Smartphone Stories: Experiences of Blind and Low Vision Older Adults in Acquiring a Smartphone

Isabela Figueira, Yoonha Cha, Jun Zhu, and Stacy M. Branham
{i.figueira,yoonha.cha,junz22,sbranham}@uci.edu
University of California, Irvine
Irvine, CA, USA

ABSTRACT

Older adults experience challenges with adopting novel technology due to intrinsic and social factors. However, the mobile phone adoption experiences of blind and low vision (BLV) older adults have largely been unexplored. We shed light on the socio-technical aspects of mobile phone adoption based on deep qualitative interviews with five BLV adults aged 60 and above. We found that narratives of smartphone accessibility can be misleading, expert knowledge is needed although scarce, and although smartphones increase access to society, using a smartphone with accessibility features for BLV people can be isolating. We present design implications for smartphones in order to improve shared access to the phone environment and to support inclusion and independent learning following smartphone adoption.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in accessibility**; *Accessibility technologies*; *Human computer interaction (HCI)*; **Mobile phones**; • **Social and professional topics** → **Seniors**.

KEYWORDS

accessibility, technology adoption, social support, blind, low vision, assistive technology

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1 INTRODUCTION AND BACKGROUND

Of the 45 million people aged 65 and older, over 3 million were living with a visual disability in the United States in 2016 [4]. As mobile technology becomes increasingly essential to connecting with family, receiving medical care, and even buying groceries, HCI researchers have begun to investigate the myriad of factors that influence technology acceptance and adoption of older adults [5], including those with vision disabilities [6].

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Older adults form a diverse group of people with varied life experiences [3]. Many factors influence technology adoption for older adults including "age, education, socioeconomic status, access to technology, attitudes and trust toward technology, and the perceived benefits of technology" [6]. Support from family and friends can also impact technology adoption. In their literature review, Pang et al. [5] note that both intrinsic motivations and social groups influence technology adoption for older adults. Piper et al. [6] asserted the importance of one-on-one assistance and good community support in technology adoption. However, some older adults are reluctant to reach out to their social support networks–including family–for assistance, so they first utilize trial-and-error to troubleshoot mobile technology [5].

Challenges for blind and low vision (BLV) older adults remain unaddressed regarding setting up technology, the effects of social influences [5], and challenges in continued support following adoption [6]. This prior work has largely focused on the challenges faced during the adoption process and has not explored the factors influencing BLV older adults' initial motivation to adopt a mobile phone. To fill this gap, our study addresses the following question: as older adults who are blind or have low vision adopt a new smartphone, what considerations do they make, and what resources do they utilize?

We conducted an interview study of mobile phone adoption experiences with five BLV older adults. We found that BLV older adults are motivated to learn to use mobile phones and encounter three challenges in doing so: (1) the narratives they hear about mobile phones contradict the reality of the technology, (2) the phones require expert level knowledge in order to operate, and (3) the assistive technology aspect of the mobile phone can be isolating.

2 METHODS

We recruited five participants through a local independent living center. To be included in this study, participants needed to be at least 60 years of age, identify as being blind or having low vision, and own and use a mobile phone. Participants were also English speakers who resided in the United States. Participant identifiers, demographics, visual abilities, start of vision loss, current smartphone use, and smartphone experience can be found in Table 1.

We conducted semi-structured, hour-long interviews over the phone or using teleconferencing software. Each interview was audio-recorded and transcribed in full by our team. Our interview script prompted participants to share stories about their considerations, experiences, and challenges with adopting their mobile devices. For example, we asked questions about their smartphone use,

Table 1: Participant Demographics

ID	Age	Gender	Visual Ability	Vision Loss	Current Smartphones	Smartphone Experience
P1	64	Woman	Low Vision	age 41-60	iPhone	Android, iPhone 8 Plus & 12 Pro Max
P2	72	Woman	Low Vision	age 0-1	iPhone, BlindShell	iPhone user ≈ 13 years, since iPhone 5
P3	70	Woman	Blind	age 41-60	iPhone	iPhone SE over 1 year
P4	60	Woman	Low Vision	age 41-60	iPhone	iPhone SE 1st and 2nd generation
P5	83	Man	Blind	age 60+	iPhone, BlindShell	has used Blackberry, iPhone 4 & 6, BlindShell

device accessibility, and their experience first acquiring their smartphones. We also asked participants about the social and material support resources they seek regarding assistance with smartphones.

We conducted an inductive qualitative analysis. We independently developed descriptive, interpretivist open and focused codes, and engaged in memo-writing and constant comparison [1]. We then came together as a group to establish agreement on the categories of themes.

3 FINDINGS

We present three findings from our interviews: narratives of smartphones can mislead perceptions about smartphones, expert knowledge is needed in order to learn to operate a smartphone, and using a smartphone with accessibility features for BLV people can be exclusionary.

3.1 Smartphone Stories: Narratives and Assumptions

Participants described the narratives they heard in their communities about smartphones before they acquired them, which fueled assumptions about what smartphones are and what they can do for BLV people. They expressed a disjuncture between the stories they heard and what the phone was in reality.

Initially, participants thought that smartphones were not for people with vision disabilities. Due to the big screen and lack of tactile buttons, our participants assumed that smartphones were not usable by BLV people. However, P4 and P5 had seen people who were totally blind using smartphones. P4 then thought that *"it has to work"* for her too. P3 was also puzzled by the flat screen: *"How can you navigate a flat screen when you have no vision?"*

All study participants heard about the iPhone and its assistive capabilities by word of mouth within the BLV community. P3 found *"the apps just by word of mouth and networking."* Multiple participants heard about technologies and resources through local centers for BLV people and podcasts dedicated to assistive technology reviews. Participants also heard stories from community experts about applications that are assistive to blind people.

Through these channels, a common narrative of the iPhone emerged, with near-mythical qualities. Participants like P3 were urged *"to get a smartphone because of the apps that were really helpful for the visually impaired like myself."* P4 was assured of the phone's ease of access through statements like *"it'll talk to you."* However, as exemplified by P4's testimony below, participants felt confused by such narratives and how this would actually translate to interaction:

> *"I really, in my mind, couldn't get the concept of there are no buttons. I went from a flip phone to the [iPhone] SE. Everybody kept saying 'well once you turn on VoiceOver and Siri, it'll talk to you. When you touch something it'll-' In my mind, [I] just got stuck on that. There aren't any buttons, how can this work?"*

In this excerpt, P4 refers to VoiceOver, a main accessibility feature of the iPhone for BLV people. With VoiceOver, the iPhone speaks the contents of the display to the users, allowing a user to interact with the phone with specific gestures and to localize things on the screen using touch. However, this feature is quite complex, with dozens of gestures to memorize, and requires mastery through extensive practice. As a result, participants expressed surprise and frustration after actually acquiring the iPhone and experiencing it for themselves.

Interestingly, even participants who realize this complexity still propagate the myth or promote the iPhone, as P2 described:

> *"We can't learn everything. I have to pace myself like 'what do I need to learn now, or what do I wanna learn now?' [...] Sometimes I'll tell people don't get- to not get floored by all this, like some of them stand on the edge, and I tell them if you want an iPhone, just get it, and whatever you want to do with it, just do the, even if it's just one thing you want to do with that. Just get an iPhone and do the apps that pertain to your interest. Don't try to learn everything on it. You're not going to do it. I mean, or you probably won't."*

The idea that smartphones encompass a vast depth of capability and require seemingly unattainable, immense knowledge to completely learn resonated with several participants. Yet, these narratives ultimately pointed to acquiring the iPhone.

After acquiring a smartphone and learning how to use it, participants understood what the stories were trying to communicate: the phone *can be* assistive and benefit BLV people. For example, they use apps every day that community members recommended: Seeing AI, Be My Eyes, Aira, Magnifier, and others. However, as we will see in the next section, the degree to which a smartphone, including the iPhone, can be assistive depends on access to expert knowledge and resourcefulness.

3.2 Knowledge Needs Hinder Learning & Resourcefulness

Once our participants acquired a smartphone, in order to operate it, they required access to expert knowledge specific to using the

iPhone with a vision disability. This expert knowledge included specialized gestures, technical jargon, and accessibility settings.

Participants described reaching out to a variety of experts such as technology specialists in independent living centers and BLV community members who use iPhones to set up their phones and learn how to interact with and use the phones. Most participants reported requiring accessibility experts to turn on VoiceOver for them, since the phone does not speak by default. For example, participants attended weekly classes or waited to work with their counselors to turn on VoiceOver and learn how to use and interact with their phones.

Gestures are key to interacting with touchscreen smartphones via a screen reader, like iPhone's VoiceOver. However, there are *many* gestures specific to VoiceOver, which can be difficult to remember. For example, P5 shared:

> *"There's swiping left to right, up and down, and circles, and my memory is not that great. I'm not that young, so my memory is not good. So that might be part of it, I'm not sure. But it is difficult–too difficult–for me to use without some real personalized instruction on it."*

To deal with this complexity, P3 uses Assistive Touch: *"Sometimes I don't remember the gestures on VoiceOver to get to the control panel, or the messages. So this Assistive Touch is on my home screen."*

On top of difficulties with learning gestures, some participants struggled with knowing the terminology. While P4 was very familiar with VoiceOver's "rotor" feature, P3, who had been using the iPhone daily for over a year, still found it confusing:

> *"Sometimes I don't even know the terminology. Like it will say something about the rotor, 'do something with the rotor.' I'm like, 'What the hell is the rotor?' (laughs) I don't know what that is! I'm sure the rotor is something but I don't know what it is. That kind of stuff that, if you have a little bit more knowledge or if I had the basic terminology, I'd probably-* [sic] *a piece of cake. But I don't even have the terminology."*

To use the phone with VoiceOver, people need a lot of expertise, and they need to go to experts in order to get specialized assistance. The "rotor" is a feature specific to accessibility functionality on the iPhone, in which a user utilizes two fingers in a pinched fashion as if grasping a dial and rotates left or right to make a menu selection. Thus, looking up resources to fix issues on the phone becomes difficult. Additionally, the resources such as online videos can include visuals that exclude BLV people, forcing listeners to attempt to visualize what is going on.

3.3 Isolation and Exclusion by the Smartphone

Prior to the initial acquisition of their iPhones, participants believed assistance would be readily available–through friends, local stores and organizations, or iPhone users–since the iPhone is considered mainstream. In reality, when BLV people sought assistance from sighted iPhone users, such as their helpers, they were surprisingly unfamiliar with accessibility features. For example, P3's sighted helpers were unable to set up VoiceOver: *"A couple of my helpers that tried to help me [set up my phone] even though they don't know VoiceOver, [...] they don't understand it. [...] And I couldn't guide them."* Further, P4 does not reach out to sighted family or friends for smartphone support: *"they don't understand my adaptive software. I will not reach out to them to teach me something."*

One option to get one-on-one assistance is going to phone stores. Participants expected to be able to take their phones to a local phone store for set up or assistance. Contrary to participants' expectations, employees were not necessarily knowledgeable about accessibility features: *"Not all of the [mobile phone] store people know how to get into VoiceOver. Many of them do, but it's not an area that some of them use a lot with customers (laugh)"* (P2). Similarly, P1 shared: *"I would expect that when you go in there that they can assist you [...] People go to [phone carrier] stores and they say nobody in there can help or assist you with your phone."* In those cases when sighted iPhone experts were able to provide service, they tended to turn VoiceOver off, as P4 described:

> *"Sound is only beneficial to me. Anybody with sight, sound frequently is an annoyance to them. I know a lot of times, the first thing a person with sight wants to do is say 'How do you turn over this VoiceOver, I can't concentrate because your phone is talking.' And I'm in a world where if it's not talking, it doesn't have any meaning for me."*

This has the effect of displacing opportunities to observe and learn from sighted individuals:

> *"I'll sometimes hand my phone over to someone, but I have to take the VoiceOver off. And then they do it the way that they would normally do as a sighted person. Well, that doesn't help me. (laughs) But that's the only way they can help me because they don't know VoiceOver, and I don't know enough to tell them 'okay, well, you do this, this and this.' " (P3)*

All participants described a desire and motivation to learn to use their smartphones independently. However, they were excluded from their phone environments (VoiceOver), hindering them from learning how to troubleshoot problems independently. When VoiceOver was turned off, participants felt shut out of their phones–worlds apart from sighted smartphone users.

When mainstream support resources were not accessible, participants turned to *expert* accessibility support resources such as their local BLV community of smartphone users, technology specialists at local independent living centers, and accessibility support phone lines. All of our participants reported calling the Apple Accessibility Support phone line *often* for iPhone assistance that is specialized for accessibility features like VoiceOver. This service connects people with representatives who are well-versed in VoiceOver, can see phone displays over screen-share, and can diagnose problems.

4 DISCUSSION

The smartphone narrative starts with the belief that smartphones are not for blind people, since BLV older adults assume accessibility requires tactile buttons. As they get immersed in a community of smartphone users with vision disabilities, the story changes. They hear of the phone that will "talk to you" and that allows blind people to reenter the world. They begin to perceive the smartphone as a mainstream device that could be within their ability to learn, since other blind people use it. Upon acquiring an iPhone, reality sinks in that the phone is difficult to learn [6, 7] due to its "vast depth."

Another reality of acquiring a smartphone as a BLV older adult is that resources for tech help are scarce or unhelpful. One-on-one assistance has been found to be important to older adults both sighted and with vision disabilities [5, 6]. Our findings also support this, since multiple participants including P5 value one-on-one support that is personalized to fit their needs. However, we found that one-on-one specialized support is a limited resource to which most participants do not have abundant access. Therefore, our participants relied on their social support networks for assistance to gain knowledge about smartphones. Previous works found that older adults rely on family and friends for technical support, but try not to reach out too often to avoid burdening them [5, 8]. This is consistent with our findings. However, our BLV participants encountered additional challenges. Sighted family or friends, even those who owned the same phone as participants, were unlikely to understand their assistive technology, much less have the ability to teach how to use it.

Resources that are available to anyone who uses an iPhone, such as local phone stores or other iPhone users, are not necessarily helpful and may undermine independence of BLV people. We found that smartphones–which are ostensibly devices for connection–were in some ways quite isolating. Turning off VoiceOver to assist a VoiceOver user equates to changing the environment of the phone from assistive to sighted and removing the assistive technology from a person's iPhone to fix an issue. Thus, removing the VoiceOver user's ability to interact with their phone and participate in learning to solve phone problems. This reduces the independence that assistive technologies should provide to their users, thus impeding accessibility and further signifying difference. While using mainstream devices, like the ubiquitous iPhone, can make users with disabilities feel "normal" [8] since they are using smartphones like everyone else, smartphone accessibility features like VoiceOver indicate vision disability. One concern of assistive technology users is that using assistive devices might identify them as unable to use mainstream technologies [8]. Our participants are indeed able to use mainstream smartphones, but mainstream support services are not necessarily accessible.

When resources were not accessible, our participants turned to different sources of social support: the community of iPhone users with vision disabilities, technology specialists in independent living centers, and the Apple Accessibility Support phone line. These resources, while scarce, comprise a community of experts of accessible smartphone interaction, vision aids, and assistive technology. As BLV older adults acquire smartphones, they too become experts of their smartphone's accessibility.

Older adults with diverse abilities may also experience similar challenges when adopting a smartphone. For example, older adults who experience ability changes may be unaware of accessibility features in smartphones since they are hidden and require multiple steps to configure, which can impede smartphone adoption [2].

4.1 Design Implications

Our findings reveal implications for design to increase accessibility and thus improve adoption of smartphones by BLV older adults. First, designers and companies can remove barriers between how blind and sighted people use and experience their phones. The design of the phone itself can leverage shared mental models and terms to create shared experiences of smartphones, rather than isolating users of accessibility features into a specialized model of interaction. Second, educational interventions for sighted smartphone users could improve awareness and understanding of accessibility features, as well as encouraging inclusion and equity of smartphone resources. Finally, the gap between expectations and reality for the smartphone could be narrowed if the terminology used to refer to accessibility features were themselves more accessible. Intuitive terminology would be easier to understand without referencing outside material, be easier to talk about to others, and not rely on physical or visual metaphors or prior knowledge.

5 CONCLUSION AND FUTURE WORK

We present a work-in-progress interview study of blind and low vision older adults and their experiences in acquiring and adopting smartphones. We found that participants were awed and influenced by smartphone stories promising assistive features and independence. In reality, acquiring a smartphone and then learning to use it is a long process in which resources are potentially inaccessible and isolating. Even then, participants are eager to learn and be independent. Future work includes further understanding the learning practices and social support systems of this population as well as how using smartphones impacts identity. We plan to expand this study by interviewing more participants as well as technology specialists to further understand this environment. Smartphones could be seen as a phone *for* BLV people.

REFERENCES

[1] Kathy Charmaz. 2014. *Constructing Grounded Theory* (2 ed.). SAGE.
[2] Rachel L. Franz, Jacob O. Wobbrock, Yi Cheng, and Leah Findlater. 2019. Perception and Adoption of Mobile Accessibility Features by Older Adults Experiencing Ability Changes. In *Proceedings of the 21st International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS '19)*. ACM, New York, NY, USA, 267–278. https://doi.org/10.1145/3308561.3353780
[3] Bran Knowles and Vicki L. Hanson. 2018. Older Adults' Deployment of 'Distrust'. *ACM Transactions on Computer-Human Interaction* 25, 4 (Aug. 2018), 21:1–21:25. https://doi.org/10.1145/3196490
[4] National Federation of the Blind. 2019. *Blindness Statistics*. Retrieved March 15, 2023 from https://nfb.org/resources/blindness-statistics
[5] Carolyn Pang, Zhiqin Collin Wang, Joanna McGrenere, Rock Leung, Jiamin Dai, and Karyn Moffatt. 2021. Technology Adoption and Learning Preferences for Older Adults: Evolving Perceptions, Ongoing Challenges, and Emerging Design Opportunities. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI '21)*. ACM, New York, NY, USA, 1–13. https://doi.org/10.1145/3411764.3445702
[6] Anne Marie Piper, Robin Brewer, and Raymundo Cornejo. 2017. Technology learning and use among older adults with late-life vision impairments. *Universal Access in the Information Society* 16, 3 (Aug. 2017), 699–711. https://doi.org/10.1007/s10209-016-0500-1
[7] André Rodrigues, Kyle Montague, Hugo Nicolau, and Tiago Guerreiro. 2015. Getting Smartphones to Talkback: Understanding the Smartphone Adoption Process of Blind Users. In *Proceedings of the 17th International ACM SIGACCESS Conference on Computers & Accessibility (ASSETS '15)*. Association for Computing Machinery, New York, NY, USA, 23–32. https://doi.org/10.1145/2700648.2809842
[8] Kristen Shinohara and Jacob O. Wobbrock. 2011. In the shadow of misperception: assistive technology use and social interactions. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '11)*. ACM, New York, NY, USA, 705–714. https://doi.org/10.1145/1978942.1979044