older people with impairments who were regular users of mobile phones reported that they used their phones to contact family, while 47% indicated that they used the phones to contact friends. These findings are important for people with aphasia because the presence of this communication disorder has been reported to negatively affect social activities,[7–9] relationships with other people,[10] and social support networks.[9] Second, mobile phones play an important role in emergencies for older adults with impairments. Eighty-six percent of older mobile phone users who had impairments[5] and 76.9% of adult mobile phone users with intellectual disabilities[11] reported that they used their mobile phones mostly for emergencies. Some individuals with aphasia and their family members may feel it is safer for the person with aphasia to participate in his or her community independently, if the individual has and can use a mobile phone in the case of an emergency.

Identifying the barriers and facilitators that influence mobile phone usage for people with aphasia is an important first step in ensuring access to mobile phones for this population. The World Health Organization's International Classification of Functioning, Disability and Health (ICF)[12] provides a framework that can be used to describe how everyday activities and participation involving mobile phones can be affected by a health condition such as aphasia. The ICF conceptualises disability as a complex interaction between a person's health condition, personal factors, and environmental factors. According to the ICF, environmental factors "make up the physical, social, and attitudinal environment in which people live and conduct their lives."[12(p10)] Negative environmental factors, or barriers, can hinder participation for individuals with aphasia, while the presence of positive environmental factors, or facilitators, can support participation.[13–15]

To our knowledge, no study has specifically examined barriers and facilitators to mobile phone use for people with aphasia, although some investigations have examined environmental factors that influence mobile phone use in people with other disabilities. Mann et al.[5] found that a key barrier to mobile phone use for older people with a variety of impairments was the device being too complicated or confusing. Similarly, individuals with intellectual disabilities have reported that the device being too difficult to use was a barrier to mobile phone use.[11] In another investigation, individuals with visual or upper limb impairments identified several facilitators to mobile phone use such as having product information in different media formats and mobile phones with limited features.[16]

In addition to these studies involving mobile phone use, a few studies have identified some barriers to general telephone use in people with aphasia. For example, Ashton et al.[15] found that using a phone to book a taxi was a barrier to public transport use for people with aphasia, while Howe, Worrall, and Hickson[14] reported that recorded telephone messages were a barrier to community participation for individuals with aphasia.

Mobile phone use may aid the social participation of people with aphasia. A number of studies have examined barriers and facilitators to mobile phone use in people with disorders other than aphasia. Even though some parallels may be drawn between these groups and the aphasia population, specific research into barriers and facilitators to mobile phone use by people with aphasia is required. The aims of the current study were to identify the barriers and facilitators to mobile phone use for people with aphasia.

Method

A qualitative descriptive research strategy was chosen as it allowed for an in-depth, exploratory, and detailed study of the everyday mobile phone activities of the participants.[17] The investigation involved two phases with two complementary data collection methods: (1) semi-structured qualitative interviews, and (2) structured observations of people with aphasia using a mobile phone in situations derived from the interviews. By utilising two complimentary data collection methods, methods triangulation[18] was achieved, with the observation phase confirming many of the barriers and facilitators personally reported in the interviews.

Phase 1

Semi-structured interviews were selected as the initial data collection method, because this allowed for the investigation of specific areas of

interest while providing the flexibility to pursue individual participant contributions[19] and to probe further for information. This approach also allowed for the clarification of responses, an important point when interviewing people who have communication difficulties.

A review of the literature identified key areas of interest in mobile phone use and a topic guide was constructed to investigate these areas.[18] Open-ended probe questions were developed according to recommended guidelines for the development of descriptive questions.[20] The topic guide for participants who used mobile phones included the following: experiences of using a mobile phone since onset of aphasia/prior to onset of aphasia, barriers to using a mobile phone since onset of aphasia/prior to onset of aphasia, and facilitators for using a mobile phone since onset of aphasia/ prior to onset of aphasia. The topic guide for participants who did not have a mobile phone after or prior to the onset of aphasia included the identification of barriers to and reasons for not having a mobile phone.

Participants

Six participants were recruited through the Aphasia Registry, a database of volunteer research participants with aphasia maintained by The University of Queensland. Potential participants were sent an information sheet formatted in an aphasia-friendly manner, which outlined the project details using large text, simplified language, and pictorial aids.[21] Participants then attended an initial session where demographic data were collected, the project was discussed with the aid of the information sheet, and consent was gained following recommended practices for obtaining consent from individuals with aphasia.[22] The eligibility criteria for the study were that the participants had had aphasia for at least 2 months and it was their main communication impairment, resided in the community or in an independent retirement residence, had the ability to participate in a semi-structured interview as judged by an experienced speech-language pathologist and/ or self-report, and were currently using or had interest in using a mobile phone.

Maximum variation sampling, involving purposefully selecting a wide range of variability on characteristics of particular interest in order to maximize the variation in a small sample, was used in this study.[18] Variation was sought for the following variables: gender, severity of the language impairment as indicated on the Australian Therapy Outcome Measures (AusTOMs)[23] Language Scale, and experience of mobile phone use prior to onset of aphasia. Participant characteristics are summarised in **Table 1**.

Table 1. Participant characteristics for both phases

		Number of participants	
		Phase 1. Semi-structured interview (*n*=6)	**Phase 2. Structured observation (*n*=3)**
Aphasia impairment severity	2	1	1
(AusTOMs Language scale 0 = *profound* to 5 =	2.5	3	0
none)	3	1	1
	4	1	1
Gender	Male	3	2
	Female	3	1
Experience of mobile phone use prior to	No/minimal experience	2	0
onset of aphasia	Experience	4	3
Age	<40	1	1
	<60	1	1
	60–70	4	1
Years post onset	1–3	1	0
	4–6	2	1
	7–9	3	2

Procedure

Semi-structured interviews were conducted in the participants' homes, with a principle interviewer and one observer, and were recorded on a digital voice recorder (Panasonic IC Recorder, Model No. RR-US380). A "communication book" incorporating pictures of items related to mobile phone use was developed and made available in the interviews if the participants had difficulties expressing a particular message. The total interview time for each participant ranged from 42 to 64 minutes with a mean of 54.33 (SD 8.96). During the interview, the observer recorded field notes including environmental details, the researchers' and participant's roles and relationships, and significant nonverbal cues or emotive behaviours observed during the interview.[18] The interviews were transcribed verbatim based on the conventions outlined by Poland.[24]

Analysis

Interview transcripts and field notes were analysed using qualitative content analysis based on the steps described by Graneheim and Lundman.[25] Transcripts and field notes were read multiple times before the data were divided into three broad content areas: content involving mobile phone use barriers and facilitators (e.g., "...the predictive... that's really good"); content involving personal factors relevant to mobile phone use (e.g., "I want to [make phone calls]…but…I'm scared that people won't understand me"); and other content that did not refer to something that helped or hindered mobile phone use (e.g., "Melbourne temperature was…[hotter than] more than Brisbane"). The other content area was not analysed further.

Data were then divided into meaning units or "words, sentences, or paragraphs containing aspects related to each other through their content and context." [25(p106)] Meaning units were then condensed while the core meaning was maintained. Subsequently, meaning units were grouped together into codes that were closely related and then labelled (e.g., "smallness of mobile phone buttons" as a barrier). Groups of codes that shared common descriptive content

were then grouped together into categories (e.g., the codes "smallness of mobile phone buttons" and "smallness of screen" were grouped into the category called "barriers related to design and features").

The participant's everyday communication activities involving a mobile phone (e.g., making a phone call) were identified over the six interviews. A total of six mobile phone scenarios were identified and used as a basis for the Phase 2 structured observations.

Phase 2

Structured observations of participants' use of a mobile phone for everyday communication activities identified in Phase 1 allowed the researchers to confirm barriers and facilitators identified during the interviews and to observe additional barriers and facilitators not previously identified.

Participants

The eligibility criteria for Phase 2 participation were participation in Phase 1 and current mobile phone use. Maximum variation sampling[18] was applied to select three participants from the four who were eligible, with a representative participant from each severity level of mild, moderate, and moderate/severe language impairment.

Procedure

Observations were held in a meeting room with one researcher present throughout and a second researcher making and receiving calls/texts externally. The following six scenarios were identified as being common tasks carried out by the participants from the interviews: receiving a phone call, making a phone call, making a phone call using a pre-programmed number, receiving and responding to a text message, sending a text message, and using the phone for an emergency. Participants were asked to perform the set tasks independently and were provided with verbal cues if necessary. The participants' performance on each of the scenarios and interaction with the

external researcher, including time to respond to text messages and language used, were recorded in detailed field notes.[26] The observation schedule is listed in the Appendix.

Analysis

Qualitative content analysis[25] as described for Phase 1 was used to analyse the structured observation data. A master set of field notes including the observations of both the principle and external researchers was compiled for each participant. Field notes were read multiple times before the data were divided into two broad content areas: content involving mobile phone use barriers and facilitators (e.g., hangs up the phone by closing the flip) and content involving personal factors relevant to mobile phone use (e.g., the participant pauses when required to name the state from which she is calling). Data were divided into meaning units, which were then condensed. Related meaning units were grouped together into codes (e.g., "preprogrammed number use automatic" as a facilitator), and related codes were then grouped together into categories (e.g., "design and features").

Rigour and Reflexivity

Rigour was addressed in the study through methods triangulation in which two different data collection methods were used to address the same research aims.[18] The investigators also kept an audit trail by documenting all research decisions and observations systematically in field notes.[26] In addition, the content of the interview transcripts was peer checked against the observer's field notes and the content of the structured field notes was cross-checked between the two researchers present during each observation.

Reflexivity, or the acknowledgment of personal background influences and biases that may affect data collection and analysis, is also an important part of qualitative studies.[27] The investigators addressed the construct of reflexivity by documenting reflexive observations and initial interpretations of the data in field notes.

Results

Four personal factors affecting mobile phone use were identified. As the focus of this article is on barriers and facilitators to mobile phone use, the personal factor findings will not be presented. Analysis of the data from the two research phases identified 18 barriers to and 9 facilitators of mobile phone use for individuals with aphasia. Barriers and facilitators fell into seven categories: barriers related to design and features, barriers related to written support and training, barriers related to communication partners, other barriers, facilitators related to design and features, facilitators related to communication partners, and facilitators related to written support and training. Six barriers and two facilitators were evident in both phases, while 10 barriers and eight facilitators were only identified in the interview phase. Two barriers and one facilitator were only identified in the structured observation phase.

Barriers

A summary of the barriers in each core group is provided in **Table 2**.

Barriers related to design and features

Nine barriers relating to design and features were either reported or observed. Smallness of mobile phone buttons, smallness of screen, and long mobile phone number were reported and observed during both phases of the study. Three barriers reported during the semi-structured interview were not observed during the structured observation phase (i.e., display options in pictorial form, too many display options, and too many features available). Two barriers (i.e., similarity of steps resulting in different outcomes, and single buttons having multiple functions) were observed during the structured observation only.

Barriers related to written support and training

Three barriers were identified that related to written support and training. Inadequate written support and inadequate training in phone use were both reported during the semi-structured

Table 2.   Summary of barriers to mobile phone use for people with aphasia

Barrier description	Identified in semi-structured interviews	Identified in structured observations
Barriers related to design and features		
Smallness of mobile phone buttons: One interview participant stated, "I mean the size of it and it's a little thing."	Yes	Yes
Smallness of screen: One interview participant compared the mobile phone to the traditional telephone explaining that the larger menu images and text on the traditional telephone were easier to see.	Yes	Yes
Display options in pictorial form: One interview participant explained that she did not understand the menu symbols: "I don't know what it means. I don't…camera? Don't know what that one [pointing to picture symbol] means."	Yes	No
Long mobile phone number: Two structured observation participants took between 2 to almost 3½ minutes to enter the 10-digit mobile phone number provided.	Yes	Yes
Similarity of steps resulting in different outcomes: One structured observation participant had difficulty with the similar steps required to navigate the menu resulting in very different outcomes.	No	Yes
Single buttons having multiple functions: One structured observation participant held the "call" button for too long when making a phone call, effectively hanging up immediately.	No	Yes
Too many display options: One interview participant reported that the number of options on the screen was a barrier. She indicated that too much information was provided and that it was unclear which option was selected.	Yes	No
Too many features available: One interview participant stated, " "I thought oooh I don't know what I'm going to do with this [phone]…all of a sudden you realise there's so many functions."	Yes	No
Too many steps required to complete a phone task: All structured observation participants were observed to find the number of steps required to perform a function a barrier.	Yes	Yes
Barriers related to written support and training		
Inadequate written support: One interview participant stated, "Reading that book [manual]… is I think...you have to have a degree or something to read it."	Yes	Yes
Inadequate training in phone use: One interview participant stated, "I would like to learn how to text. I love to but I don't know how to do it."	Yes	Yes
Number and type of features available not made evident: During the interviews, a number of participants were unaware of the features available on their mobile phones.	Yes	No
Barriers related to communication partners		
Unknown communication partner: One interview participant stated, "When it's someone else [an unknown person] starts to ask questions…I get confused."	Yes	Not applicable
Other barriers		
Text language requirements: One interview participant stated, "I won't have a clue what it [the text message] says because it's all written in some weird and fancy coding…I don't know what he was saying."	Yes	Not applicable
Inadequate sound quality: One interview participant stated, "I found it hard…but I can't hardly hear people, all the time."	Yes	No
Increased complexity of task: One interview participant expressed concern over his ability to attend to the phone while attending to something else: "Then…I've got to stop the car and…you can't…be thinking one thing and doing another thing and woo it's a worry."	Yes	No
Cost (of phone and calls): One interview participant stated, "I'm on a…lowest plan…so…I don't make many [phone calls] if I don't have to."	Yes	Not applicable
Limited coverage: One interview participant stated, "When you go over to the island there's a lot of area that doesn't connect."	Yes	No

Table 3.   Summary of facilitators to mobile phone use for people with aphasia

Facilitator description	Identified in semi-structured interviews	Identified in structured observations
Facilitators related to design and features		
Function of button written on it: One interview participant stated, "[when asked what might help her use the phone] it um…it tells you [on the buttons]…things called talk, up, menu, clear."	Yes	No
One letter per button in alphabetical order: One interview participated stated, "Um…KFDF, QWERTY…I have trouble because ABCDEFG (pressing imaginary individual buttons) that would be easier for me."	Yes	No
Texting option: One interview participant stated, "I think my text with my neighbour is just…um…she's often at work and she's always doing something so [we] use it [texting] all the time."	Yes	No
Predictive texting: One interview participant stated, "It's good now, I send [heaps of texts] because I found that thing [predictive texting] on the phone."	Yes	No
Pre-programmed numbers: One interview participant stated, "Yes, find them [preprogrammed numbers] I have to go...just go like that [demonstrates use of preprogrammed number]."	Yes	Yes
Flip phone handset: One structured observation participant with a hemiparesis was able to answer and hang up her phone easily with her prestroke nondominant hand.	No	Yes
Facilitators related to written support and training		
Training benefits: One interview participant reported that previous speech therapy sessions focussing on mobile phone use had been beneficial: "[After therapy] I got it all to the stage where I can put 'em together and start using it [the mobile phone]."	Yes	Yes
Written support: One interview participant reported that written cues and images describing mobile phone use provided by a speech pathologist during therapy sessions were beneficial.	Yes	Not applicable
Facilitators related to communication partners		
Known communication partner: One interview participant reported, "It's [talking on the mobile phone] easy when you have someone who…knows what's happened with aphasia."	Yes	Not applicable

interviews and observed during the structured observations. One barrier relating to the number and type of features available not being evident was reported during interviews but was not observed during the structured observations.

Barriers related to communication partners

One barrier was reported that was related to unknown communication partners, but this scenario was not applicable during the structured observations because the participants knew the investigators.

Other barriers

Five other barriers were reported during the interviews but were either not observed or not applicable to the structured observations: text language requirements, inadequate sound quality, increased complexity of task, cost (of phone and calls), and limited coverage.

Facilitators

A summary of the facilitators in each core group is presented in **Table 3**.

Facilitators related to design and features

Six facilitators were either reported during the semi-structured interviews or observed during the structured observations. One facilitator, pre-programmed numbers, was identified both during interview and in the structured observations. One facilitator, flip phone handset, was identified only in the structured observations. Four facilitators (one letter per button in alphabetical order, texting option, predictive texting, and pre-programmed numbers) were reported during the interviews but were not observed.

Facilitators related to written support and training

Two facilitators were identified that related to written support and training. Training benefits

were both reported during the semi-structured interviews and observed during the structured observations. Written support was reported to be a facilitator during the semi-structured interviews, but observation was not possible during the structured observations.

Facilitators related to communication partner

One facilitator relating to communication partners, speaking with a known communication partner, was reported during the interview.

Discussion

The aims of this exploratory study were to identify the barriers and facilitators to mobile phone use for adults with aphasia. The study identified 18 specific barriers and 9 facilitators. Barriers and facilitators involved design and features, training and written support, and communicative partners. In addition, a few other miscellaneous barriers were reported. The following section discusses these findings in relation to the literature and examines the clinical and policy implications of these findings.

This study found that mobile phone and network design can be both barriers and facilitators to mobile phone use for people with aphasia. The small size of buttons and screens has previously been reported in the literature as a barrier to mobile phone use for older people with impairments.[5] The format of display options in pictorial form as a barrier supports the findings of Funnell and Allport,[28] who reported that the interpretation of logographic symbols utilises the same processes as natural language and that this ability may therefore be impaired in adults with aphasia. The remaining design and features barriers (i.e., long phone numbers, similarity of steps, single buttons having multiple functions, too many steps required, too many display options, too many features available, and too many steps) are all related to the complexity of the mobile phone design. This finding has previously been reported in the literature as a barrier to mobile phone use for older users[29] and people with visual and upper limb impairments.[16]

A mobile phone's texting feature was viewed as a facilitator to mobile phone use and to social participation. A desire to use texting was clearly expressed by participants with limited spoken output. Texting as a method of social interaction without speech has been enthusiastically adopted by the deaf community[30,31] and may have a significant role to play in the social participation of at least a subset of adults with aphasia, who have relatively intact reading and writing skills. The current study identified that predictive texting facilitated spelling in text message composition. This feature may prove to be a valuable tool for at least a subset of adults with aphasia who can recall the word's initial grapheme. A further finding was that text language requirements, or the common use of phonetic abbreviations in texts, was a barrier to mobile phone use. There is no current literature addressing text language and aphasia, however it is speculated that due to the common co-morbidity of aphasia and alexia[32] it may be possible that difficulty in deciphering unknown phonetic abbreviations is related to a deep or phonological dyslexia.[32] A number of other potential facilitating design features such as buttons with their function written on them and single letters per button were also identified in the study. These features have not, to the researchers' knowledge, been previously reported in the literature.

Participants in this study identified that they were unaware of many features available to them on their mobile phones. This may suggest that adults with aphasia are less likely to explore their mobile phones and teach themselves. It may also be related to a combination of factors typically found to impact negatively on adults with aphasia, for example, acquired dyslexia[33] may make comprehension of the user manual and therefore the phone functions more challenging.

The majority of participants who owned a mobile phone reported that the written phone manual was a barrier as it was not easy to comprehend. Written information was also observed to be a facilitator in one participant's use of pre-written aphasia-friendly instructions provided by a speech and language pathologist. The benefits of providing written instructions in a less complex manner has previously been raised with regard to older people

with disabilities.[5] Smith-Jackson, Nussbaum, and Mooney [16] also raised the possibility of product information provided in a number of different media. Previously discussed problems with alexia suggest that complex written manuals are not an effective means of providing product information for people with aphasia. Providing training information in an aphasia-friendly format, as reported by Rose, Worrall, and McKenna,[34] is likely to assist this population.

Inadequate training was identified as a barrier and included limited training given by family and friends and a desire for further training. Training was also reported to be a facilitator and included prior training, regular use of a particular feature, and cueing. Both lack of training as a barrier and training as a facilitator have been identified in previous research. Mann et al.[5] identified lack of training as a barrier to the use of cell phones in older adults with disabilities. It could therefore have been predicted that older adults with aphasia would also find this to be a barrier. Training as a facilitator to Internet use[35] and to emergency scenario response[36] has already been reported for people with aphasia. The implications for training programs are that a small amount of instruction, involving simple verbal cueing, may be effective in facilitating the use of mobile phones for people with aphasia and therefore in increasing their social participation and autonomy.

Communicative partners were also identified as being both barriers and facilitators to mobile phone use by people with aphasia. Talking to an unknown person on the phone was specifically stated as a barrier and talking to known communicative partners was explicitly stated to be a facilitator. This is consistent with previous studies,[37,38] which have reported that familiar communication partners increase communication participation in people with aphasia.

Clinical and policy implications

Almost half of the observed or reported barriers involved the design of the mobile phone. Many of the reported design barriers such as smallness of buttons and similarity of steps are addressed by a set of principles devised to make all products ac-

cessible for everyone—the principles of universal design.[39] The barriers reported in this research suggest that these principles, devised a decade ago, may not have made their way into mobile phone design and manufacture. The importance of product design and product information, which incorporate the needs of all consumers, needs to be brought to the attention of the relevant policy-makers and mobile phone designers.

Communicating with strangers by mobile phone was reported to be problematic for the adults in this study. Health professionals involved with this population therefore need to advocate for a greater awareness of aphasia in the general population. Positive communication outcomes following training of communication partners has previously been reported in the aphasia population.[7] Given the desire of two participants for a mobile phone to use in emergencies, training of communication partners in key areas such as emergency services is critical.

Professionals involved in aphasia treatment have long argued for a holistic approach[40] to rehabilitation. The results of this study suggest that intervention should be at multiple levels of the ICF framework. At the activity level, therapy needs to address the use of mobile phones for specific purposes, tasks, and activities, such as business transactions. Given the negative impact of aphasia on social relationships,[10, 41] intervention must also address the participation level of the ICF framework in encouraging and facilitating the use of mobile phones in people with aphasia, which may in turn assist them to participate more fully in their social community. Finally, intervention also needs to address the environmental level of the ICF framework. This study suggests that barriers such as phone design may be reduced by recommending the use of a phone with larger buttons and less complexity. Facilitators such as texting may be further enhanced by training.

Strengths, limitations, and future directions

This project was a preliminary study with a small number of participants. Future research recommendations include expansion of the number of participants and a greater diversity in the sample

population, such as including participants from a wider variety of cultural backgrounds. In addition, further research examining the most functionally effective method of mobile phone training for people with aphasia would be useful. A strength of the study was the research design. The interview phase allowed participants to communicate their uses of the mobile phone and the barriers and facilitators they experienced. The observation phase confirmed these reports as well as allowed the researchers to identify additional barriers and facilitators not previously identified by the participants during the interviews.

Conclusion

The aim of the study was to identify the barriers and facilitators to mobile phone use for people with aphasia. The research achieved this aim by identifying 18 specific barriers and 9 facilitators. The large number of barriers identified suggests that mobile phone use is truly challenging for this population. Effective outcomes of ongoing research and innovative therapies can mean that new technologies such as mobile phones become valuable tools for people with aphasia in maintaining and developing social relationships and ensuring social inclusion for people with communication disability. Findings from this preliminary study suggest ongoing research into barriers and facilitators to mobile phone use for people with aphasia is important for informing both policy and intervention programs and product/phone selection. This research will ensure that people with aphasia have equitable access to mobile technologies and effective use of mobile phones, the importance of which is emphasised by the following quote from a person with aphasia:

> A cell [mobile] phone will allow you to summon help in an emergency. The cell phone can store all the numbers (and pictures) of your family and friends. Once you learn to use the phone, you can call them without reading any words or numbers. Your cell phone can store Emergency Information – whom to call in an emergency, as well as your health and medical information…. If you have only ONE piece of technology, a cell phone is the most important.[42]

Acknowledgments

APPENDIX
Structured Observation Schedule

Scenario 1A → Receiving a phone call

- Participant will be told they will be receiving a call as part of the research.
- External researcher to phone participant and ask "how are you today?"

Task checklist	✓	Field notes
Hear phone ringing		
Locate phone		
Hold phone		
Press appropriate key to answer		
Hold phone to ear and hear		
Greet caller		
Respond to caller		
Closing statement to caller		
Hang-up the phone		

Scenario 1B → Receiving a call (with cues)

- Participant will be told they are receiving a call as part of the research.
- Interviewer will demonstrate once as needed:
  - o Key to press to answer the phone
  - o Key to press to hang up the phone
- Researcher to phone participant and ask "how are you today?"

Task checklist	✓	Field notes
Hear phone ringing		
Locate phone		
Pick up phone		
Press answer key		
Hold phone to ear		
Greet caller		
Respond to caller		
Closing statement to caller		
Hang-up the phone		

Scenario 2A → Making a phone call

- Participant will be asked to call researcher on mobile phone.
- Interviewer will provide the phone number in written format.
- Participant will be required to say that they are running late and will be there in ten minutes' time.

Task checklist	✓	Field notes
Unlock phone		
Enter number appropriately		
Press appropriate key to make call		
Greet call recipient		
Tell call recipient that they are running late but will be there in ten minutes' time		
Closing statement to call recipient		
Press appropriate key to end call		
Lock the phone		

Scenario 2B → Making a phone call (with cues)

- Participant will be asked to call researcher on mobile phone.
- Interviewer will provide the phone number in written format.
- Participant will be required to greet communication partner and state that they are running late and what time they will arrive.
- Interviewer will demonstrate once as needed:
    - o Keys to press to unlock the phone
    - o Key to press to make the call
    - o Key to press to end the call
    - o Keys to press to lock the phone

Task checklist	✓	Field notes
Unlock phone		
Enter number appropriately		
Press appropriate key to make call		
Greet call recipient		
Tell call recipient they are running late and will be there in ten minutes' time		
Closing statement to call recipient		
Press appropriate key to end call		
Lock the phone		

Scenario 3 → Making a call using pre-programmed numbers

- Interviewer to determine if pre-programmed numbers exist in phone
- Participant will be asked to show how they access pre-programmed numbers.

Task checklist	✓	Field notes
Unlock phone		
Manage menu to find pre-programmed number		
Identify appropriate key to make call		

Scenario 4 → Emergency task

- Participant will be shown a photo of somebody who has "collapsed."
- Interviewer will ask "how would you get help using your mobile phone?"
  Possible response #1:

Task checklist – family/friend	✓	Field notes
Unlock phone		
Manage menu to find pre-programmed number		
Identify appropriate key to make call		

- Interviewer will ask:
  - o What is the problem?
  - o Do you need me to call the police, fire, ambulance?
  - o Where are you?
  - o Is the person conscious?
  - o Is the person breathing?

Scenario 4 → Emergency task

Possible response #2:

Task checklist – "000" or "112"	✓	Field notes
Enter number appropriately		
Identify appropriate key to make call		

- Interviewer will ask ambulance scenario questions:
  - o What town and state are you calling from?
  - o Do you need police, fire, or ambulance?
  - o Where is the emergency?
  - o What phone number are you calling from?
  - o What is the problem? (Tell me what happened)
  - o How many are injured?
  - o Are they conscious?
  - o Are they breathing?

Scenario 5A → Receiving a text message

- Participant will be told they will be receiving a text as part of the research.
- Researcher to text participant and ask "have you finished the research?"
- Participant will be asked to respond appropriately.

Task checklist	✓	Field notes:
Hear message alert		
Locate phone		
Hold phone		
Unlock phone		
Manage menu to open text message		
Read message		
Manage menu to respond to message		
Enter message appropriately		
Manage menu to send message		
Manage menu to return to main screen		
Lock phone		

Scenario 5B → Receiving a text message (with cues)

- Participant will be told they will be receiving a text as part of the research.
- Researcher to text participant and ask "have you finished the research?"
- Interviewer will demonstrate once as needed:
    o Keys to press to unlock the phone
    o Keys to press to open text message
- Participant will be asked to respond appropriately
- Interviewer will demonstrate once as needed:
    o Keys to press to reply to text message
    o Keys to press to send the text message
    o Keys to press to return to main screen
    o Keys to press to lock the phone

Task checklist	✓	Field notes:
Hear message alert		
Locate phone		
Hold phone		
Unlock phone		
Manage menu to open text message		
Read message		
Manage menu to respond to message		
Enter message appropriately		
Manage menu to send message		
Manage menu to return to main screen		
Lock phone		

Scenario 6A → Sending a text message

- Participant will be asked to send a text message to the researcher whose number will be pre-programmed into the phone.
- Interviewer will provide picture cue for "milk."
- Participant will be asked to request the researcher get some milk from the shop.

Task checklist	✓	Field notes:
Unlock the phone		
Manage menu to find create message screen		
Enter message appropriately		
Manage menu to find appropriate pre-programmed number		
Manage menu to send message		
Manage menu to return to main screen		
Lock phone		

Scenario 6B → Sending a text message (with cues)

- Participant will be asked to send a text message to the researcher whose number will be pre-programmed into the phone.
- Interviewer will provide picture cue for "milk."
- Participant will be asked to request the researcher get some milk from the shop.
- Interviewer will demonstrate once as needed:
  - o Keys to press to unlock the phone
  - o Keys to press to find create message screen
  - o Keys to press to find pre-programmed number
  - o Key to press to send the message
  - o Keys to press to return to main screen
  - o Keys to press to lock phone

Task checklist	✓	Field notes
Unlock the phone		
Manage menu to find create message screen		
Enter message appropriately		
Manage menu to find appropriate pre-programmed number		
Manage menu to send message		
Manage menu to return to main screen		
Lock phone		

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