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Smartphones and equal access for people who are blind or have low vision

A project with Vision Australia

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Foreword

One of the most significant aspects of the digital revolution that we have experienced over the past decade or so has been the rapid increase in the use of smartphones. Today, more and more Australians are using their smartphones to do online shopping, make banking and other financial transactions, check the weather and the stock market, book taxis, order home-delivered food, interact with government services, and a myriad other tasks.

The first smartphones were not based on principles of inclusive design, and so were largely unusable by people who are blind or have low vision. Fortunately, much has changed since then, and developers like Apple, Google and Samsung have recognised the many tangible benefits of designing products that everyone can use. Today, people who are blind or have low vision are also able to participate in the smartphone revolution.

We know, however, that technological developments can present significant challenges as well as opportunities for people who are blind or have low vision. In 2015, Vision Australia found that although smartphone usage was widespread in younger age groups, few people over 65 who had acquired a vision loss were using smartphones, and across the age spectrum most people were using their smartphones mainly for making calls, sending texts, and checking emails.

In 2020 Vision Australia was pleased to collaborate with Curtin University in this research. We recognise Curtin has a long and distinguished record of research in the area of media and communications, as well as extensive experience in working in partnership with the disability sector. I would like to also gratefully acknowledge the financial support that the Australian Research Council provided and which made the research possible.

The result of Vision Australia's collaboration with Curtin is this ground-breaking report that provides a wealth of detail about how our clients are using smartphones, the challenges they face, and the opportunities for Vision Australia to play a positive and proactive role in addressing them. Of particular note is that since our initial research in 2015, smartphone usage by our clients has increased significantly across all age groups, and there has been a corresponding increase in the range of tasks for which smartphones are being used.

The report identifies several important opportunities to improve Vision Australia's service delivery in smartphone training and also continues to build key themes for our advocacy activities. For example, by working to raise awareness of the benefits of smartphones for older age groups, and to encourage more app developers to follow inclusive design guidelines so that their apps can be used equally by people who are blind or have low vision.

Smartphones will undoubtedly develop further in the coming years, and will play an ever-increasing role in the way we carry out our work, conduct our business, and live our lives. The findings of the research that are detailed in this report will help to ensure that people who are blind or have low vision will not be left on the wrong side of the digital divide, but will be able to participate fully in the transformations that smartphones are creating for our society.

Ron Hooton

CEO, Vision Australia.

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Preface

The survey conducted in February/March of 2020 was the last stage of a broader project conducting research on the way people with disabilities used smartphones in their navigation through urban space. The initial stage of this research used focus groups and interviews to uncover what was already suspected: smartphones are becoming an integral part of navigating urban space for all Australians, including those with disabilities. However, our research also found there were differences in the way people with different types of disabilities used smartphones, and while all our participants used smartphones, there was a range of factors that impacted the type and breadth of use of this essential technology.

This survey builds on the findings of our initial research, capturing the specific role of smartphones in the everyday lives of vision impaired Australians via an extensive survey. This survey is the first of its kind - providing a detailed snapshot of the role of the smartphone for over 800 people who are blind or have low vision. It details not only who uses a smartphone, but the complex relationship with, and different ways in which people with vision impairments navigate, both the smartphone itself and the world around them.

As the survey was being finalized at the end of March 2020, Australia began to feel the impacts of the COVID 19 pandemic. We took the opportunity to extend the initial study to conduct interviews, online and over the telephone, to explore the impact of the pandemic on people who are blind or have low vision and the impact it had on how they make use of smartphone platforms.

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Finally, we would like to extend our thanks to all of the 845 people that completed the survey, and to those who also gave us feedback on how their smartphone use changed during the COVID-19 pandemic.

Executive Summary

This report explores the way Vision Australia clients are using smartphone technology in their everyday lives. It details findings of the research project *Smartphones and equal access for people who are blind or have low vision* conducted in collaboration with Vision Australia. The research centred on a survey conducted during February and March 2020 that aimed to explore the usage patterns and experience of using a smartphone for people with low vision or blindness. It aimed to discover how important the smartphone is for this cohort, what they use their device for, what limitations or obstacles they face, and what might make the smartphone more useful and accessible for them.

The report has three parts. Part 1 begins with a background review of previous studies into how people who are blind or have low vision use smartphones, finding that studies have traditionally approached this from a technological perspective with the aim to resolve accessibility issues with a technological solution. By comparison, this report focuses on the user, aiming to better understand the relationship between smartphone use and low vision and blind users in order to gauge if and where accessibility issues arise.

Part 2 is concerned with the findings of, and offers discussion on, the results of the survey. A total of 845 people participated in the survey. Detailed insights were gained into three core components: participant demographics (including age, type of vision impairment and their living context); smartphone use; and app use. Questions were designed to capture information on who owned and used a smartphone, and the breadth of and limitations on this use.

As the survey drew to a conclusion towards the end of March 2020, Australia began to be impacted by the COVID-19 pandemic. The effect of this on the way people with low vision or blindness used technology, including the smartphone, was anticipated to be significant. Part 3 of the report therefore communicates findings of an additional interview stage focused only on the effects of COVID-19. From a sample of 83 participants in the survey who had indicated they would like to be a part of further research, 13 individuals across Australia between the ages 23-83 were asked eight questions about their smartphone use during the COVID-19 pandemic in order to gauge if and how this threat to individual health, isolation

and rapidly shifting federal and state regulations around social distancing shifted the way participants interacted with their smartphone.

The key conclusions as a result of this survey include:

- A significant proportion (79%) of the blind community use a smartphone.
- A previous study of Vision Australia clients from 2015 had found only a 17% use of smartphone technology. There has been a 365% growth in smartphone use by people who are blind or have low vision in less than five years.
- While age still plays a role in determining uptake, the age 'gap' is decreasing, and only statistically significant in the over 75's.
- Age does play a role in the breadth of use – noticeable in app uptake and broad range of use.
- The level of vision of participants, and the duration in which people have experienced low vision or blindness, also effect smartphone use; this being the key determinant in the reasons participants gave for not owning a smartphone.
- Accessibility apps were used by approximately 50% of participants, but many participants were unaware of these apps and their capabilities. Those that do use accessibility apps still face a range of issues, limitations and a lack of accessibility.
- Voice assistants (eg. Siri) were the most popular accessibility feature of the phone, but other assistive features were less used. Again, level of vision and a lack of familiarity with these features plays a significant role in their use.

The recommendations of this report specify key suggestions for industry, government, service providers and smartphone app designers and developers. We argue that, particularly in the context of the COVID19 pandemic, the usability, compatibility, information on and training in smartphone use is integral for people who are blind or have low vision.

Introduction

Smartphones have become an important part of our everyday lives, helping us to connect, collaborate, create and undertake many everyday tasks. For people who are blind or have low vision, smartphones can also be an essential tool, particularly for facilitating independence and increasing access to information, products and services. However, people who are blind or experience low vision rely on varying in-built features and apps for these devices to be useful and accessible for them.

Smartphones and accessibility for people with disability have a long history. The technology enjoyed and depended on by the entire population is the direct result of adaptive technology designed to make the world more accessible for people that have various impairments. For example, the telephone was invented by Alexander Bell as a way to communicate with his mother who was deaf (Ellis and Goggin, 2015). Innovations associated with the smartphone such as touch screen and antiglare are both adaptations designed for people with disability. Touch screen evolved from FingerWorks, a gesture recognition company founded by Wayne Westerman after he acquired repetitive stress problems as a doctoral student. Similarly, antiglare screens, while initially created for users who were blind or had low vision, allow everyone to use their smartphones outside and in the sunlight. While the smartphone is a mainstreamed rather than specialised device, it still offers great potential for people with disability and particularly those who are blind or have low vision, if it is made accessible.

Smartphones are an essential telecommunications tool. Increasingly both governments and businesses are embracing app-based methods of communication. However, for people who are blind or have low vision the smartphone can be a source of anxiety with inaccessible interfaces, unskilled service providers offering advice and training and high financial costs. There are a number of ways smartphones can be made more accessible to this population. These include via voiceover screen reader; text resize, zoom and magnification; contrast, colour and brightness adjustments; audio description; and voice assistants such as Siri. Apps, both general and more specialised accessibility focused can also greatly enhance the usability and accessibility of these devices.

Smartphones and apps are often presented as an automatic source of inclusion for people with vision impairments yet there is little research into the ways this group engage with mobile technologies. This survey is the first Australian research to comprehensively investigate the patterns of usage, and the perceived and actual barriers to smartphone use by people who are blind or have low vision.

The survey aimed to find out about the usage patterns and experience of using a smartphone for people with low vision or blindness. We gathered insights into how important the smartphone is for Australians with low vision or blindness, what they use their device for, what limitations or obstacles they face, and what might make the smartphone more useful and accessible for them.

This information is increasingly important in an ageing society, as we know that vision loss occurs most often in older ages. It is also important in understanding whether smartphones do increase equality and accessibility for people who are blind or have low vision. We also aimed to find out what currently limits the use of these devices in mitigating experiences of disability. Lastly, we explored whether smartphones exacerbated experiences of disability for some people, and if so, how this might be addressed.

To provide a comprehensive overview of smartphone use by people who are blind in this country and improve access to these services, we need to investigate how consumers use existing apps and how they could be improved. This survey provides a previously unavailable resource on smartphone use by this cohort that can be distributed to key stakeholders.

The impact of COVID-19 on Smartphone use: Interviews

As the survey drew to a conclusion towards the end of March, Australia began to be impacted by the COVID-19 pandemic. The effect of this on the way people with low vision or blindness used technology, including the smartphone, was anticipated to be significant. Thus, we undertook a set of interviews with a sample of the survey participants in order to gauge if and how this threat to individual health, isolation and rapidly shifting federal and state regulations around social distancing shifted the way participants interacted with their smartphone. The details of this further research can be found at the end of this report.

Due to the recency of this pandemic, there is a lack of rigorous research on how COVID-19 will impact the nature of smartphone use; what research has emerged has already flagged the possible ramifications of the global health crisis on digital inequalities (Beaunoyer, Dupéré and Guitton 2020). We are fortunate in the timing of this survey to contribute to what will no doubt be a burgeoning body of research in this area.

Background

In the last decade there has been a dramatic increase in the use of smartphones by the general population, and significant evidence that suggests people with disabilities are likewise avid users (McNaughton and Light, 2013). However there remains a lack of recent data on the uptake of smartphones by people with disabilities, and specifically people with vision impairments.

Despite this, there is a growing body of research that has emerged in the past decade on the usability or potential use of smartphones by people with vision impairments. However, this research has largely derived from the fields of science and technology studies, a field with “the moral imperative to fix” (Colligan, 2004). Thus, engagement with disability tends to be focused on technological solutions to accessibility issues.

Examples include studies which present smartphone innovations or specific apps that increase accessibility: Rodrieguez-Sanchez et al (2014) offer a wayfinding system for blind users; Peng et al (2010) develop a sensor for objects; and Götzelmann (2014) details an interactive tactile smartphone map for the visually impaired user. This research (which represents only a few examples in a burgeoning collection of app-based accessibility studies) while valuable, largely examines practical strategies for improved usability, but is based on the capabilities (or deficiencies) of the device and applications, rather than an understanding of its users.

Therefore, despite an increase in the range of accessibility apps and features of the modern smartphone, there is a lack of research and information that is user-led, that questions how people with vision impairments use smartphones, what they use them for and what limits their use.

Some recent studies have aimed to address this gap in knowledge around the relationship between mainstream devices and disability. Crossland, Silva and Macedo (2014) surveyed people with vision impairments in Portugal, the UK and the US on their smartphone use, finding an 81% uptake. Likewise, Griffen-Shirley et al. (2017) conducted a survey on the use of mobile applications for people who were legally blind, with 95% of 259 participants, mostly from the US, using a smartphone. Several larger surveys of smartphone use by people with disabilities

have also been undertaken, but across a range of disability types, not just people with a vision-based disability. For example, a 2016 survey, "Smartphone Use and Activities by People with Disabilities" contained only 8% of responses by people who were blind or had low vision (Morris, Sweatman and Jones 2016).

Most recently, Martinello et al. (2019) provide a study of over 400 individuals across seven countries (though predominantly participants were from the USA), who have a vision impairment and who use a smartphone or tablet. They found 97% used a smartphone (though the parameters of the research – excluding individuals who did not use either a smartphone or tablet – suggests this figure is not representative of the broader low vision and blind community). Their sample showed that smartphones and tablets ('mainstream devices') were replacing the use of traditional assistive devices for people with low vision (such as screen readers, braille display, magnifiers or sighted help). Pertinently, the researchers also revealed the diversity of types of use and of users of smartphones within the blind and low vision community. They argue that the relationship between age and the proficiency in smartphone use was significant, as was the age in which participants lost their sight. This research is important, not only for comparing the statistics in our own survey, but in providing some balance to the plethora of studies which assume the ways in which smartphones are utilised by the blind community.

Other research has provided in-depth analysis of the limitations of or problems faced by blind and low vision smartphone users. These studies, typically involving smaller data samples, workshops, or ethnographic approaches, have also contributed to developing a more nuanced understanding of user-led experiences of smartphone use. For example, Reyes-Cruz, Fisher and Reeves (2020) aim to garner a holistic perspective of the use of smartphones in the everyday life of people with low vision or blindness, finding a range of competencies and adaptations used that extend beyond specific engagement with the device. Whilst their research is based on a limited data sample of 12, this study is important in shifting dominant research perspectives that are technology, rather than user, driven.

Building on this body of work, this study provides a significant indication of how many people with vision impairments are using smartphones in Australia, what they use their devices for, and how demographics impact upon this use.

Methodology

The initial objective of this research was to find out about the usage patterns and experiences of using a smartphone for people with low vision or blindness. In order to achieve a wide data set that accurately represented the perspective and behaviours of the Australian blind community, we constructed a survey that could be both completed online or through phone interviews, and dispersed it using the Vision Australia client contact information and networks.

Working in collaboration with Vision Australia, we drafted 24 questions that captured information on three core components: participant demographics (including age, type of vision impairment and their living context); smartphone use; and app use. Questions were designed to capture information on who owned and used a smartphone, and the breadth of and limitations on this use.

The final sample size was 845. This was larger than initially predicted. Drawing on data from the Australian Bureau of Statistics (2017-2018) National Health survey, 131 500 people have partial or complete blindness. However, there are also other eye conditions which cause low vision (that cannot be corrected by wearing prescription glasses), thus the total population of people who are blind or have low vision is estimated by Vision Australia to be 384 000 (as of 2016). Thus, our sample of 845 respondents reflects a margin of error of 3%.

Online survey

Constructing an accessible and useable online survey was an integral part of this research, however we found multiple accessibility and usability issues, incompatibilities with browsers, and a lack of service provider responsibility and commitment to ensuring accessibility. Despite attempts to initially create our survey using Qualtrics (a reputable platform popular across Australian universities), in trials completed through Vision Australia, the survey was not compatible with several screen readers, with repeat reading occurring. Specifically, when customer service representatives from Qualtrics investigated this duplicate reading by various screen readers, they found that:

The issue has been caused by our platforms design to be accessible to a wide range of third-party screen reader softwares. Some screen readers

read one label type, and some screen readers read another. As a result, to ensure universal screen reader compatibility, our surveys have the two different types of labels present, which means some screen readers will end up reading the question text twice.

However, when asked if this could be 'switched off' or modified for our survey, they responded that they were not able to make this modification. No further action was taken by Qualtrics to alleviate the compatibility issues with screen reading software, other than to suggest researchers submit a customer form that suggests 'further features' for future development of the software. Essentially, the platform's aim to make their surveys accessible to all undermined its usability.

Beyond the repeat reading issues found in the Qualtrics survey platform, we also found consistent incompatibilities with different web browsers. This browser compatibility was also an issue with the second survey platform we used to design our survey – Survey Monkey. For example, neither platform worked reliably with Internet Explorer, and compatibility issues were found with Voiceover software and Safari.

In this instance, having already failed to establish compatibility with screen reading software using Qualtrics, it was determined that directing participants to use specific browsers when using Survey Monkey would mitigate the remaining usability issues.

We have highlighted this specific usability/accessibility issue here as we believe the problems encountered in our own research project methodology mirror many of the issues raised by our research participants as they attempt to navigate smartphones and associated software in an increasingly complex and layered digital environment.

Phone survey

Almost two thirds of our responses, however, were gathered directly by our research team from targeted phone calls to the Vision Australia client base. Recognising that not all members of the blind community would use smartphones or access the internet, and that smartphone and internet use statistics in the broader community declines with age, we designed the survey so that it could be

read to participants over the phone and completed by the research team interviewing the individual online.

We also recognised that the advertising and promotion of the survey, predominantly via Vision Australia's communications – this included an email newsletter and promotion through their social media channels – would likely only capture 'active' clients that consistently engaged with this service provider. The phone calls conducted by four interviewers over a six week period allowed us to capture a large sample size, and one reflective of the age range of the blind community.

Results

In total 845 participants completed the survey. The majority of responses (632) were gathered from phone-based surveys (in which researchers filled out the online survey for the participant based on their responses over the phone).

Of these participants, 79% owned a smartphone. However, the age of the participant also affected the likelihood of smartphone ownership, with 100% of those under 25 owning a smartphone, compared to 31% of those over 85.

Table 1: Smartphone ownership by age bracket

18-24 year olds	100%
25-34 year olds	98%
35-44 year olds	92%
45-54 year olds	94%
55-64 year olds	91%
65-74 year olds	78%
75-84 year olds	57%
85+ year olds	31%

In contrast, a 2015 survey of Vision Australia clients found 17% used a smartphone. This percentage was heavily influenced by age, with 25% of those between 65-74 using a smartphone and 2.8% of those over 75 using a smartphone. These results indicate a significant growth in the penetration of this technology in Australia's blind and low vision community over a period of less than five years.

Recognising there was a range of vision experienced by people who are blind or have low vision, and that the level of vision may affect the way people used their smartphone, we asked participants to describe their level of vision. Twenty six percent said they had low vision, 45% had legal blindness, 20% had total blindness and 10% described other vision impairments, such as tunnel vision, macular degeneration, limited peripheral vision, or blindness in one eye.

Fifty three percent had experienced low vision for more than five years, 24% since birth and 23% for less than five years.

Thirty percent of participants also experienced another disability, primarily a level of hearing loss (28% of the 239 people who listed an additional disability).

Our highest proportion of participants were between 75-84 years old (23%), 21% were 55-64 and 21% 65-74, 5% were over 84. Thirty percent of our participants were under 55. Therefore, almost half of the participants in this survey were over 65 years old.

This older subset was reflected in the question around income source – 45% received the Age Pension (blind) and 41% received Disability Support income. Eighteen percent were receiving paid income. Participants also cited income from other sources, such as superannuation and investments.

While the majority of participants lived in metropolitan areas, a significant amount of people, 38%, lived in rural or regional Australia.

Smartphone Use

Of the 79% of participants that owned a smartphone, 74% used an Apple iPhone, and 26% used an Android phone with Samsung being the most popular model (65%). The accessibility features of the phone was a dominant reason for their phone choice (48%), but compatibility with other technology (and this was often cited in relation to participants using Apple products) was cited by 19%. Recommendations by others also appeared as a strong reason in determining product choice (15%). Six percent noted the price of the device and/or plan also impacted their decision. This was supported by the results that showed 84% obtained their phone via their own personal savings. Only 3% had obtained a phone via the NDIS, and 5% had been gifted their phone.

Those who used a smartphone used it throughout their everyday life – 84% citing they used it throughout the day, and for a broad range of purposes. While making and receiving calls was the most commonly cited use (97%), there was a range of uses noted (see Table 2).

Table 2: Which of the following activities do you use your smartphone for?

Making or receiving phone calls	97.4%
Sending or receiving text messages	86%
Sending or receiving emails	57.7%
Accessing Vision Australia services, including the library	39.4%
Banking	39.2%
Booking taxis and ridesharing services	38.3%
Checking public transport information such as timetables	36.3%
Browsing the web	47.3%
Getting around in the community (eg. navigation/GPS)	41.5%
Listening to music, radio or podcasts	56.6%
Online shopping, or payment for goods and services	24.3%
Playing games	13.8%
Ordering takeaway/home delivered food	17.8%
Social media, such as Facebook, Instagram or Twitter	44%
Watching movies or television	20.7%
Reading ebooks	25.1%
Checking the weather	52.9%
Other	25.2%

The age of the participant affected the breadth of use – there was a significant reduction in the amount of people over 65 using their smartphone beyond phone calls. For example, 33% used it for emails, 24% for accessing the Web, and 17% used social media. This is a reduction of over 25% in each category compared to participants under 65.

The use of built-in assistive features was common across participants: 65% used voiceover screen reader, 43% used text resize, 41% used zoom and magnification, 32% used contrast, colour and brightness adjustments, and 18% used audio

description. Voice assistants such as Siri were also popular, with 80% of participants using the program for a range of purposes (see Table 3).

Table 3: Do you use the voice assistant provided in your smartphone, for example Siri or Google Assistant? If yes, which of the following do you use your voice assistant for?

Get a telephone number	57.9%
Get the weather	44.8%
Answer a general question	59.5%
Turn on and off a setting	29.8%
Set a timer/alarm	45%
Spelling help	18.1%
I don't use a voice assistant	20.3%
Other	26.4%

Beyond the smartphone, participants used a range of assistive technology: 33% used screen reading software, 34% used smart home devices, 27% used screen magnification software and 9% used bone conduction headphones. Fifty six percent cited other assistive technology, with iPads and tablets being a dominant response, as well as computers, Apple watch and DAISY Player.

Accessibility apps were also used widely (over 50% of participants responded to our questions regarding the use of apps) and for a range of purposes. Artificial intelligence or AI based apps were the most commonly used, followed by GPS/Navigation apps, reading apps and human assistance apps. However, 13% of responses stated they had either never heard of these apps or had heard of them, but did not use them, or know how to use them.

The most common apps used for navigating urban space were Google Maps or Apple Maps (39%), Blind Square (12%), Guide Dogs Australia (9%) and Soundscape (8%). Participants reflected on how these apps not only provided logistical assistance, but more independence

I use Blind Square navigation app, Sound Scape Navigation app. I use these apps to assist me navigating streets, finding bus stops and train stations,

navigating back home. They give me independence to get around without the need for other assistance; e.g sighted guide.

The amount of time participants had been blind or had developed low vision impacted upon app uptake – for those with less than 5 years' experience of their vision loss, only 29% used accessibility apps.

There were also some poignant reflections from some participants on how the apps they use now (or do not use) may shift according to changing contexts

I currently don't use Apps to help me get around, but in this time of social distancing with Covid19 I anticipate a need to use something like Aira to help me follow someone into a medical consultation to avoid taking their arm and getting too close.

These reflections prompted follow-up interviews with some participants as to how their smartphone use had changed during the pandemic (see below).

In sourcing these apps, most participants used Vision Australia or another service (53%). Family and friends (30%), and other people who are blind or have low vision (30%) were the other most common responses.

Issues with the apps designed for people who are blind or have low vision were most commonly cited as 'glitches/technical issues' (44%). Thirty eight percent expressed they were difficult to use or understand, and another 35% stated they were not fully accessible. When participants had issues with an app and found that it wasn't accessible, most chose to delete it or not use it anymore. However, 31% did report inaccessible apps to the developer and a further 21% contacted Vision Australia about the issues. Participants were less inclined to leave a negative review (13%).

When asked if there was an app participants would like to see developed that would enhance their everyday life, there were three dominant types of responses: apps that are more accessible, apps that are simpler to use, and apps that are more accurate. Often participants didn't suggest an entirely new app that they would like to see developed, rather they wanted existing apps to 'work better'.

Rather than apps, improve phone functionality/accessibility, and compatibility of these features with apps.

Weather app improved - more detailed, more user friendly/accessible. Make apps more accessible - go through stricter requirements.

I would like apps that would work reliably for people like me who have difficulty with clear speech & fine hand control as Siri & gestures are not reliable enough for me to use independently.

Those that did suggest new apps tended to align with the examples given in the question, such as apps that could read signs ("*None of the available reading/scanning apps are able to read digital panels/displays, so an app with the ability to do this would be helpful*") or help with navigation ("*an app would help with indoor navigation but would be free or low cost unlike Aira*").

Finally, when asked what Vision Australia could do to support peoples use of smartphones, 65% wanted more information on the types of apps and smartphone features they could use, 65% also would like more training on how to use a smartphone, and 52% would like Vision Australia to provide more advocacy for the blind community to encourage smartphone and app developers to be more accessible. A further 35% of responses offered other suggestions, notably to assist in improving funding for smartphones (eg. via the NDIS).

People who don't use Smartphones

Of the 18% of participants who stated they did not own a smartphone, a further 3% stated they did previously but don't anymore. Eighty three percent of participants who did not own a smartphone were over 65 years old.

The reasons provided for not owning a smartphone included insufficient vision (43%), not needing one in everyday life (20%), a lack of familiarity with how to use them (13%) and cost (7%). Other participants used other technology, such as a 'non-smart' phone, an apple watch or iPad (5%).

In comparison to the 2015 Vision Australia survey, a similar proportion (47%) of respondents said the reason they do not use a smartphone is because their vision inhibits them from doing so.

These participants also cited using a range of other assistive technologies, instead of a smartphone. Eighteen percent used smart home devices, 14% used screen magnification software, and 7% used screen readers. But 78% of responses to this question listed other technology not included in these options – 28% listed an iPad, 26% used a computer, and 11% used a Daisy Player.

When asked what support services like Vision Australia could do to support their use of smartphones, 37% wanted training, and 34% wanted advocacy for their community to encourage smartphone and app developers to be more accessible. Thirty seven percent wanted more information about smartphones and apps for people with low vision, and 17% would like facilitated connections between people who are blind or have low vision who use smartphones. Financial support, or help obtaining funding for a smartphone, was also noted by 9% of respondents. This is in line with the finding that only 1% of these participants were in paid employment.

Observations beyond the survey questions

The research assistants conducting the survey over the phone were able to garner some important insights and responses that were not necessarily captured by the questions themselves. For example, many participants who did not use a smartphone, believed they did not have enough vision to use one, or used it in a limited manner (for example, just for phone calls), felt their responses were not of value and as such, either did not complete the survey or 'skipped' most questions. This reflection is important for recognising the different ways in which a lack of accessibility is managed or accepted by individuals.

The length of time participants had their smartphone also impacted responses. Whilst the survey asked participants how long they had experienced blindness or low vision for, the length of time they had been active smartphone users was not captured. Concurrently, there were several participants who used accessibility apps but on devices other than a smartphone (such as a tablet), but this uptake was not captured in the scope of this survey.

The final question in which participants were asked to provide feedback on the ways in which Vision Australia might assist in smartphone use was met with some uncertainty. For example, some interpreted the question as a 'rating' of Vision Australia's service. Others noted that the question did not capture where

participants feel the responsibility for accessibility lies – often noting that they are happy with Vision Australia’s service, but that the inaccessibility of smartphones and apps require the developers to change their approach.

Survey Conclusions

The most significant conclusion that can be drawn from this research is that a large proportion of people who are blind or have low vision do use smartphones; they are a part of their everyday lives and used for a broad range of purposes. Furthermore, the broad adoption of this device is a recent phenomenon – there has been a 365% increase in smartphone use in less than five years.

- While age still plays a role in determining uptake, the age ‘gap’ is decreasing, and only statistically significant in the over 75’s.
- Age does play a role in the breadth of use – noticeable in app uptake and broad range of use.
- The level of vision of participants, and the duration in which people have experienced low vision or blindness, also effect smartphone use; this being the key determinant in the reasons participants gave for not owning a smartphone.
- Accessibility apps were used by approximately 50% of participants, but many participants were unaware of these apps and their capabilities. Those that do use accessibility apps still face a range of issues, limitations and a lack of accessibility.
- Voice assistants (eg. Siri) were the most popular accessibility feature of the phone, but other assistive features were less used. Again, level of vision and a lack of familiarity with these features plays a significant role in their use.

There is a broad desire for more information, education and assistance in using smartphones in the blind and low vision community. However, any possible intervention to increase the breadth of smartphone use is not a simple, one-size-fits-all strategy. As our survey results have revealed, individual contexts, age,

tech-proficiency and level of vision all impact on the way people use their smartphone. Thus, returning to the deficiencies we identified in existing research, technology needs to be understood as it is used, rather than as the solution to accessible use.

Interviews: the impact of COVID-19

Following the conclusion of the survey in mid-March 2020, Australia began experiencing a rapid increase in COVID-19 cases and entered an unparalleled time of public health controls and regulations, self-isolation and community health anxieties. As 'stay-at-home' rules were enforced and businesses closed or moved online, there would likely be impacts upon how and what people used to stay connected, mitigate a lack of face-to-face access to services and spend their time at home. As such, researchers on this project wanted to identify whether the COVID-19 pandemic had likewise affected the way in which people with low vision or blindness used their smartphone.

Participants on the initial survey who had stated they would like to be a part of further research were contacted and researchers completed interviews with 13 individuals. Out of the 83 individuals who had indicated they would like to be a part of further research, three people responded to our email questions about changes to their smartphone use during the COVID-19 pandemic, and a further ten people who had listed a phone call as their preferred contact responded to our questions via a phone interview. The age range of participants included 23-83, all but one of which owned a smartphone. Participants resided in a mix of rural and urban locations, across the states of Victoria, New South Wales, Queensland and Western Australia. They were asked eight questions about their smartphone use during the COVID-19 pandemic in a semi-structured interview (see Appendix 2).

Interview Results

Overall, smartphone use increased across all but one participant (who did not own a smartphone). However, what they used their smartphone for did not change significantly.

I always did use social media to connect with many friends and family and that didn't change, other than, I did use it more often.

I've used it a lot more. It was very helpful as I was working from home.

I used my phone for a lot of different things before Covid, so I guess I generally just use it more. In particular, I used Teams and shopped more online.

Conversely, for people who were newly blind, or undergoing life changes, the COVID-19 pandemic had a significant impact on the way they used their phones. For these individuals, different functions, apps and combined online/offline strategies were employed.

I'm newly blind, or have been for less than a year. I was going to get assessments, voice readers... but this was halted or attempted over zoom. And zoom was really challenging and hard for this.

I had just received my guide dog and we weren't able to finish training, and then the trainer couldn't come because of Covid. I used my smartphone to help finish the training.

For others, isolation was seen as an opportunity to use their smartphone for more leisure purposes, such as reading or watching television and videos.

I was connected to it 12 hours a day! A lot of streaming tv/ entertainment purposes.

I used the Vision Australia library a lot.

I used it for reading as I had more time.

Another participant noted that other leisure practices, such as playing games on a smartphone, were limited for people with low vision.

There was also an increased use of communication apps and features, such as Zoom, social media, and various messaging apps. Zoom, Skype and Teams were utilized more in professional contexts (such as for people working at home), with several participants noting that learning how to use these apps was a challenging

process. Interestingly, despite accessibility barriers, most expressed that they would use the apps they adopted during COVID-19 again.

I will use YouTube more, not Zoom which I don't really like... it's messy and you have to be very proficient to use it... I prefer Skype.

Learning how to set up Zoom meetings was difficult... but I will use Zoom again.

Moreover, over half of the participants interviewed saw the shifts in increased use of smartphones and related technology during the pandemic would elicit a 'cultural shift' and continue beyond the alleviation of social distancing restrictions.

Our workplace is using Teams a lot more and I think they will continue to do this.

I will use the note taking app and online shopping from Woolworths. And I'll try and get a new, better phone. I assume I will use Zoom etc, as I think people will be working from home more, the office culture is changing anyway regardless of my vision.

Smartphones were also used creatively to circumnavigate the restrictions that COVID-19 brought on people's everyday lives.

My support walker would come and video the walks [with my new guide dog], I would send the videos to the trainer, and we would later call to discuss how things were going.

I took photos of my disability card, which allowed people to come and take me for a walk, and not be stopped by the police for breaking the rules.

The cost associated with increased smartphone and associated technology use was varied; while many didn't identify a direct increase, other participants experienced a financial impact through increased internet use, cost-per-minute services such as Aira, or a reliance on support workers, taxis and tech support.

The Australian experience of the COVID-19 pandemic provides some unique insights into how people perceived the health concerns/threat, experienced isolation, and interacted with the social distancing regulations. Though infection

rates in Australia rapidly increased for a brief time, the spread of the virus was relatively contained, thus the fear of infection for many people was both brief and relatively localised (however, as this report goes to print an increase in rates of infections in Victoria may undermine these perceptions). Most of the people interviewed were not overly concerned about the impact of COVID-19 on their own health as they believed they had a statistically insignificant chance of contracting the virus. Many expressed that the threat of the virus was minimal in their area and did not affect everyday practices significantly.

I wasn't as worried as my area wasn't effected/there weren't cases near me. I used hand sanitizer etc more, just for peace of mind.

I didn't really avoid touching things or going places, I just washed my hands more.

My human guide/support worker still worked we just took more precautions. However where I live there was very few cases so I wasn't as concerned.

This feeling of being 'unaffected' by the pandemic was also reiterated in the response to the question about whether they had downloaded the government COVIDSafe app. Several participants did not believe it was relevant to them as they either lived in a rural/remote area, did not travel, or did not use public facilities often.

Furthermore, most participants expressed some scepticism about the app, both its effectiveness and the way their privacy/data would be used.

I didn't download the App because, of the adverse reports on its tracking capability, particularly on iPhones. If I had felt confident it would do what was intended, I would have been more than likely to have installed it.

I did [download it]. I felt it was socially responsible. Not many people I know have it. They don't trust the government, the amazon cloud, whatever.

I didn't get it. I wasn't sure where my information would end up.

I downloaded the app, but then I took it off, my wife was concerned about privacy.

Other participants stated that the app was not accessible to them.

When it was first downloaded onto my phone there was only one button that was unidentifiable.

I tried but it was quite difficult.

I did download it, but my son had to do it for me.

The responses from people interviewed about the effect on their smartphone use during the COVID-19 pandemic identified that the role of this everyday device is amplified in a health emergency context. The smartphone is used more, but not always in new ways. When participants did attempt to learn a new function or app, the process was often difficult and exacerbated by inaccessibility, yet once mastered the new app was appreciated and embraced.

The limitations and inaccessibility of the device for different individuals is also magnified when alternative support structures are removed, exacerbating isolation and disconnection. Blind and low vision users employ creative and adaptive techniques, combining technology and human support, to remove accessibility barriers and limitations imposed in a health emergency setting. A lack of uptake and scepticism about the COVIDSafe app mirrors findings on the broader community's perspective (Simko et al 2020). Furthermore, as highlighted in previous research, people with disabilities may exhibit increased privacy concerns and participate in more active privacy management (McRae et al 2020).

It should also be noted that the interview responses provided were a snapshot of a response to a relatively short-lived period of isolation and regulations – the role and function of the smartphone for blind and low vision individuals may have needed to expand significantly as the health crisis is further protracted.

Recommendations

Government

The smartphone has become a significant tool for the blind community, and the development of a range of accessibility apps and in-built functions has supported this uptake. However, funding for smartphones as an accessibility tool remains heavily restricted. We recommend that the smartphone become recognised by the NDIS as a valid accessibility device for people with low vision or blindness.

Given the respondents to our COVID 19 study represented a particularly vulnerable group of the population both in terms of age and disability, the drawbacks expressed in relation to the Federal Government's contact tracing app are particularly concerning. Any similar initiative in the future, both in Australia and internationally, will need to address as a priority the concerns raised here about accessibility and privacy, as this has clearly been a critical point of failure for the adoption of this app by this group.

Smartphone designers and app developers

App developers, device designers and service providers need to be aware that the blind community are smartphone users.

However, there is a myriad of 'types' of users, and a range of factors which impact use. Our own attempts to develop an accessible survey for this project highlight how important cross-platform compatibility is: the capacity to be read by a screen saver, across browsers and by users with varying levels of tech literacy highlights that access is not unitary.

Our participants actively use voice assistants, but limited uptake of other accessibility features suggests these features require further development or promotion. User led research, that captures the full spectrum of low vision and blind consumers, should be at the forefront of accessibility design and development.

While there have been significant improvements in creating accessible operating systems, 'mainstream' app developers should make sure their smartphone apps

are also accessible. Accessibility is not only the responsibility of smartphone designers. We recommend employing app store accessibility policies, ensuring app developers meet access requirements for all users. Current app store guidelines should likewise be expanded beyond the current technical focus to emphasise usability and operability for the end user.

Industry

Our survey has identified that people who are blind or have low vision are a significant smartphone consumer base, using their devices for banking (39%), online shopping (24%), and other purposes. However, capitalising on this increasing use of smartphones and apps requires both targeted information for the blind community on what apps are available, and ensuring their accessibility. 'More apps' is not a remedy for increasing consumers, rather users ask for *compatibility, usability and reliability*. The emphasis is on quality rather than quantity.

People who are blind or have low vision are also avid entertainment and media consumers, with a significant proportion (57%) using their smartphone to access podcasts, listen to music or the radio. With the onset of audio description on broadcast television, now is an opportunity for online videos and television to also embrace this accessible technology.

Service providers for the blind and low vision community

Service providers, and specifically Vision Australia, play a crucial role in the way people with low vision or blindness use their smartphone – over 50% consulted Vision Australia when determining what features or apps on their smartphone could be useful for them. While many of our respondents spoke positively about the organisation, more information and education about the capabilities and functions of their smartphones were desired, with 37% wanting more education and training, and a further 37% wanting more information on smartphones. The cost and location of services remains a contributing factor in the uptake and use of smartphones, with clients in rural areas or with less financial support requesting more assistance.

Across all sectors

The experience of the COVID-19 pandemic is an opportunity to consider how a health emergency (and indeed, any large emergency context) exacerbates digital inequalities. As online shopping, telehealth and video/audio conference apps become normalised during and post-pandemic, usability, compatibility, information on and training in these services should be proactive rather than reactive.

Our research occurred at a relatively early stage of the pandemic, and indicated an increased use of, and reliance on, mobile digital technology in general, and smartphones particularly in response to the conditions created by the pandemic. As the consequences of this public health emergency continue to evolve, it is important that access to these devices and associated technologies by all people, and particularly those with blindness or low vision, are monitored and enabled.

Finally, we recommend that the responsibility for accessibility is embraced and shared across all sectors, recognising that access is not simply established through device design, but achieved through responsive industry, service provider and government policies.

Authors

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Kathryn Locke is a Researcher, PhD candidate and member of the Digital Disability research program at Curtin University. Kathryn has worked within academia for a decade, most recently in the field of accessibility and disability. She has held research roles on significant projects including the ARC Discovery project *Using Smartphones to Navigate Urban Spaces* and is published in seven journals, including several papers that contributed to the advocacy for audio description on television.

Katie Ellis

Katie Ellis is Professor in Internet Studies and Director of the Centre for Culture and Technology at Curtin University. Her research is located at the intersection of media access and representation and engages with government, industry and community to ensure actual benefits for real people with disability. She has authored and edited 17 books and numerous articles on the topic of disability and the media, including most recently the monograph *Disability and Digital Television Cultures* (Routledge, 2019).

Mike Kent

Mike Kent is a Professor in Digital Disability at the Centre for Culture and Technology at Curtin University. His most recent publications include the two volume collection on the future of critical disability studies with Katie Ellis, Rosemarie Garland-Thomson and Rachel Robertson *Manifestos for the Future of Critical Disability Studies* (Routledge, 2019) and *Interdisciplinary Approaches to Disability: Looking Towards the Future* (Routledge, 2019).

Leanne McRae

Leanne McRae is a senior researcher at Curtin University whose expertise ranges across critical disability studies, internet studies, popular cultural studies, terrorism, and education. Her first book *Terror, Leisure and Consumption: Spaces for Harm in a Post-Crash Era* was published with Emerald in 2018. Her second book; *Crowd-Sourced Syllabus: A Curriculum for Resistance* is forthcoming and due for release in 2021. A third book is in preparation entitled *Secrecy, Social Media and the State: Defining Crime, Managing Harm, and Protecting Privacy* and due for publication in 2021.

Gwyneth Peaty

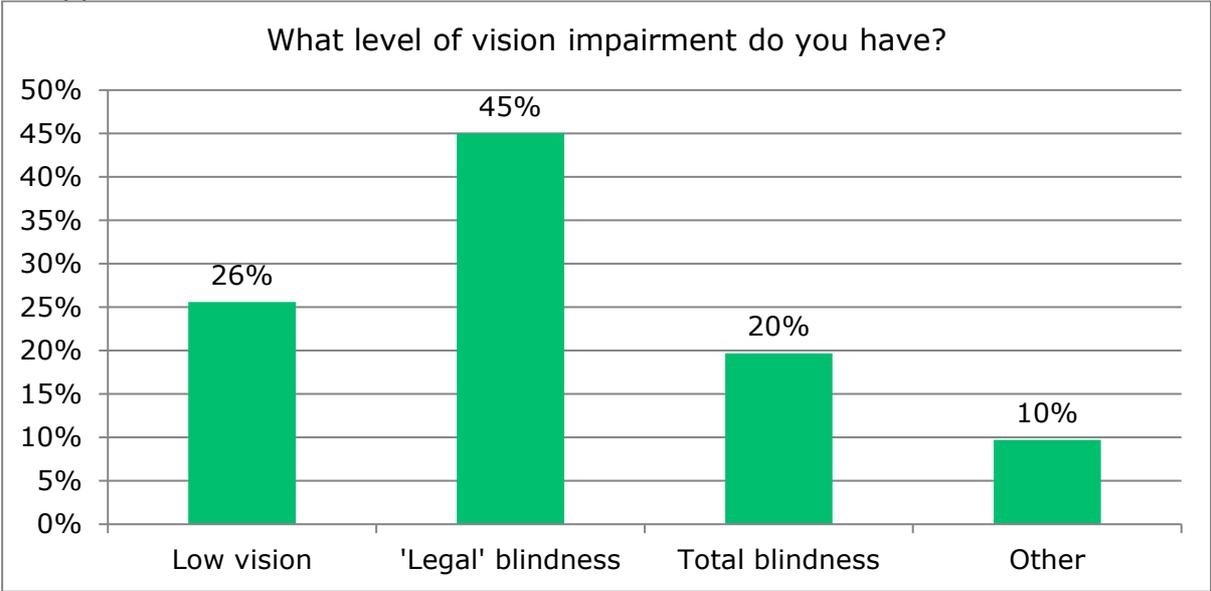
Gwyneth Peaty is a Research Fellow in the Centre for Culture & Technology at Curtin University. Her research focuses on popular culture, digital media, disability, and the Gothic. Recent publications include "Monstrous Machines and Devilish Devices" in *The Palgrave Handbook to Horror Literature* (2018) and "Power in Silence: Captions, Deafness, and the Final Girl" in *The Journal of Media and Culture* 20.3 (2017). Her first book, *The Gothic Gargoyle*, is forthcoming from University of Wales Press.

Appendix

1. Survey results

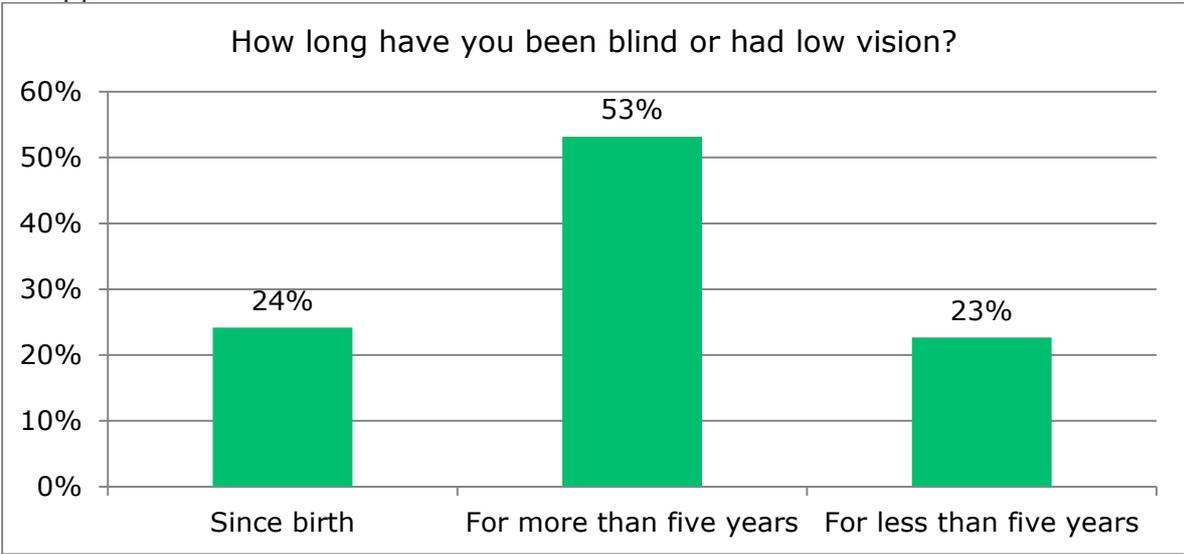
Q1 What level of vision impairment do you have?

Answered 793
Skipped 52



Q2 How long have you been blind or had low vision?

Answered 786
Skipped 59

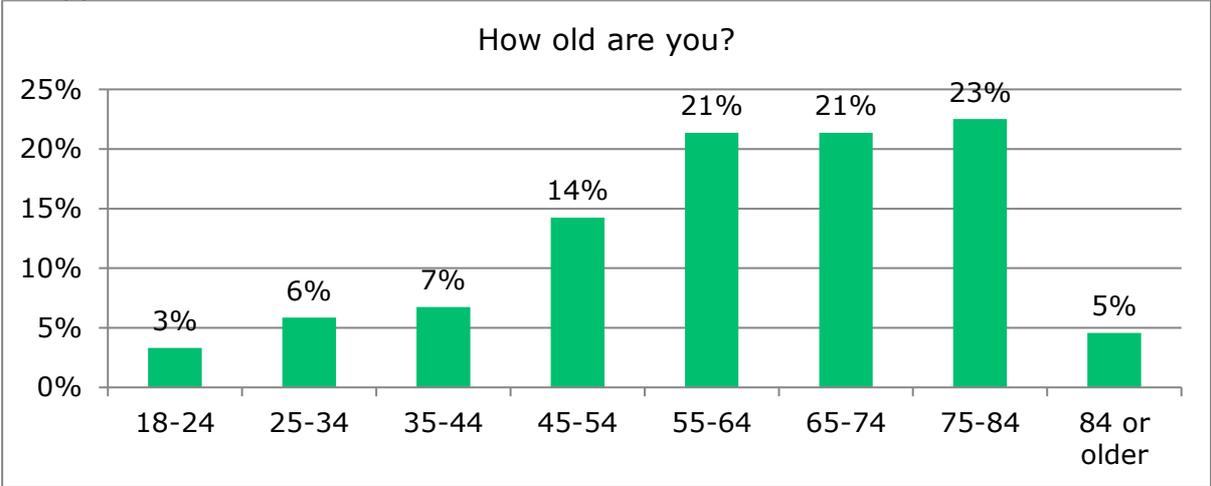


Q3 Do you have any other disabilities?

Answered	784
Skipped	61
No	69.3%
Yes	30.7%

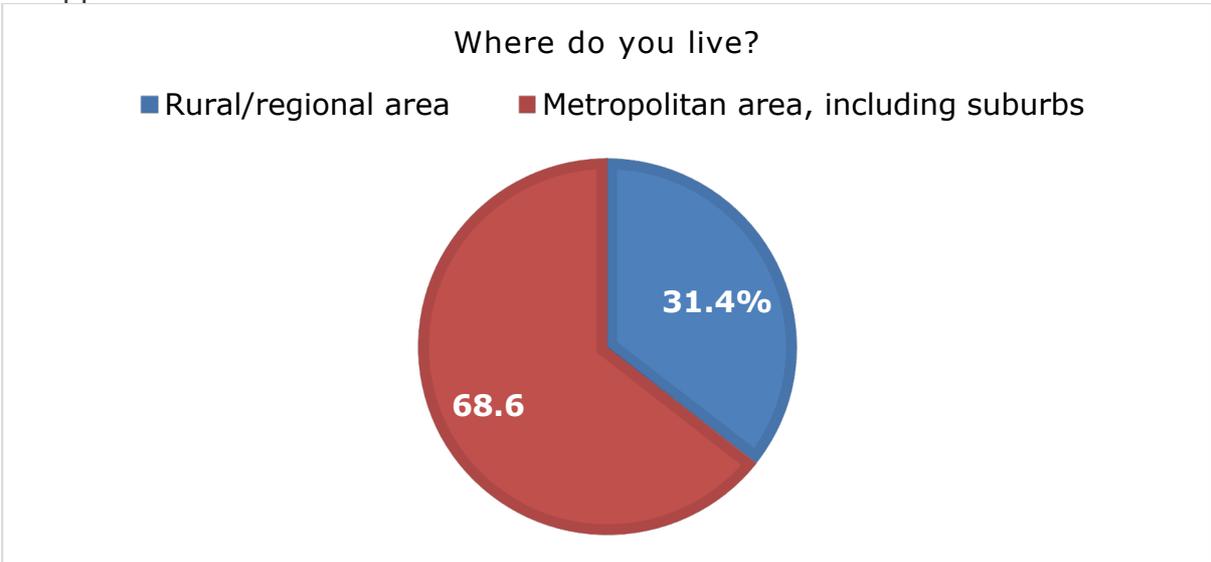
Q4 How old are you?

Answered	784
Skipped	61



Q5 Where do you live? Please provide your postcode.

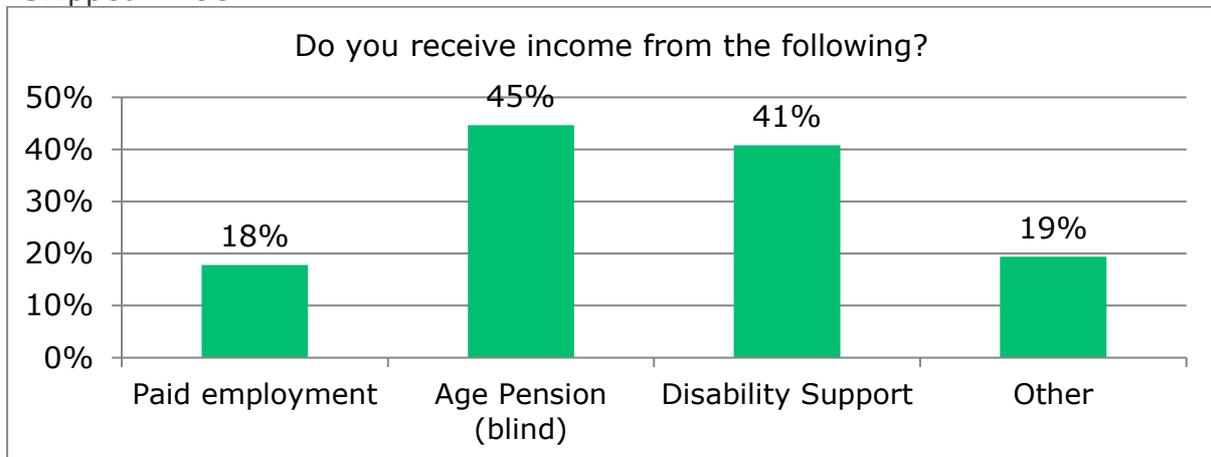
Answered	778
Skipped	67



Q6 Do you receive income from the following?

Answered 752

Skipped 93



Q7 Do you own a smartphone, either outright or on a contract?

Answered 759

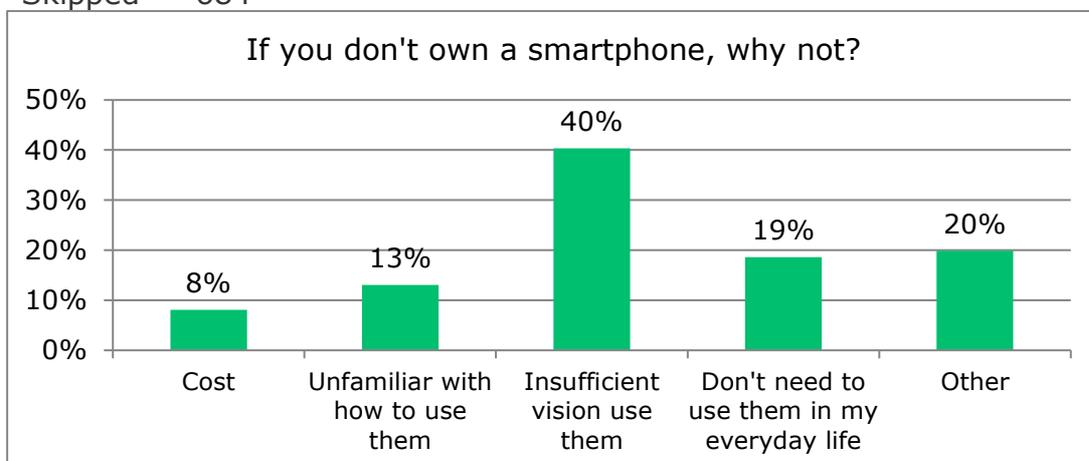
Skipped 86

Yes	79%
No	20%
I have previously, but do not anymore	1%

Q8 If you don't own a smartphone, why not?

Answered 161

Skipped 684



Q9 What funding source did you use to obtain your smartphone?

Answered 603

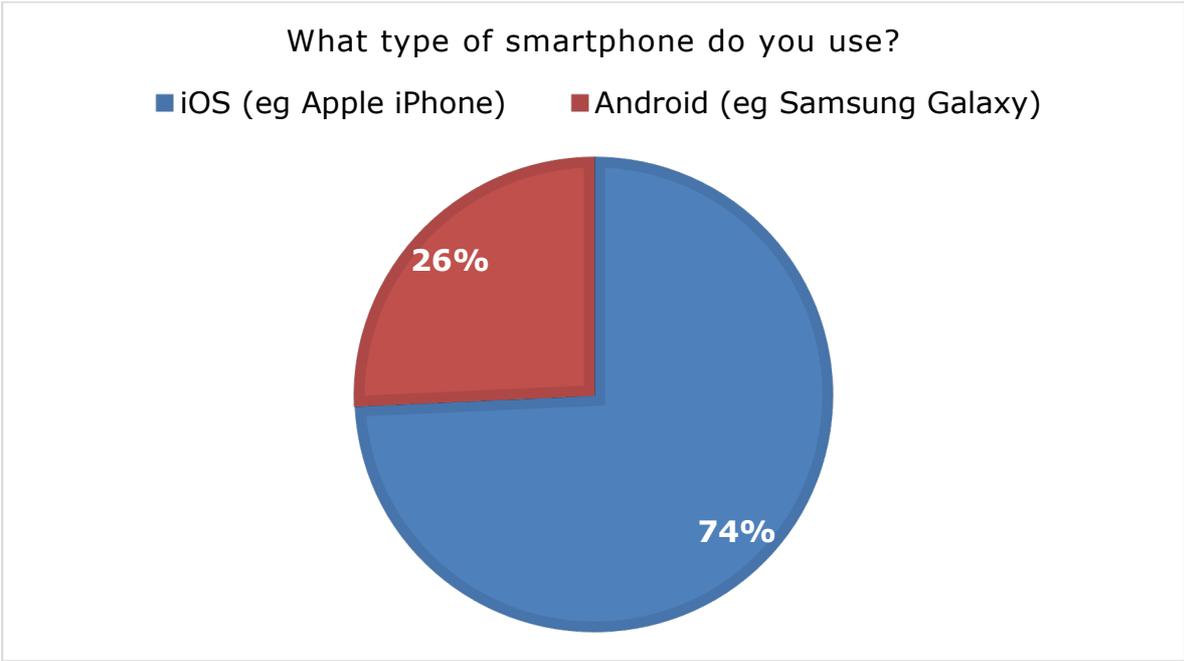
Skipped 242

Personal savings	83.8%
Job Access	0.7%
National Disability Insurance Scheme (NDIS)	3.0%
My Aged Care (MAC)	0.5%
Other	12.1%

Q10 What type of smartphone do you use?

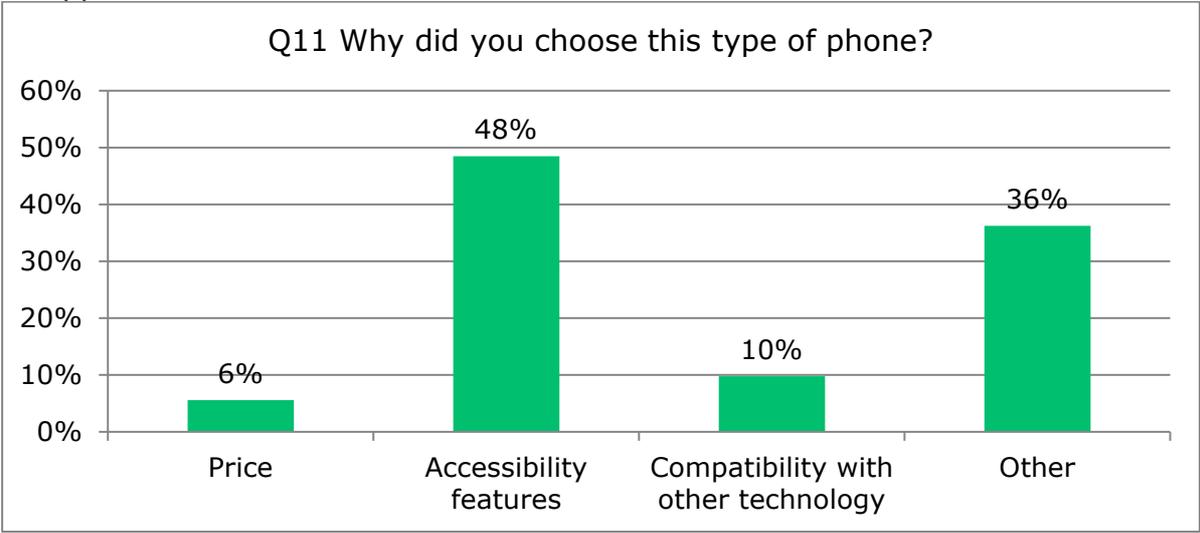
Answered 618

Skipped 227



Q11 Why did you choose this type of phone?

Answered 613
Skipped 232



Q12 How often do you use your phone?

Answered 620
Skipped 225

Throughout the day	84%
At least once a day	9%
2-5 times a week	4%
Once a week	1%
Less than every week	2%

Q13 Which of the following activities do you use your smartphone for?

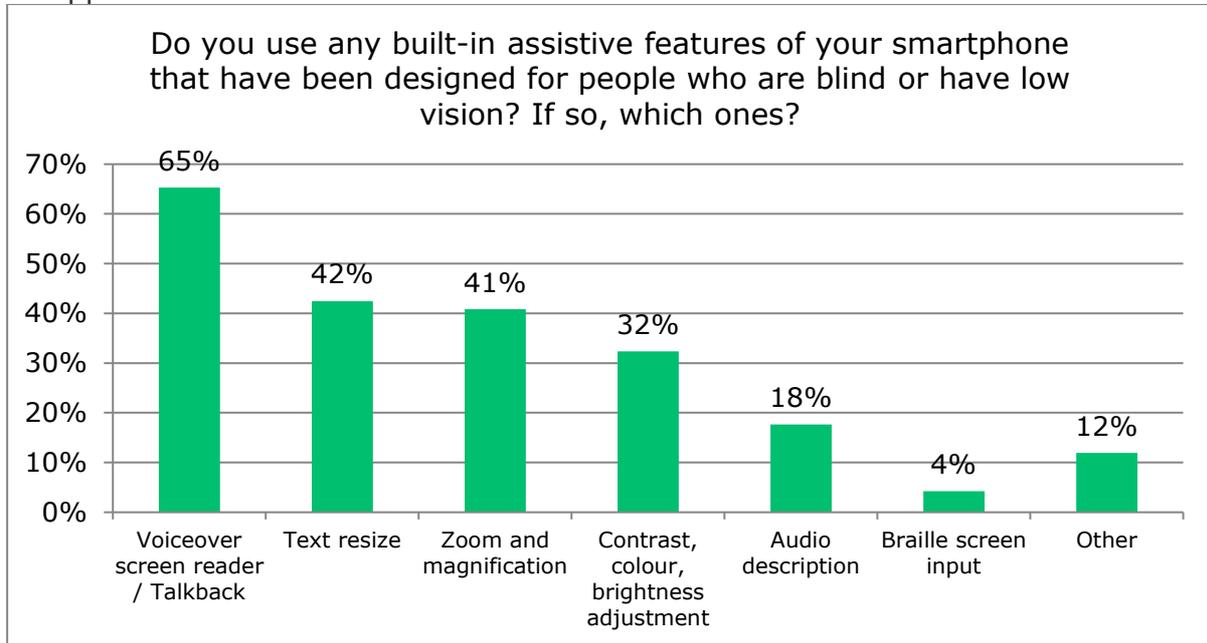
Answered 622

Skipped 223

Making or receiving phone calls	97%
Sending or receiving text messages	86%
Sending or receiving emails	58%
Listening to music, radio or podcasts	57%
Checking the weather	53%
Browsing the web	47%
Social media, such as Facebook, Instagram or Twitter	44%
Getting around in the community (eg. navigation/GPS)	41%
Accessing Vision Australia services, including the library	39%
Banking	39%
Booking taxis and ridesharing services	38%
Checking public transport information such as timetables	36%
Reading ebooks	25%
Online shopping, or payment for goods and services	24%
Watching movies or television	21%
Ordering takeaway/home delivered food	18%
Playing games	14%
Other	25%

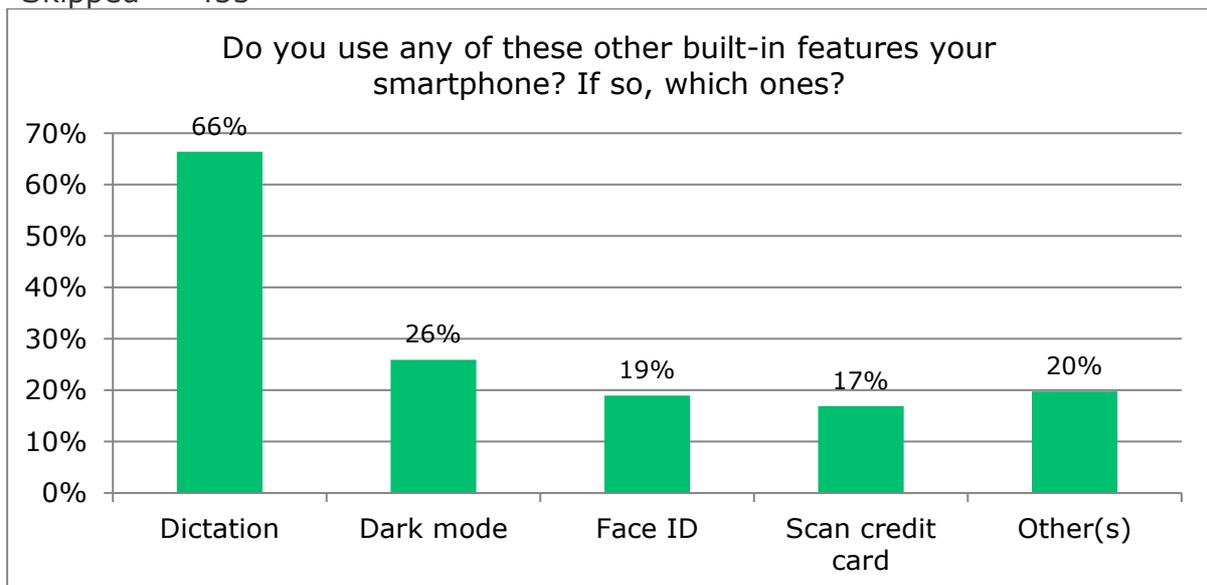
Q14 Do you use any built-in assistive features of your smartphone that have been designed for people who are blind or have low vision? If so, which ones?

Answered 544
Skipped 301



Q15 Do you use any of these other built-in features your smartphone? If so, which ones?

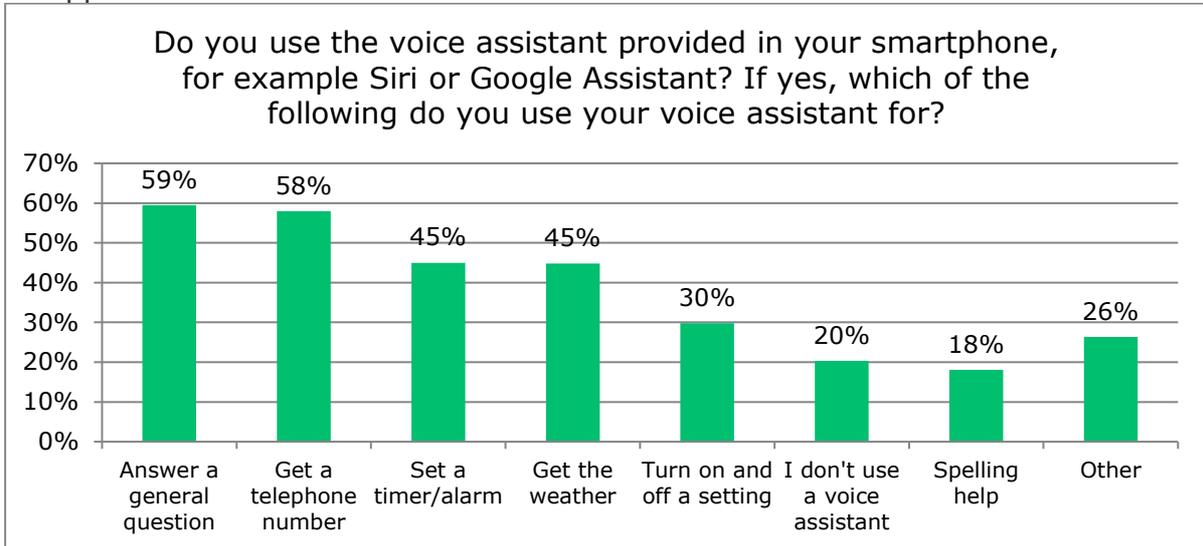
Answered 390
Skipped 455



Q16 Do you use the voice assistant provided in your smartphone, for example Siri or Google Assistant? If yes, which of the following do you use your voice assistant for?

Answered 580

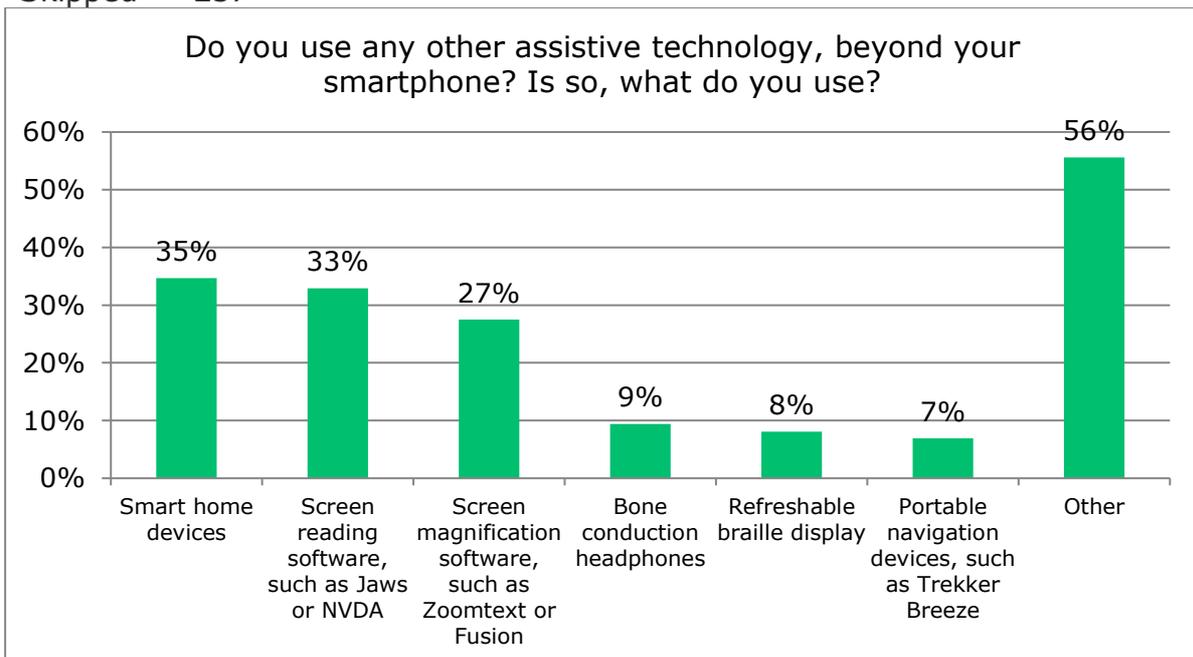
Skipped 265



Q17 Do you use any other assistive technology, beyond your smartphone? Is so, what do you use?

Answered 608

Skipped 237



Q18 Do you use any of the following types of apps which have been specifically designed to meet the needs of people who are blind or have low vision?

Answered 426
 Skipped 419

AI-based apps, such as Envision and Seeing AI	53%
GPS/Navigation apps, such as BlindSquare, Soundscape, GuideDogs NSW/ACT	35%
Reading apps, such as KNFB Reader, Prisma Go, and Voice Dream Reader	33%
Human Assistance apps, such as Aira and Be My Eyes	28%
Object identification apps, such as Tap Tap See and CamFind	19%
Colour identification apps, such as Clothes Colour and Coloured eye	11%
Games apps, such as A Blind Legend	9%
Light detection apps, such as Light Detector	7%
Other	35%

Q19 What apps do you use to help you get around in the community or navigate public spaces? How are these apps beneficial to you?

Answered 373
 Skipped 472

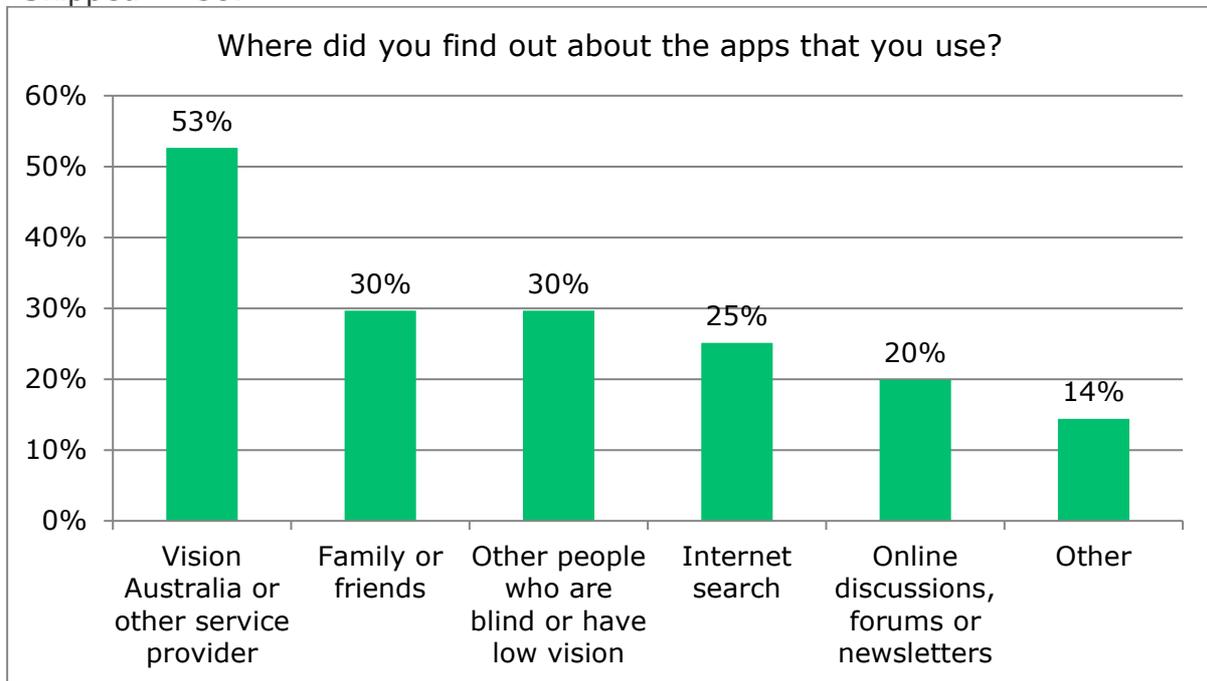
The answers to this open question were manually coded and the top nine response as can be seen in the table below:

Google Maps	34%
BlindSquare	12%
Guide Dog	9%
Soundscape	8%
Moovit	6%
Aira	6%
Apple Maps	5%
TripView	4%
Maps (unspecified)	3%
Do not Use Apps	26%

Q20 Where did you find out about the apps that you use?

Answered 458

Skipped 387



Q21 What issues, if any, have you had with the apps designed for people who are blind or have low vision?

Answered 316

Skipped 529

Glitches/ technical issues	44%
Difficult to use/ understand	38%
Not fully accessible	33%
Cost	18%
Discontinued/ not updated	17%
Features do not work as advertised	17%
Not applicable to my level of vision	15%
Not applicable to my location	9%

Q22 If you have found an app to be inaccessible, what have you done?

Answered 248

Skipped 597

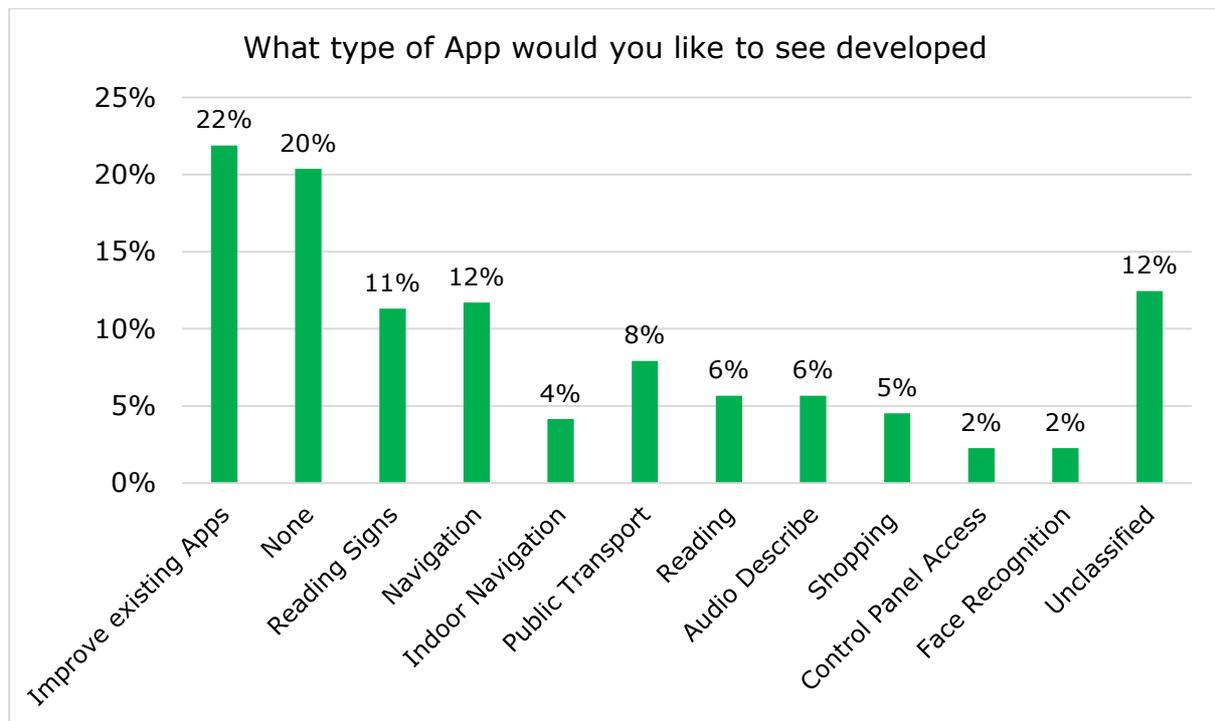
Deleted it/ did not use it any more	69%
Reported it to the app developer	31%
Contacted Vision Australia Help Desk	21%
Left a negative review	13%

Q23 Is there an app that you would like to see developed that would enhance your everyday life? What would this app do? (For example, would it help with identifying objects, read signs or control panels, or help with navigation?)

Answered 265

Skipped 580

The answers were manually coded as can be seen in the graph below



The largest groups of answers from 22% of respondents called for improvement in the accessibility of existing apps. This group included comments such as:

All apps have limitations. Ideally apps that are fully "conversational" would be most helpful; a lot to ask given the current state of technology!

App to improve dictation when sending messages and emails

Others in this category focused on the accessibility of smart phone and their operating systems

Beyond apps we have to encourage big tech that regulate the operating systems to embed accessible technologies into the OS. It should be a requirement for all apps to meet the Play/App Store, they meet certain accessibility standards.

Rather than apps, improve phone functionality/accessibility, and compatibility of these features with apps.

The next largest classification including 20% of responses answered that they didn't have any suggestions. The next largest group related to the development of Apps that can read street and shop signs. Twelve percent suggested Apps to improve navigation – with more than a third of these (4% of the total responses) specifically suggesting improved indoor navigation Apps be developed. Eight percent suggestions related to public transport including accessible timetabling, trip planning, and bus and train stop alerts. Six percent of responses related to improved reading Apps, with another 2% responses specifically requesting better apps for reading digital displays and other control panel access. Six percent of responses related to audio descriptions apps for colours and images, and another 2% specifically wanted better facial recognition Apps. There were 33 responses, 12% of the total, that could not be easily classified in these groups. These included suggestions such as:

App with latest updates on the types of apps available for blind people.

App to use to notify others of being vision impaired by tapping it to display VISION IMPAIRED ie going into a crowd or public toilet area.

A navigation app that alerts me when I'm approaching a steep incline in footpaths.

Finding object that you've dropped.

Warn if vehicles are approaching.

Fuel injection App so that those of us who are mechanically inclined can enter the industry to tune cars and other vehicles

Q24 What role can organisations like Vision Australia play in supporting people's use of smartphones?

Answered 628

Skipped 217

Provide more information on the types of apps and features of smartphones for people who are blind or have low vision	65%
Provide training on how to use a smartphone	65%
Provide advocacy for the blind community to encourage smartphone and app developers to be more accessible	52%
Facilitate connections between people who are blind or have low vision who use smartphones	31%
Other	36%

2. The impact of COVID-19 on Smartphone use: Interview questions and responses

In this second part of the research we interviewed thirteen people who had taken part in the original survey. Twelve of these people used a smartphone and one did not. Six of these people were located in the state of New South Wales, four in Victoria, two in Queensland and one in Western Australia.

1. Has the COVID-19 pandemic changed the way you use your smartphone and what you use it for? Please detail. If your use hasn't changed, please explain why.

No	7 (3 noted that the reason it hasn't changed was because they already used their smartphone a lot)
Yes	6
Used my smartphone more	7
New uses	Zoom, telehealth, webinars, streaming tv/entertainment, Teams, online shopping, Siri, phone calls, Aira, news, internet, podcasts, social media, the emergency services app, health apps, talk to text, podcasts, radio, Facetime, videos

2. Are there aspects of your life that you now rely on your smartphone for, that you didn't before (e.g. do you use FaceTime instead of meeting up with friends, or navigation apps instead of a human guide)?

No	6	
Yes	7	(Navigation apps (3), news and weather, generally used more (8), telehealth, zoom, audiobooks/VA library (3), online shopping (3), Teams/Zoom (3), Facetime/connecting with family and friends (5)

3. What issues or problems have you had using your smartphone at this time?

None	8	
Issues/problems cited	5	magnification, accessibility, no games, difficult to navigate, clarity, privacy, cost

4. Have you had to learn new things about your smartphone as a result? (e.g. finding out about new apps or accessibility features?)

No	8	
Yes	5	had to research more, rely on help, phone isn't right for me, online services, zoom, Victor screen reader

5. Has your cost of living been affected by an increased use of or reliance on smartphones and other technology?

No	8
Yes	5

6. Has COVID-19 changed other practices or technology uses (for example, have you avoided shared surfaces such as braille signs)?

No	8	
Yes	5	guide dog use, avoid touching tech/surfaces, photo of disability ID, more help, hand washing

7. What are your thoughts on the COVIDSafe app released by the government? Have you downloaded it? Have you found any accessibility issues with the app?

Downloaded	6
Did not download it	8
Accessibility issues cited	4

8. Will any of the changes you have made to your smartphone use in the past weeks continue when the pandemic and associated regulations have passed?

No	5	
Yes	7	keep new apps used, online shopping, Zoom (2), Teams, Aira, podcasts, Skype

Glossary

AI: artificial intelligence

Aira: a visual interpretation service and app that uses sighted guides to describe a user's setting via access to their smartphone camera

AT: assistive technology

Blind Square: a GPS and navigation app which describes navigation, points of interests and locations

Bone conduction headphones: wireless headphones that transmit sound to the inner ear via the skull, bypassing the eardrum.

DAISY Reader/Player: an audio book device using a Digital Accessible Information System that reads DAISY formatted text as audio, and allows the user to navigate the text (e.g. search, bookmark).

GPS: global positioning system

NDIS: National Disability Insurance Scheme

Sound Scape: an audio mapping app that uses audio cues to aid in navigation and descriptions of settings

Teams: Microsoft app for group conversation, video/audio conferencing and file sharing

Zoom: an app for group conversation and video/audio conferencing

References

- Beaunoyer, E., S. Dupere and M. Guitton. 2020. "COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies," *Computers in Human Behaviour* <https://doi.org/10.1016/j.chb.2020.106424>
- Colligan, Sumi. 2004. "Why the Intersexed Shouldn't Be Fixed: Insights from Queer Theory and Disability Studies", in *Gendering Disability*. Eds. Bonnie Smith and Beth Hutchinson. New Brunswick: Rutgers University Press.
- Crossland, Silva and Macedo. 2014. "Smartphone, tablet computer, and e-reader use by people with vision impairment", *Ophthalmic and Physiological Optics* 34(5): 552–557
- Ellis, K. and G. Goggin (2015). *Disability and the Media*. New York, Palgrave Macmillan.
- Götzelmann, Timo. 2014. "Interactive Tactile Maps for Blind People using Smartphones? Integrated Cameras", Proceedings of the Ninth ACM International Conference on Interactive Tabletops and Surfaces, 16 November, 381-385.
- Griffen-Shirley, N., D. Banda, P. Ajuwon, J. Cheon, J. Lee, H. Park and S. Lyngdoh. 2017. "A survey on the use of mobile applications for people who are visually impaired", *Journal of Visual Impairment & Blindness* 11(4): 307-323.
- Martinello, N., W. Eisenbarth, C. Lehane, A. Johnson & W. Wittich. 2019. "Exploring the use of smartphones and tablets among people with visual impairments: Are mainstream devices replacing the use of traditional visual aids?", *Assistive Technology*, November. DOI 10.1080/10400435.2019.1682084
- McNaughton, D., & J. Light. 2013. The iPad and mobile technology revolution: Benefits and challenges for individuals who require augmentative and alternative communication. *Augmentative and Alternative Communication*, 29(2), 107-116. <http://dx.doi.org/10.3109/07434618.2013.784930>
- McRae, L., K. Ellis, M. Kent and K. Locke. 2019. Privacy and the Ethics of Disability Research: Changing perceptions of privacy and smartphone use, in *Second Handbook of Internet Research*. Eds. J. Hunsinger, L. Klastrup and M. Allen. Springer: 413-429
- Morris, J., M. Sweatman and M. Jones. 2017. "Smartphone use and activities by people with disabilities: User survey 2016. *The Journal of Technology and Personas with Disabilities* 5(22)

Peng, E., P. Peursum, L. Ling & S. Venkatesh. 2010. "A smartphone-based obstacle sensor for the visually impaired" in *Ubiquitous Intelligence and Computing*. Eds. Z. Yu, R. Liscano, G. Chen, D. Zhang and X. Zhou. Vol 6406. Berlin, Heidelberg: Springer.

Reyes-Cruz, G., J. Fisher and S. Reeves. 2020. "Reframing disability as competency: Unpacking everyday technology practices of people with visual impairments", *CHI '20: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, April 2020.

Rodriguez-Sanchez, M., M. Moreno-Alvarez, E. Martin, S. Borromeo, & J. Hernandez-Tamames. 2014. "Accessible smartphones for blind users: A case study for a wayfinding system," *Expert Systems With Applications* 41(16): 7210-7222