

Comparing Older and Younger Adults Perceptions of Voice and Text-based Search for Consumer Health Information Tasks

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Abstract

The increased prevalence of voice search presents opportunities to address consumer challenges accessing online health information. However, it is essential to understand how users' perceptions of voice affect their search processes for health information, concerns, and different scenarios for using voice for health information tasks. We conducted semi-structured interviews with 16 younger (18-25) and older (60-64) adult participants to understand and compare their perceptions of using voice and text-based search for non-health-related and health-related tasks. While most participants preferred traditional text search, younger adults were not inclined to use voice search for health information due to concerns about privacy, credibility, and perceived efficiency in filtering results. Older adults found voice search potentially beneficial for reducing manual query generation burdens; however, some were unsure of how to use the technology effectively. We provide a set of considerations to address concerns about voice search for health information tasks in the future.

Introduction

While consumer-facing voice technologies (e.g., browser-based voice search, mobile assistants) have been around for some time, advancement in speech recognition and natural language understanding have led to a growth in the use of these technologies in everyday life. Some online voice-search technologies such as Google Voice and Microsoft Cortana allow users to navigate visual user interfaces by performing traditional keyword searches using their voice. Others such as Apple Siri and Amazon Alexa act as assistants to find information on behalf of the user. Each approach has pros and cons, but for each approach voice is perceived as a more natural and convenient way of interacting with information and for completing search tasks¹⁻⁴.

The availability of voice technologies and their perceived efficiency has also led to an increased interest in using these technologies to support health information tasks. Several researchers have investigated the potential usefulness of voice to help different users obtain information and resources regarding their health^{2,5-15}. Yet, early findings are mixed as some users see potential while others feel that using voice for health tasks poses safety concerns¹⁶. Despite concerns, research in this area is growing leading to a need for closer examination and additional empirical evidence of users' experiences with voice for health search tasks to identify ideal use cases and ways forward.

In this paper, we build on prior work to examine older and younger adults' perceptions of voice search for consumer health information tasks. We purposefully recruited to compare older and younger adult experiences due to potentially different generational and technology experiences. We conducted semi-structured interviews with 16 participants (6 younger adults and 10 older adults) that searched for online health information using text-based input and voice. For the purposes of this study, we did not limit voice search to a particular type of device (e.g., online voice search vs. voice assistant) because we wanted to understand a wide range of experiences with the two different online voice search methods. We found that both older and younger adults utilized the Internet as a supplement to doctor's advice and explore alternative treatments. Both appreciated the convenience of being able to search for health information online and felt that it provided them an opportunity to become a more informed patient. However, both groups experienced challenges with searching for information online particularly with gauging the credibility of the information and health literacy. When it came to voice however, younger adult participants were more critical, sharing that they believed that using voice did not provide the depth of insight needed to be able to compare information when searching for health topics. In comparison, older adults were more receptive and hopeful about using voice for health, suggesting that if some open issues could be fixed, they felt it would be more convenient than traditional text-based keyword search. We discuss our findings in relation to prior work and make suggestions for improving older and younger adults' experiences with voice search for health in the future.

Related Work

The Internet has become a key resource for finding and accessing information and helping patients become more engaged¹⁷⁻²². However, for some tasks such as for health information search, finding and navigating information can be challenging^{20,23-28}. Over the years, there have been many efforts to improve users' interactions with online health information through computational means, many of which have focused on older adults. For example, some researchers have explored guided search to assist older adults with navigating health information online²⁹. Other interventions have focused on improving older adult's online health literacy³⁰⁻³². However, in recent years, there has also been widespread interest in examining how voice technologies can support health and wellness.

A review of the use of conversational agents in healthcare reveals that voice technologies and other conversational user interfaces are increasingly being explored to support healthcare tasks ranging from mental health to chronic disease management⁷. With the increase in voice-based technologies available to consumers, interest in exploring technologies such as voice assistants for both clinical^{5,6,8,10} and home¹⁰⁻¹³ healthcare delivery is also growing. Studies have explored using emerging voice-technologies to support independence and wellness in the home of older adults^{2,11,12,14,15}. Several researchers have also explored voice technologies to support aging in place^{2,11} while others have examined the potential of voice technologies for navigating and providing access to different types of health information^{5,6,8}. For example, recently researchers have explored the use of voice assistant technologies for supporting healthcare delivery tasks during the pandemic noting the benefits and barriers of existing voice assistant devices⁸.

For older adults and other users, voice-based technologies are often perceived as more efficient¹⁻⁴ and are thought to provide advantages for supporting access to information among older adults and people with disabilities^{4,33}. Because of these perceived advantages, voice technologies have gained renewed attention in recent years to examine uses for informational tasks such as health search. For example, O'Brien and colleagues examined reviews of popular commercial voice assistant technologies to understand how older adults are using devices, and beyond typical uses such as entertainment and smart home control, they also found that older adults were using voice assistants for memory aids, companionship, and emergency communication.² Nallam and colleagues found that low-income older adults perceived voice assistants as a potentially efficient way to improve their access to health information and resources at home but like others^{14,34-36}, had concerns about the privacy and security of health information shared with the device. On the other hand, early research suggests that using certain voice-based technologies might leave users susceptible to other risks. Bickmore and colleagues for example, found that while most commercially available voice assistant devices can make the search for health information more efficient, they also place users at risk for unsafe behaviors, particularly if the user acts on the advice without proper knowledge of how to use the information returned¹⁶. However, despite concerns, some suggest that with improvement voice and other conversational technologies could transform how older adults engage with health information and resources^{2,11,44}. But, there is still limited understanding of the usefulness of voice search for health. In this paper, we examine younger and older adults' experiences searching for health information online to compare their experiences and perceptions of using voice search for consumer health information tasks.

Method

We conducted semi-structured interviews with 10 older adults and 6 younger adults to understand their experiences using traditional, keyboard and emerging, voice search technologies for health-related and non-health-related tasks. In this section we discuss our purposeful recruitment method and our data collection and analysis procedures.

Participants

Participants' ages ranged between 18 to 64. Because one goal of our study was to compare experiences, we purposefully recruited participants in the age range of 18-35 (younger adults) and above the age of 60 (older adults). Our reasoning for selecting these groups was to understand if differences in responses might occur based on generational experiences with technology. Older adult participants were recruited from a local senior center, while younger adult participants were recruited from the local community. Prior to their selection, potential participants were informed of the main inclusion criteria: experience using traditional, text-based keyboard or voice search and experience searching for health information online. Interviews were conducted either in person or remotely at a time of convenience for both participants and researchers. Interviews took place before the COVID-19 pandemic. Of the sixteen participants, nine of the older adult participants were female and one was male. Half had a college degree, either an associate's or bachelor's degree, two participants had a high school degree, one had vocational training, and the remaining two participants had college credit but no degree. Three older adult participants had physical impairments and two had visual impairments; however, these impairments did not prevent them from searching online

using typed search and voice search. Of the ten older adult participants, seven used computers, four used mobile devices, and one used a tablet. For younger adults, six used a computer and four used mobile devices. Of the six younger participants, four were female and two were male. Half of the younger adult participants had bachelor's degrees, two had a high school diploma, and one graduated with an associate degree. No younger adult participants reported a disability or impairment.

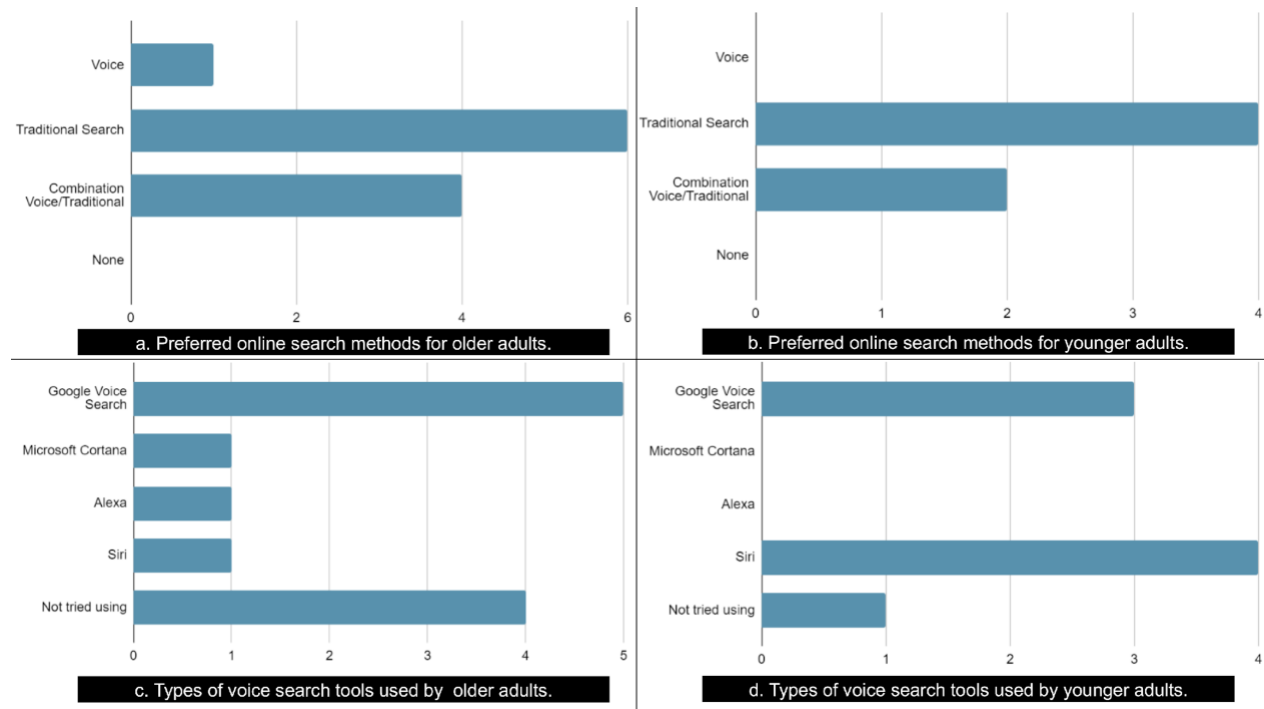


Figure 1. Participants preferred online search methods and experiences with voice search tools.

Older adults and younger adults preferred text-based keyword search for finding information online, however many older adults preferred to use different methods for different situations (See Figure 1). Younger adult participants used Google voice search or Siri while older adults used a wide spectrum of voice search tools including Google voice search, Microsoft Cortana, Amazon Alexa, and Siri. Google voice search was the most used voice search tool among both groups (See Figure 1).

Data Collection

Before commencing interviews, we obtained approval from the Institutional Review Board at Indiana University. During interviews, after informing participants about the study and their rights, we asked participants to complete a background questionnaire to collect demographic data and information about their current technology use for searching information online. We then engaged participants in semi-structured interviews. In interviews, we asked participants to reflect on their experiences by sharing particular instances where they searched for health and non-health related information using each approach. For each scenario they shared, we asked them to reflect on the benefits and challenges of the approach and what they might do differently, if the content (health vs. non-health related) or approach (voice vs. traditional) were changed. To fully understand the common deterrents and benefits of each approach (i.e., voice or text-based search) we asked participants to share their general Internet search practices and preferred approach (voice or traditional search), reason and processes for searching for health and wellness information, experiences with voice-based search, and experiences using voice search for health and wellness. To conclude the interview, we focused discussions on the effectiveness and relevance of information provided by their preferred search approach, the benefits and challenges of their preferred approach, and suggestions for future improvements. All interviews were recorded and then transcribed. Participants were asked for consent prior to the recording of the interview. Participants were provided with a \$20 grocery gift card for their time.

Data Analysis

We used thematic analysis^{41,42} to identify emerging themes from the data. Our analysis process entailed two researchers independently noting common codes based on an initial review of each of the transcripts. Following the initial independent coding, the two researchers met to discuss and consolidate codes which led to an initial set of codes that were used in a second round of analysis to code data. Example codes included themes such as search preferences, device reasoning, challenges, and reasons for online health search. In addition to thematic codes, we also grouped the responses of older and younger participants to examine similarities and differences in their responses and approaches. The final stage of analysis included several meetings where the two researchers met to consolidate similar codes under high-level themes which correspond to the subcategories listed in the findings section.

Findings

We discuss and compare younger and older adults' experiences with using voice and traditional, text-based search for health and non-health related tasks.

Experiences with voice and traditional, text-based search for everyday search tasks

While the focus of our interview was to investigate online health search within a broad spectrum, we also sought to compare participants' experiences with the efficiency of voice search versus text-based search for different tasks. Both younger and older adult participants shared different experiences. During interviews, we asked participants about their preferences when searching online, not limited to health information tasks. Less than half of the older adult participants (N = 4) reported feeling comfortable using voice search and preferred it in comparison to traditional, text-based search. The other half of older adult participants were not opposed to voice search but preferred traditional search because they were more familiar with searching for information that way. Three of the older adult participants in this group mentioned they would be willing to use voice search more often if they had better instructions on how to use it. Some older adult participants therefore were hesitant to use voice technologies due to what they perceived as a barrier of entry, and they were not inclined to search online for instructions for a product they used infrequently.

All younger adult participants (N = 6) preferred traditional text search, with only two mentioning consistent use of voice search. Younger participants' inclination towards traditional search was due to their belief that traditional text search was more efficient and accurate. In comparison to voice search, younger adult participants felt that when using traditional text search, there was less of a chance of their query being incorrectly interpreted. Participants also liked being able to manually type in their queries; any mistakes they made could be quickly fixed opposed to the potential additional steps to fix issues related to speech recognition errors. Participant 12, stated, "*I think usually people want information as quickly as possible so if they have to do it manually by typing it out, they'll do that. I don't see the huge need for voice-based search engines unless someone has a disability, that's where I think they're necessary*". Security and reliability were also raised as concerns about using voice search, Participant 9 mentioned, "*Because it [voice search] doesn't feel totally reliable for me these days. I'm pretty sure that'll change in 15, 20 years when they develop and improve the technology, but I don't like the way it works right now*". This participant's criticism with voice search related to the prior concerns about being able to control the search process, participants felt that voice search provided less control for generating queries but also manipulating queries to customize the search. Participants felt that currently the lengths they needed to go through to correct a query mistake ended up outweighing the benefits of a hands-free experience. For those younger adults that used voice search frequently, the reason for use was convenience, specifically when multitasking. Thus, these participants reflected on using voice search in moments such as taking transportation or conducting housework, where they felt the availability of voice search outweighed the occasionally jumbled or misunderstood queries. Therefore, the benefits and participants preferences for traditional search compared to voice search were related to the usability issues they encountered when carrying out search tasks using voice such as issues with speech recognition, use of small screens, and lessened ability to compare results.

Reason for searching health information online

Online health search for most participants, both young and old, provided what participants believed was a good amount and variety of information to support their health decisions compared to other information sources (e.g., books, magazines, etc.). Participants also believed the variety of online materials represented far more people and situations compared to other information sources which they felt was important. Both older and younger adults had similar sentiments about using the Internet to support their information needs regarding their health. Both parties, older and younger, agreed that they would not solely trust the Internet for pertinent health information. However, there were also differences.

All (N = 10) older adult participants mentioned using online health search often. For example, all the older adults interviewed has access to a patient health record or portal that they frequently used to obtain health information provided to them by their medical professional. Participants shared that initially they had to adjust to checking these applications to make updates to their information or view changes in their own health record such as a change in medication or posting of test results. As this became a part of their daily routine, they shared that they would use the Internet to supplement their understanding of a diagnosis of illnesses or new medication. Participant 1 described, *“It’s been a little over a year. But I was diagnosed with pulmonary fibrosis. So, you know, the doctor gave me information and stuff. But I was able to get information [online] to know where I am at, you know, giving me more in-depth information that I could read at my leisure. So, I like that all that information is handy [online], and you can find support groups and all that type of stuff, too”*. Older adults appreciated the ability to seek out information beyond the scope of a clinical setting and felt that searching online was far simpler than what they perceived as waiting on a delayed response from doctors. However, as Participant 1 discussed, older adult participants often shared that they consulted the Internet as a secondary source of information compared to younger adult participants. Older adults shared that they were more often searching the Internet for information about chronic or acute diseases, or medication, thus they were more inclined to seek help from a medical professional to verify the information they found.

Younger adults felt that online health search provided a simpler way to find information and keep it in one place. Young adult participants’ discussions of online health search pertained to finding information for themselves when they were ill or providing information to others who have asked them for suggestions. Some younger participants also suggested that being able to search for information online could help mitigate feelings of stigma when attempting to find information on a topic they felt might be difficult to talk about with others. Participant 8 explained, *“I think [about online health search for] something like a mental health issue, like anxiety it’s just something that’s kind of a stigma that’s hard to talk about ... I think online is somewhere that you can look up this information without feeling stigmatized and without feeling shame.”* Younger participants also brought up concerns about the expense related to seeking information in clinical settings. If it was not a “grave” emergency some younger participants felt it was more economical to search for something for free using a search engine. Participant 12 stated, *“But sometimes you just don’t want to go out your way to talk to somebody else or sometimes it might be private and just a really simple question and you don’t want to have to go to the doctor about it [...] Plus I mean Googling something, that’s free. To go into the doctor is a little expensive.”* Finally, younger adults also felt searching online allowed more opportunities to find instances of what they might be going through. Participant 11 shared, *“I feel searching online is better because the person I might talk to may not have complete knowledge of medicine and may not have faced the sickness I am going through right now. There might be other users who have gone through my state, and who might actually have those similar symptoms where they can confirm they had a particular disease. In that way, I can confirm that I might have a sickness or disease. It might be more confirming than getting information from one person”*. Participants shared that they sometimes found solidarity with others in similar circumstances and at times it brought them comfort in addition to the ideas of different solutions that might address the health problems they are facing.

Overall, health search was categorized as advantageous only to the extent that it was taken simply as supplemental advice, and with awareness that the information could be false. Participants were comfortable searching for health information online if it was not “*extremely*” serious. Therefore, participants expressed that finding credible sources online that could be backed by a healthcare professional was a key part of their home health management strategies.

Challenges Searching for Health Information Online

The previous section highlighted a common theme among all participants regardless of age concerning credibility when searching health information online. In this section, we provide additional insight on the challenges participants encountered searching for health information online. All participants discussed that they were keenly aware that not all information online represented fact and they took this into consideration when filtering through online websites. Participants were also aware that information found about symptoms could not be confirmed without a formal diagnosis from a medical professional. Participant 8 echoed this sentiment, stating, *“But the problem is that you don’t know if it’s accurate. For example, I can look up symptoms, but I don’t know if it’s really the same as my health issue. So, it’s really vague. I would say that you don’t know which source is trustworthy compared to other information so maybe you can know for sure if it’s accurate”*. Most participants felt that filtering information for credibility was challenging due to different users’ capacity to find and process information relevant to their situation. However, older adults mentioned this concern more often. Four older adult participants acknowledged that they found it difficult to discern whether information found in an online health search was relevant or pertained to their situation. Several older adults provided as an example their experience of looking online to search for a symptom they were having only to realize after talking with a medical professional that they were led to diseases that were far worse than what they were

facing. Therefore, while the amount of information on the Internet was sometimes useful, the abundance of information on the Internet also could be problematic.

Establishing credibility when looking for online health information was varied among all participants, with some explaining a more elaborate plan for determining relevance compared to others. Younger adult Participant 11 explained how he filtered through a certain number of queries as follows, *“If I have three symptoms which are related to a disease, ... I type those three symptoms and I get multiple results. I verify with each website, at least four to five websites so they will be mentioning other symptoms that could associate with that disease... So that is how I process the information from the results that I get and also maybe two or three websites that say the same thing, I will go with that result as well.”* One older adult participant, Participant 6, shared that this type of filtering information can be frustrating, *“It’s just general, you know, it’s just like if I would put in rashes or something, so many things would come up and I don’t want to search through this long list of things looking for that particular type of rash or whatever it is.”* Older adult participants overall however were lenient to taking more structured approaches to improve the query by selecting more concise word choices or including additional words even though they acknowledged it was not always clear that it might lead to better information. For example, participant 2 an older adult participant stated, *“and you kind of have to fly by the seat of the pants because you can’t tell what’s perfectly real and what’s not on the Internet. But if you get 2 or 3 different opinions or answers and theirs similar, I think you can take that as its real. I don’t trust everything on there that I read like some people do.”* Like P11 and P2, other participants expressed that they often compared information on different websites to gauge credibility and were more likely to gain confidence with data if it was repeated on different websites. In addition to repetitiveness, participants also found assurances in websites they knew from experience were reliable, such as websites with .org or .gov addresses.

Participants also mentioned they sometimes did not understand the information discussed in online articles due to jargon which made searching for health information online difficult. Participants mentioned issues with health literacy and terminology as one of the main reasons they were often inclined to talk to a health professional for information rather than searching online. Participants also mentioned challenges due to the overwhelming amount of online content. Participant 7 explained, *“That’s a hard part. Like I said, you know you put in one subject in the computer, and it pulls up 50 things for you to look at, you know? That could be very confusing.”* To accommodate challenges some participants attempted to develop strategies to narrow down the amount of information and reduce the time it takes for them to parse through. Some younger adult participants shared strategies of how they would skim through different websites rather than read them completely, because they knew not all information pertained to them. These participants felt that getting the gist of information was more important than complete details. For example, one younger participant shared, *“If I go onto a website and there’s just a lot of information like an overwhelming amount, usually I’ll skim and try to I guess highlight what I’m interested in. That’s usually what I’ll do for most websites because I don’t want to read every single paragraph knowing that it doesn’t relate to what I want to know about.”* Participants suggested that sometimes skimming through websites provided enough information to satisfy their reason for search. However, the amount of information returned, and the time needed to parse through it was still discussed as a source of contempt among many of the participants.

Perceptions of Using Voice for Health-Related Search

Participants varied slightly when asked their comfort level when using voice search for online health. Each group addressed specific concerns that were related to their specific perceptions of using voice technologies for health search. The dominant theme that emerged among older adult participants was that they appreciated having a wide set of health information available online regardless of the search tool. However, they felt that voice search could make it easier to access information, improve accessibility and reduce the challenges associated with generating and typing queries. Participant 6, an older adult, described the efficiency of voice-technologies as a benefit, *“Just convenience is the main thing. Um, not that it takes a long time to type it in, but you have to worry about hitting the wrong buttons and all that. So, it’s so much easier just to say, “Hey, Google”.* Another older adult participant also reiterated the convenience of not making mistakes while typing, sharing that they felt using voice created less confusion and more of the work was being placed on devices opposed to the user. Four of the ten older adult participants had never used voice search at all for online health search but mentioned that they were not opposed to it. Participant 2 stated, *“I wouldn’t be opposed to it ... I don’t have it on my phone. I suppose if I had a phone that would access it [voice search] I would be more inclined to do it”.* The other three participants provided similar reasoning stating that they simply did not understand how to use voice search; however, if they were guided, they would be more likely to use it for online health search.

Younger adult participants were more critical of using voice search for online health than the older adult participants. Only two of the seven participants had used voice search in the past for online health and both participants discussed

that the negatives outweigh any benefits. Participant 12 described, *“It wasn’t bad, but the experience could’ve been a lot more beneficial to me. It gave me websites that were related to what I was trying to search but they weren’t that detailed or in depth as I wanted them to be.”* Being able to access sufficient information was a concern many participants had with voice search even when not conducting online health information. Participants also shared that they felt that the number of responses returned by voice search queries particularly on mobile and standalone devices are fewer, so users are not able to listen and compare multiple sources of information. Unlike older adult participants, all younger adult participants preferred to search for online health information through traditional search methods to gather a wide variety of information and to be able to manually compare results. Younger participants, unlike older adults also felt it more efficient to type and customize queries manually rather than relying on speech recognition. In addition to criticisms about voice supporting effective online health search, participants were additionally concerned about privacy and mentioned that they would be hesitant to ask about certain health topics in public and they might not be for non-health related topics. One participant therefore mentioned that they would limit online health search to situations where they were alone out of fear of revealing personal information.

Discussion

Our findings suggest that older and younger adults have different perceptions of the usefulness of voice search for consumer health information tasks. Most younger adult participants preferred traditional text search for non-health related and health related search tasks citing that voice search can make search in general more complicated and time consuming. Older adults on the other hand saw potential in the use of voice search for improving the efficiency of the search process by reducing challenges they faced with query generation and typing. Therefore, voice search for online health remains a point of contention for both older and younger adult groups. In the following suggestion we discuss potential ways forward for better utilizing voice search to support online health information search processes.

Improving Voice Interactions for Health Search

Our findings align with prior work that has explored the benefits and barriers of voice search more broadly. Prior work notes that older adults often prefer voice for its efficiency¹⁻⁴ and there have been concerns about the practicality of voice search for health-related tasks¹⁶. Our findings imply that despite the growing interest and availability of consumer-facing voice technologies, open challenges exist in using these systems for health-related search tasks. From a younger adult perspective, the potential conveniences provided by voice search were counteracted by the limited set of results often returned. While voice search options are available on web browsers and return comparable results similar to traditional, text-based search, participants often equated voice search with something to be used on the go. Thus, most often participants’ discussions of online voice search were concentrated on mobile or standalone devices which have distinctive design principles that may not be ideal for some health search tasks. Thus, improving voice search for health and more generally may require a closer examination of existing conversational design principles used to guide voice assistant interactions and how these interactions can be reimagined for supporting voice health search. For example, younger adults felt that limited results returned from voice queries did not suit their needs of being able to filter through options. To accommodate a broader range of results, voice search could implement similar abilities to traditional search such as providing a broader range of options but personalize and rank the results based on prior knowledge of the user or using an approach that reveals different options based on predetermined categories. The conversational design could also be altered to provide follow-up dialog to alleviate the potential usability issues that arise when presenting long lists of options on smartphone or voice-only interfaces. Providing interactions that allow users to compare results could move forward voice search for health.

In parallel, older adults raised concerns about not knowing how to use voice search. Older adult participants’ main deterrent to voice health search was a lack of knowledge on how to use technology. Supporting discoverability or a user’s ability to successfully uncover and explore the capabilities of voice-based systems is an open challenge particularly in voice-only systems^{37,43}. To advance voice search for health, use cases should consider options for guiding users through the voice search process. Some participants mentioned that in-person instruction might be the most suitable method for learning as opposed to the typical online and offline user guides. Guides such as these have been found problematic among older adults for promoting transparency in the past³⁸. Thus, moving forward, it would be useful to further explore both technical and non-technical solutions to increasing older adults’ agency in voice search for health.

Addressing Trust and Safety Concerns

Trust and safety concerns mentioned by participants when using voice for health were linked to the lack of credible information available in search results and lack of knowledge of where health-related search queries were being sent.

Apart from voice health search, participants raised gauging credibility of online information for health purposes as difficult. Although participants shared different filtering methods, it was not clear whether different methods garner more verifiable information. The ability of users to identify credible information online in health-related searches is a known issue and we know that the ability to gauge credibility can be impacted by demographics and information source^{39,40}. Participants' criticisms regarding credibility implied that voice technologies provided less transparency and therefore made it more difficult to make decisions which they felt was key to facilitating online health information search.

Gauging credibility of websites prior to displaying results and then providing users with access to that information within the search result list may partially address this issue. For example, systems could rank results based on a credibility score. For voice only systems, the device could capitalize on existing approaches that announce where the information came from (e.g., "according to WebMD diabetes is ...") to provide users with data to help them decide if they want to use the information or not. However, it might be helpful to also provide information to help people gauge credible sources. For example, include information about the website itself to help users decide if they want to take information from that website (e.g., "WebMD is a credible consumer source of information based on ..."). Therefore, providing some indication of the credibility of the information might help users better trust voice-based search and gauge potential risks.

Limitations

While we collected data until we began to see recurring themes in our data (i.e., reached saturation), our study may be limited by our participant demographics. Our participants younger and older were primarily female and most had some sort of college experience. While younger and older adults had different technology experiences, most did use technology. While some participants were familiar with voice search and had used it in the past, there were several participants that shared that they no longer used voice search or limited their use. Also, most participants that used voice for search used voice assistants which are designed to provide different types of search interactions compared to text-based search in a web browser. Therefore, our findings might be limited due to context and the specific demographic of participants. As our study is qualitative with a smaller number of participants, we do not aim for generalizability. We expect that our findings will transfer to similar groups and contexts^{41,42} however additional studies may be needed to determine relevance to other populations of users.

Conclusions

Our study compared experiences with text-based and voice search among older and younger adults for health and non-health related tasks. We found some differences in older and younger adults' perceptions of the usefulness of voice for conducting health search tasks. Our findings suggest that the potential to use voice for health information search tasks still requires several improvements. A combination of increasing transparency of search results when interacting with voice-based technologies and improving voice search recognition and filtering will be essential to increase acceptance and use. Continued studies examining participant concerns, especially studying individual use, is one of our next steps to better understand the usefulness and feasibility of voice for supporting health information tasks. In addition, we will further divulge the necessary requirements for improving conversational design to accomplish transparent and efficient voice-based health search.

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