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Disabilities and User Experience.

An exploratory case study of survey and website accessibility.

A. Miller, Middle Tennessee State University, United States,
a.miller@mtsu.edu

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Abstract: There is a lack of research regarding the challenges experienced by people with disabilities when taking surveys or participating in usability testing. Websites, digital health applications, and electronic books are products users are recruited to evaluate through surveys and usability tests. However, these products and the instruments used to evaluate them aren't necessarily developed with the intended users being people with disabilities. Although some products use accessibility and usability practices when designing products, they vary in quality and quantity. Before a product—the website or electronic book—can move to production, it needs to be tested by a sample of people who are potential users but there is a lack of research on accessible instrument design that would make the user testing population and practices more inclusive. The purpose of this case study is to address this lack of research; and understand the experiences, challenges, and preferences of diverse users when participating in research studies through three forms of data collection: an interview, observation, and document analysis. The interview explores the experiences and observations encountered by a disability services professional at a public research institution. This data is triangulated with content analysis from a relevant document that describes 12 disability personas and an observation about accessible web design for people with cognitive disabilities. Two main themes emerged in the findings: Challenges and frustrations for people with disabilities and advice or guidance for information design. The triangulated analysis brings forth accessible design considerations for future research, practical advice for survey and usability testing with the disability community, and new questions for future research on inclusive instrument design.

Keywords: disabilities, user experience, survey design, usability testing, accessibility, usability.

1. Introduction

Websites, smartphone applications, and electronic books are products people use daily to access information. However, these products aren't necessarily developed with the intended users being people with disabilities. Although some products use accessibility and usability practices when designing products, they vary in quality and quantity. In some instances, accessibility and usability are not used at all or merely afterthoughts rather than being an intentional focus of design from the beginning of a product concept and with prototyping and testing phases later. Before a product—the website or electronic book—can move to production, it needs to be tested by a sample of people who are potential users. This population includes people with disabilities, yet product and research surveys fail to make participation accessible.

1.1. Research problem

There is a lack of research regarding tools and strategies used to collect data from people with disabilities, and the challenges experienced by people with disabilities when taking surveys or participating in usability testing is also scarcely seen in scholarly literature. Though publications

may discuss creating inclusive surveys, design considerations and guidance on accessible survey or usability testing design is difficult to locate (Nikivincze & Ancis, 2018). As a result, people with disabilities may struggle to complete or participate in surveys or usability testing; additionally, they may be offended by the process researchers use (Interviewee, personal communication, June 23, 2023). Therefore, this study will address this lack of research by investigating the experiences faced by people with disabilities and the recommended practices that can help increase positive and effective participation in web-based surveys and usability testing. This will increase successful participation, and the quality of the product being developed as more inclusive perspectives are being addressed and varied user testing applied in the iterative design phases.

1.2. Research purpose and research questions

This case study is part of a larger study that seeks to understand the experiences, challenges, and preferences of diverse users when participating in research studies (which involves taking surveys, being interviewed, or performing a usability test of a website or product). This study has two specific goals: One aim is to investigate survey design and usability testing recommended practices. The second aim is to learn how research studies can enable more inclusive ways and opportunities for people with disabilities to participate in earlier design and testing phases of web-based products. At this stage in the research, the experiences and observations of using web-based products (which includes online surveys) was examined through the perspective of a disability services professional at a public research institution. This professional not only works with people who have a variety of disability conditions, but is also the parent of a child with disabilities and has disabilities themself. This varied perspective informs the case study's direction for further research and is triangulated with relevant data from document and observation analysis while addressing the following research questions:

1. What are recommended practices for diverse users to participate in research studies from the perspective of a special education and disability services professional or a person with disabilities?
2. What are recommended practices for creating accessible websites that reduce barriers for people with cognitive disabilities?

1.3. Definitions and background

The world population is estimated to have 1.3 billion people who have a significant disability, which is about 16% of the population (WHO, 2023). Disability is defined as "an interaction between an individual with an impairment and the environment rather than as a deficit of an individual" (NCD, 1998). The World Health Organization (WHO, Ageing and health, 2024) states, "Disability is a part of being human" and almost everyone will temporarily or permanently experience disabilities at some point in their life. Accessibility is concerned with making products or services available to a range of people with a focus on specific accommodations to enable people with disabilities to have access to products and services (W3C, 2016). Usability is defined as something being usable (Hasnain, et al., 2014) with a focus on how effective, efficient, and satisfying the product is to use (W3C, 2016). User experience is a concept that covers a user's feelings, attitude, and behaviour while using a system, service, product, or space (Neusesser, 2023). This experience involves how a person interacts with a system or product and any positive or negative aspects encountered, including challenges and preferences.

For this paper, research studies are defined as studies that involve the creation of instruments by researchers to assess, evaluate, or further research a topic where instruments (surveys, interview protocols, usability test protocols, etc.) are used to collect data, analyse a theory or assumption, and/or make informed decisions, and for some, publication of products or research outcomes. Surveys are organized templates used to gather information by asking questions and are used in both scholarly and social inquiries (Nikivincze & Ancis, 2018).

Web Content Accessibility Guidelines (WCAG) are a set of technical and design guidelines for web content authors to minimize difficulties faced by people with disabilities (Hasnain, et al., 2014). These internationally recognized WCAG guidelines are established by the Web Accessibility Initiative (WAI) group within the World Wide Web Consortium (W3C) with endorsement from the U.S. government. There are 14 WCAG guidelines divided into compliance checkpoints and priority levels. All of the guidelines fall into one of four basic groups: information that is perceivable, operable, understandable, and robust. The latter group of robust requires content to be interpreted widely by various users and their agents such as assistive technologies (WCAG, n.d.). Section 508 of the Rehabilitation Act was created to ensure that federal employees (in the USA) and members of the public with disabilities have access to and use information in a manner that is comparable to others and ensures that all information communication technologies are accessible (Section508, 2018). Section 508 incorporates the WCAG guidelines to ensure a range of technologies and services are accessible. The WCAG guidelines are also tested against in a Voluntary Product Accessibility Template (VPAT) that some vendors use to document efforts towards accessibility compliance of web-based products (Willis & O'Reilly, 2020).

1.4. Literature review

Given the diversity of the population with disabilities—including types and severity, age, employment, education, and environmental supports—there are complexities in designing accessible and usable surveys (Mitchell, Ciemnecki, CyBulski, & Markesich, 2006). Literature shows surveys for participants with disabilities have used proxy respondents, assisted interviews, and incentives in order to overcome challenges with disability research (Kroll, 2011; Mitchell et al., 2006; Wilson et al., 2013). However, this is not enough, as existing practices still largely exclude people with disabilities from research studies (Hasnain et al., 2015; Kroll, 2011; Parsons et al., 2001). There are general reasons for the exclusion in national research initiatives: lack of alternative survey formats, inappropriate handling of proxy responses, lack of interviewer training, and under-sampling (Hasnain, et al., 2014). Given the range of types and severity levels of possible disabilities, it is nearly impossible to design a survey that addresses all disability categories (Hasnain et al., 2015; Mitchell et al., 2006).

However, there have been various recommended practices for designing inclusive surveys across disability types, which include use of simple language (Mitchell et al. 2006; Nikivincze & Ancis, 2018; Wilson et al., 2013), brief questions and shorter survey lengths (Mitchell et al. 2006; Nikivincze & Ancis, 2018), shorter recall periods (Mitchell et al., 2006), minimizing high frequency sounds (Mitchell et al., 2006), building in breaks or checks points for participant fatigue (Kroll, 2011; Mitchel et al., 2006), using multiple sessions if needed (Kroll, 2011; Mitchel et al., 2006), rewording questions as needed for comprehension (Kroll, 2011; Mitchell et al., 2006), offering alternative methods or formats (Kroll, 2011; Nikivincze & Ancis, 2018; Parsons et al., 2001), streamlining question types and scales (Nikivincze & Ancis, 2018; Wilson et al., 2013), and layout changes such as high contrast, large font sizes, and adjusting the presentation of selections, questions, and scales (Nikivincze & Ancis, 2018; Wilson et al., 2013). These recommended practices are mentioned in studies that discussed disabilities generally (Mitchell et al., 2006;

Parsons et al., 2001) and other studies that focused specifically on health-related impairments (Kroll, 2011), print disabilities (Nikivincze & Ancis, 2018), and intellectual, physical, and sensory disabilities (Wilson, et al., 2013).

Error handling is another common accessibility challenge, especially when required survey fields don't notify the participant through the use of screen readers or a sound alert which can explain the mistake or error. Nikivincze and Ancis (2018) also stress a focus on survey navigation, especially keyboard tabbing order, which is not always perceivable or turned on; and it is critical to test and get feedback from your target audience, including those with disabilities, before implementing a survey. To further remove barriers, interviewer training should not only happen but should include strategies for sensitizing interviewers to the needs of people with disabilities, including how to use assistive technologies (Mitchell et al., 2006; Parsons et al., 2011).

Until recently, online survey providers lacked experienced in accessibility practices though guidelines that exist with WCAG and Section 508. Two studies in particular have reviewed online survey platforms such as Survey Monkey and Qualtrics, among others, and found that only 1 out of 13 were compliant with WCAG accessibility guidelines and all 13 were deemed unusable by assistive technologies such as screen readers (Gottliebson et al., 2010; Nikivincze & Ancis, 2018). These studies found that most accessibility issues occur in the implementation phase by the researcher as they have limited knowledge of best practices and "rely on that [online survey] platform's implementation and compliance to web accessibility standards" (Nikivincze & Ancis (2018, 3). Hasnain et al. (2015) concluded that very few researchers and survey tool vendors follow the WCAG guidelines, even if they claim to and testing has demonstrated otherwise as seen in Gottliebson et al. (2010) and Nikivincze and Ancis (2018). According to Hasnain et al. (2015), "In most cases, noncompliance was due to complex layout and heavy reliance on JavaScript, a ubiquitous software that adds cosmetic flair to a website and applications." Additionally, web-based products broadly have seen a lack of WCAG or VPAT accessibility compliance as seen with health-related websites (Fernandes, Paramananthan, Cockburn, & Nganji, 2023), online databases (Willis & O'Reilly, 2020), and web products or services (DeLancey, 2015).

Some user experience researchers (Alahmadi & Drew, 2018; Lazar et al., 2007, 2017; David et al., 2023), have studied web accessibility challenges while other researchers have studied survey design challenges (Gottliebson, Layton, & Wilson, 2010). Societal assumptions of some disabilities impact web accessibility and design. For example, most Deaf people use a national sign language as their first language; moreover, up to 80% of Deaf people have limited reading comprehension (David, Morado Vázquez, & Casalegno, 2023). Thus, text-heavy instruments or surveys may not be readily accessible to the Deaf population. Ribera et al. (2015) studies the difficulties people with motor impairments have when interacting with webpages and found that web forms and Flash elements were critical accessibility barriers. Similarly, there are unique challenges for people with a sensory disability and it's vital for designers to understand the characteristics of people with visual impairments to address accessibility barriers with web-based systems or products (Alahmadi & Drew, 2018). For example, visually impaired users may interact with online images, animations, video, voice, and text where this content requires descriptive text for such media to be transferred to a screen reader, Braille code, or other assistive technology. Descriptive text for these non-textual elements (e.g., images and video) are accessibility standards put forth by WCAG, Section 508, and others.

Universal design is a key principle to increasing survey accessibility and usability (Nikivincze & Ancis, 2018). This design approach is the responsibility of the researchers and survey designers,

which includes not only engaging people with disabilities but also understanding human diversity (Gottliebson, Layton, & Wilson, 2010). Further, the researcher must make accommodations in the survey and interview designs (Wilson, et al., 2013). Both researchers and web designers must be educated on the needs of the disability community and survey designs must comply with the necessary code to make them accessible to diverse users (Hasnain et al., 2015; Wilson et al., 2013).

1.5. Research gap and research goals

Although some studies have examined and modified surveys distributed to people with disabilities (Hasnain et al., 2015; Mitchell et al., 2006), few studies have focused on the survey design with an intentional focus on the design parameters directly from these participants. Most studies only focus on accessibility (Wilson, et al., 2013), rather than both accessibility and usability of surveys. Additionally, survey usability and tasks analysis (a structured, scenario-based usability test) are largely underrepresented in the literature. Instead, the attempt of a usability test is an unstructured "catch any problems you can" task given to a person with disabilities (without guidance or instruction). This alone is a weak way to test for usability. Further, many of the studies examined come from the researcher perspective, with only some feedback from the survey participants, and most studies don't provide the actual instruments or examples of question-wording to demonstrate their findings. Moreover, although some online survey tools have undergone evaluation (Gottliebson et al., 2010; Nikivincze & Ancis, 2018), studies evaluating Springshare's LibWizard and Google survey tool products are lacking.

Studies conducted to date seem to evaluate online survey tools that are selected by the researcher, rather than those tools preferred by people with disabilities. This study sought to understand the user experience of people with disabilities who take surveys and accessible design recommendations that can help improve the experience. This study also sought direct feedback from a person with three vantage points—the perspective of a disability services provider, a parent of a child with a disability, and a person with a disability themself. This rare combination is unique when compared to existing research.

2. Methodology

2.1. Methodological approach and positionality

A case study approach was selected to provide an in-depth understanding of a case (Creswell & Poth, 2018). The case pertains to the experiences and perspective of the disability community when participating in research studies. User experience (UX) and human-computer interaction (HCI) frameworks that guided this study include universal design and human-centred design (Dolph, 2021; Hasso, 2024; Lazar et al., 2017; Nikivincze and Ancis, 2018) as well as participatory design (Henry, Gallagher, Stringfellow, Hooven, & Himmelstein, 2007) which involves stakeholders and researchers working together to ensure the needs of the population are met. As typical with case study methodology and UX/HCI research, this study uses multiple methods of data collection such as interviews, document analysis, and observations (Alahmadi & Drew, 2018; Antona et al., 2009; Lazar et al., 2017; Yin, 2009). Given the varied aspects of disability types, instrument types, product (e.g., survey tools) features, the use of mixed methods is well matched for analysing accessibility and design considerations (Alahmadi & Drew, 2018; David et al., 2023) for research study participation.

The author, an experienced designer of web-based products, focuses on inclusive design methods as practice (positionality). This practice includes design thinking, validating user experiences, removing bias from design, and advocating for changes that effect edge cases. Given this experience, the author hopes to build on prior knowledge and learn how to create more accessible and usable information products such as websites or electronic books, by learning about the lived experiences of people with disabilities and their interactions and preferences of surveys and usability testing instruments and environments. The inclusive mindset is a philosophical framework brought to both the scholarship and practice of the UX field.

2.2. Methods and sampling strategy

A purposeful sampling strategy was used for this qualitative case study. Specifically, convenience sampling was selected due to the nature of the study's exploratory nature and criteria sampling was utilized where the participants had to meet certain criteria for quality assurance (Creswell & Poth, 2018). "Qualitative inquiry typically focuses in depth on relatively small samples, even single cases (n = 1), selected purposefully" (Patton, 2002, p.272-273) where there is power in purposefully selecting information-rich cases that can yield insights and an in-depth understanding of the case. Purposefully sampling was also used which helps when working with hard-to-reach or sensitive populations (Abrams, 2010).

2.2.1. Interview

Using these sampling strategies, a list of possible organizations (disability service providers) and potential people who work there (who met the criteria for the study) was drafted, culminating in a ranked list of potential interviewees. Ultimately, one participant was recruited for the study (interview phase) who met the age criteria of at least 18 years old, who worked within the disability services profession and within the higher education field, and also identified as having a disability. The academic nature was preferred as this population would be more prone to participating in research studies, such as taking surveys or performing usability testing. Once a potential participant was identified, they were contacted via email and invited to participate in the study. Due to prior professional rapport with the participant (convenience sampling), the recruitment was successful.

2.2.2. Observation

Typically, qualitative case studies also use non-probabilistic techniques (purposeful and convenience sampling) for units of analysis other than people, such as documents and observations (Hurst, 2023). Similar to interviewing, the procedures involved in collecting observation data began with identifying possible sites to be observed and gaining access. Several live webinars were considered based on the topic, presentation abstracts, presenter bio, and expertise. That list of potential observation sites (live webinar) narrowed to a disability focus of cognitive impairment and lived experiences (criterion sampling) while also being a source the author had access to as it was accessible online and free (convenience sampling). This webinar on cognitive disabilities and user experience (UX) was selected (for the observation analysis phase) because of the author's background in UX and their lack of experience with design for specific disabilities. This was an opportunity to learn about cognitive disabilities and accessibility on the web.

2.2.3. Document

Similarly, the document selected for analysis (Accessibility Dos and Don'ts Posters by Deque, 2023) had a disability focus but was broader by describing 12 different disability types through

the use of personas (a tool used to create a representation of a person in order to build empathy and design for that person). The document selection also sought a complementary yet different approach with a design focus (method or tool approach used by a reputable organization) that can help create better web-based designs (criterion sampling) while also being accessible in the public domain (convenience sampling).

2.3. Data collection and analysis

Case study data analysis starts with the creation and organization of data files for the interview, document, and observation that will undergo analysis. The interview used a semi-structured protocol with eight pre-determined questions (see Appendix A) and several other non-scripted questions. The interview lasted approximately one-hour on Zoom.

This study used an inductive coding approach with open coding, where codes are developed based on topics in the data. This open coding used a combination of descriptive coding and values coding (Creswell & Poth, 2018) to capture both short phrases consistently used throughout the interviews and observations, and considered the participant's own values and attitudes towards the topic. This combination brings perspective to the initial coding process, further enabling the iterative and thematic coding to take shape. For example, "accessibility" and "tools" were later consolidated into one theme. The codebook example in Creswell and Poth (2018) was modified for this study and shows how the themes, code name, and code definition guided the development and boundaries for this study (see Appendix C). This coding helps to make sense of the collected information from interviews, observations, and documents by aggregating data into categories and using labels to identify the code placed on the theme (Creswell & Poth, 2018).

Inductive coding was also applied to the document analysis using the same iterative coding process used with the interview analysis. The document described twelve personas of people with disabilities, as discussed later in the Results section. The Document Content Analysis Matrix (Appendix D) was created to assist in the analysis and mirrored the format of the interview codebook mentioned earlier. The observation was a webinar on cognitive disabilities and user experience, and it was presented by a person with disabilities who wanted to share website creation best practices, as discussed in the Results section later. The observation analysis used a protocol template (see Appendix B) to document and reflect on the lessons of the observation.

While reading through the text (the interview transcript, document, and observation protocol), notes were made in the margins which helped to inform the initial codes that were developed in the code names identified in Appendix C. This use of categorical aggregation helps to establish themes or patterns. Additionally, this study used direct interpretation and naturalistic generalizations of what was learned from the data (Creswell & Poth, 2018) by using quotes from the interview, document, and observation. Once coded, interpretation required abstracting out from the codes and themes to find a larger meaning within the data (Creswell & Poth, 2018).

2.4. Ethical considerations and validation strategies

This study received institutional review board (IRB) approval from the University of Missouri. Additionally, participant consent was obtained prior to the interview and the participant was informed of how the interview was being recorded and what would happen with the data. The participant's personal information was redacted prior to analysis. Validation strategies included having a colleague review the semi-structured interview questions prior to use for understandability, and an external audit was used as a form of peer review of the methodology (Creswell & Poth, 2018). The document was freely available in the public domain and placed on

the document authors' website (an established organization). The observation required registration and a password-protected login to attend the live presentation. The observation's field notes intentionally redacted the presenter's information for privacy, but this may not have been necessary as the presentation recording and slides are now publicly available online. Triangulation was used to control bias and corroborate evidence across the three forms of data collection (interview, document, and observation), as recommended by Creswell and Poth (2018).

3. Results

From the three forms of data collection, themes were noticed that influence the nature and degree of difficulty a person with disabilities experiences with daily life or participation in research.

3.1. Data collection 1: Interview

3.1.1. Challenges

The most prevalent theme during the interview regarded various challenges faced by people with disabilities. This included challenges in daily life, school life, and specific to research studies (where people with disabilities are recruited to participate in research through a survey, interview, or product usability testing). These challenges include feelings of frustration or missed opportunities. For example, the lack of support at school or work, limited funding, and limited understanding from others are a constant challenge. The interviewee further emphasized a lack of understanding or willingness to accommodate work or school environments:

> *It's frustrating that [someone] could be so successful and so beneficial to the company if they [the company] would just be willing to work with [that person]" or that some teachers think that following a documented accommodation protocol for a person with a disability is a form of "babying them (Interviewee).*

According to the interview, teachers who don't follow accommodations enable troubles to continue in school settings for students with disabilities, which is frustrating as it is a fixable problem if the accommodation would have been supported.

Regarding participation in survey or usability testing, frustration or challenges also arise from people with disabilities. The interviewee put this into perspective when describing how constantly asking the same person for website usability feedback "takes away from their human experience because they are spending all their time testing" (Interviewee). This feeling of bombardment occurs when the same person feels they are always asked to represent a disability community. Other negative feelings in this theme included the dislike of long surveys. For a person with physical impairments, autism, or ADHD, long surveys cause frustration due to a lack of patience, attention, and hand cramps.

3.1.2. Positive

Rewarding or positive themes during the interview foreshadowed success, even small success, is a big deal. For example, the length of time in a job for an autistic person can be a cause for celebration. The interviewee highlights this by saying "seeing success is an amazing thing when everything is so hard and so we tend to celebrate smaller successes" (Interviewee). Giving a person with a disability an opportunity to share their experiences or opinions in research settings is also beneficial and can be a positive experience.

3.1.3. Reflective advice

The interview also heavily discussed guidance of solutions or fixes to known problems. Retrospectively, the interviewee described alternative or better approaches to consider in design or practice, both broadly and with surveys specifically. An example of a broad application is rather than trying to design for the disabled community with current methods, it is better to hear directly from people with disabilities. "I think the voices that need to be heard the most are from people with disabilities" (Interviewee). Pragmatically, there is room for greater improvement regarding accessibility, which can help people with disabilities. For example:

> *I think every company should have somebody who's an accessibility specialist, an adaptive technology specialist, whether they have a disability or not. They need to be an expert on all the different types of disabilities. What are the different issues that people are gonna have with this thing? And how do we fix it? And they need to test extensively, etc. I wish that was consistent at all companies, that they have…a person [like that] as part of the testing process (Interviewee).*

Guidance for survey design was also discussed, including how to ask demographic questions at the start of the survey. Advice on how to ask about disability types is challenging as there are so many different types of disabilities and categories within the types. Giving options for selecting various types of disabilities or gender options is considered inclusive for the demographic section of surveys. Other survey design guidance included breaking up long surveys into shorter segments, enabling a user to work on just one page at a time, and a progress bar.

> *I would think that those two things would be helpful for almost any disability. [For] somebody who is blind, who's using a screen reader, or a braille device, I can see it being the same for them as long as it's easy for them to navigate to the next page (Interviewee).*

Another critical survey design feature is that the more keyboard friendly a survey or website is, the better it is for everybody. The interviewee shared how frustrating a lack of keyboard accessibility can be to someone with a disability:

> *I get annoyed with things that I can't tab in or tab space to enter my answer. I have to physically drag my mouse over and push the thing, that's a lot of extra work. And I imagine, with a screen reader like JAWS, that it doesn't work right. I imagine others have trouble getting to the next page. If I can't do it with my keyboard, I bet they can't either, which is a problem. (Interviewee).*

When end users (in this case, people with disabilities) do a usability test, most times they are directed to a website and asked to test it without guidance. When this happens, asking the tester whether they did an in-depth or surface level review is advised. This context provides meaningful feedback. A person's mood at the testing time or the quality of the review process may vary among testers, so it is wise to know about the level of the review conducted. Additionally, it gives testers a choice in survey or usability tests and lessens the time it takes to complete. If compensating people for their time is impossible, try other types of rewards.

> *I love the little things that if you play a game or you do a survey, you get points, and eventually you've done enough to get a $5 Amazon gift*

card…rewarded [time] is advertised a lot. Those might be good ways to get people (Interviewee)

In addition to this type of points system as a reward, entering people into a drawing is another way to recruit people to complete surveys and improve their usability review quality.

3.1.4. Terms

Understanding terms or policies used in a discipline, industry, or within the disability community can help remove barriers. For example, it is important to know that "differently abled" and "handy capable" are labels not embraced by the disability community (but perhaps by some parents of disabled children) (Interviewee). In the education setting, the term "exceptional" is used, which is "a nice word because it covers anything that's outside the norm…both sides of the spectrum [disabled and intellectually gifted]" (Interviewee). Twice exceptional is a term for "kids that are both literally gifted in high IQ, etc. and have neurodiversity, autism, or ADHD, etc." (Interviewee) that are from the disability side of the spectrum.

Neurodiversity is another term currently used which applies to disabilities that involve how the brain works. This includes ADHD, autism, anxiety, and depression. The interviewee further explains that a neurodivergent person's brain behaves differently than other people's:

It is divergent of the neurotypical set up…neurodiversity is a person who is neuro divergent. A group is neuro diverse by having a variety of people with a variety of experiences. That is how those labels are applied. (Interviewee).

3.1.5. Accessibility and tools

The theme of accessibility and tools describes considerations, practices, challenges, benefits, or resources within the discipline, industry, or disability community. Tools mentioned during the interview included JAWS (a read-aloud device), braille devices (a reading tool for blind people), and Amazon MTurk (a reward system for doing surveys).

According to the interviewee, there are discrepancies in what is considered accessible. In industry.

A lot of companies say that their website or app or service is accessible. It's only accessible at the very bare minimum. You know, they've done the least amount possible which doesn't necessarily make it accessible…in the real-world setting (Interviewee).

One of the biggest accessibility requests (as a disability services professional) of the interviewee is for accessible books. Many of these requests require a book to be read out loud. Some digital book apps do this better than others, and specific ones are avoided entirely because,

Their app isn't great…you can't use JAWS [and] you can't use [it]…for somebody who has dyslexia or ADHD" or a disabled person's own tools can't be used within the app, which makes the app unusable, in addition, it has a bad built-in read aloud tool (Interviewee).

When asked about online survey tools that are compatible with the JAWS tool, the interviewee did not know of any JAWS-friendly survey options. However, they use Google Forms because it is free and has fewer limitations than Survey Monkey. Though Google Forms does have its limitations, "my impression is that Google Forms is supposed to be completely accessible" (Interviewee). That's why survey design is important; regardless of what survey tool you use,

consider how JAWS will read the survey, considering how JAWS reads everything on the page. Therefore, when the interviewee designs surveys, they try to limit what JAWS will read:

> *If I'm going to have different sections of a form, I'm not going to put the same instruction at the top of each section, because then they [people taking the survey] have to listen to it all over again (Interviewee).*

3.2. Data collection 2: Document content analysis

For triangulation analysis, the relevant document that underwent content analysis was the "Accessibility Dos and Don'ts Posters" by Deque (2023). This document has developed 12 personas to represent people with varying disabilities and the types of experiences and challenges they face daily. For each persona, a brief description is given about that person (complete with a name and image), and other aspects that describe them: demographics, personality, needs, frustrations, and things that a design should always do and should never do for someone with that specific disability.

The posters, or personas, cover a wide variety of disabilities, including blindness, mobility, deafness, dyslexia, colourblindness, autism, low vision, anxiety, vestibular disorders, ADHD, ageing, and photo-epileptic sensitivity. The interview codebook (Appendix C) was adapted to guide the document's content analysis matrix by listing 12 disabilities in the document and their aspects of accessibility considerations via tools used, challenges, advice, and quotes as seen in Appendix D. Tools were only listed for four of the 12 personas and therefore omitted from the matrix. The tools for these four disabilities included: screen reader, haptic feedback (blindness); voice dictation software (mobility); text to speech (deafness); and big screens, screen magnification software (low vision).

Each persona describes the user experience of a person with the specific disability of that persona. When looked at holistically, the Document Content Analysis Matrix (Appendix D) shows crossover, where one design consideration can help people with various disabilities who may have similar experiences or challenges with inaccessible web-based products. For example, a selection of the most frequently cross-referenced accessibility tips among the personas includes the following:

- 5 of the 12 disability types (deafness, dyslexia, autism, and aging), recommend to **always** "leverage plain language principles to make the content easier to read, process, and understand" (Deque, 2023).
- 5 of the 12 disability types (deafness, colour-blindness, low vision, and aging) recommend to **always** "support information on the pages with a combination of text, colours, and other visual cues" (Deque, 2023).
- 3 out of 12 disability types (blindness, mobility, and aging) recommend to **always** "ensure navigation or features throughout pages or screens can be fully achieved using just the keyboard."
- 3 of 12 disability types (autism, anxiety, and aging) recommend to **always** "provide clear instructions so people understand what to expect as they interact with the content (Deque, 2023) (Deque, 2023).
- 3 of 12 disability types (deafness, dyslexia, and ADHD) recommend to **never** "organize the content of the page into large, intimidating, hard to scan, and unappealing blocks of text" (Deque, 2023).

- 3 of the 12 disability types (blindness, mobility, and aging) recommend to **never** "design or implement features on pages that are only meant to work with the use of a mouse," **never** "impose complex finger gestures that make it impossible for some people to use the interface," and **never** "require painful wrist movements (Deque, 2023).
- 2 of 12 disability types (vestibular disorder and photo-epileptic sensitivity) recommend to **never** "rely on flashing, blinking, or other strobing effects as a way to draw people's attention on the screen" (Deque, 2023).

3.3. Data collection 3: Observation

The observation was a live webinar with a guest speaker on the topic of cognitive disabilities and user experience. An observation protocol (Appendix B) was used to document descriptive and reflective notes during the observation. This one-hour-long presentation was guided by a slide presentation and a speaker who gave a background on their experience with disabilities and their professional experience in creating accessible experiences for people with cognitive disabilities. Attending this webinar live allowed the author to see the moderator interact with the speaker and participants and ask questions at the close of the presentation. The speaker began with factual statements including that 25% of people in the U.S. have a disability.

Additionally, 80% of those people have an invisible disability (e.g., trouble reading, colour-blindness, etc.). Next, the speaker presented a cognitive disabilities overview by defining which disabilities are considered cognitive: dyslexia, autism, ADHD, and learning (intellectual challenges, trouble solving problems). Additionally, of all disability types (e.g., motor, vision, hearing, learning, etc.), cognitive disabilities have a higher percentage of the U.S. population across all age group (18-65+). This background segment was followed by a brief demonstration of how to refer to a disabled person according to the speaker, preferably with an identity-first approach (a blind person, a person with disabilities, etc.).

The next topic was challenges or barriers for people with cognitive disabilities, which include complex layouts, long paragraphs/texts, unusual words, and media you can't stop or turn off (ASERL, 2023). Advice or ways to assist people with cognitive disabilities include keeping user interfaces (UI) clean and simple, providing alternative formats, and making it easy to get help. To illustrate this point, the speaker showed an example of a frequently asked questions (FAQ) webpage that has a massive number of links and asked the audience "Are these really helpful FAQs when there are so many?" Similarly, the "Browse by topic" navigation feature had over 90 topics to select from, where the audience was asked, "Is this really a browsable list at 90 topics?" Although both questions posed to the audience were rhetorical, the speaker's point was understood without question. This exercise demonstrated the user experience of interacting with a website for someone with cognitive disabilities.

The advice given falls under basic UX principles: affordance; keep things simple; provide signposts and clues; and provide people with the information they need. Other examples given that can help improve content on websites (and in related products such as books or surveys) include:

- Readability: word choice; avoid abbreviation.
- Headings: use large font size; avoid underlining and italics; and avoid all caps.
- Space: around items.
- Layout: left justify text; use bullets, 60-70 characters per link; avoid sentences starting at end of the line.

- Writing Style: avoid long sentences; be concise.
- Contrast: use colour combinations strategically.
- Links: avoid “click here”, “read more”.
- Icons: if using icons, also have words with icons or use words as links.
- Underline: only underline links; use italics or bold for emphasis instead of underlining.

All of these considerations can help with cognitive load. Creating accessible content makes things easier to use for everyone, including people with and without disabilities. The lack of content that is easy to use is the digital divide for people with cognitive disabilities [note: the digital divide is the lack of internet access]. The speaker’s concluding thought was that “if people think a website is accessible, they will have a more positive experience with the content” (ASERL, 2023).

3.4. Triangulation of findings across the 3 forms of data collection

The interview, document analysis, and observation revealed crossover of codes and content. The two most frequent occurrences were the themes of challenges and advice.

3.4.1. Challenges and frustrations for people with disabilities

The interviewee’s examples around society’s lack of understanding of people with disabilities highlight the challenges encountered at work and school when other people lack the knowledge and empathy for people different from themselves. This lack of understanding of human diversity was also mentioned in the literature (Gottliebson et al., 2010).) The interview and literature also discussed web-based products (DeLancey, 2015; Fernandez et al., 2023; Willis & O’Reilly, 2020) and survey tools (Gottliebson et al., 2010; Nikivincze & Ancis, 2018) available, most lacking in accessibility compliance even when products or companies claim to be accessible (through VPATs or their own testing).

Data from the interview, document analysis, and observation all mention challenges or frustrations with long pages or long surveys. For many people, with and without disabilities, long pages, or surveys cause frustration due to lack of patience, attention, time, and physical pain (such as excessive scrolling which causes hand cramps for those with mobility challenges).

Challenges or barriers for people with cognitive disabilities include complex layouts, long paragraphs or texts, unusual words, and media you can’t stop or turn off, which was represented across all three forms of data collection. The data presented in the observation correlate to the data found in the literature regarding disability populations and cognitive disabilities being one of the largest categories. Given its girth, information design should consider following more of the design advice for people with cognitive disabilities.

3.4.2. Advice or guidance for improving information design

The document analysis looked at accessibility dos and don’ts through the use of personas, a design tool used to create a representation of a person in order to build empathy and design for that person. Challenges and advice within those 12 personas were reminiscent of challenges and advice also mentioned during the interview and observation. For example, using simple language, clear instructions, and having multiple ways to distinguish information (colour, text, visual clues, etc.) were all advice given across the forms of data collection. The persona tools were impressively designed. Finding, using, and creating personas is important in design work, and having personas specifically address accessibility is unique and certainly lacking in the literature.

For example, for Cindy (a persona with a mobility disability), the accessibility dos and don'ts state to never design features on pages that are only meant to work with the use of a mouse (so you should have it designed to also work with a keyboard) and to provide experiences that are fully optimized for voice dictation and other assistive technologies. These points were also made during the interview, further corroborating this critical design need.

Regarding terms and labels, it is important to seek advice from the disability community or the person directly. As the interview revealed, terms and labels change over time, and there are debates within communities on their preferred use. The observation and interview referenced the 'identity-first' approach when talking with and about people with disabilities, though there are other approaches that can be explored in future studies.

Although the accessible design considerations previously described are advice that can be applied to the information design of websites and surveys, there is also advice on how to recruit people to help with research studies specifically. For example, the interview discussed the use of a reward system for participation in research studies when direct compensation is not possible, a concept lacking in the literature. Using rewards (a positive experience) to compensate people for their time in surveys and usability testing can help recruit users and it appropriately compensates them for their time. This could be done with money or gift cards, though this is not always possible. However, an alternative could include a points system that adds up over time as a game-like experience that attracts and retains participants for research studies.

4. Discussion

The case study aimed to understand the experiences, challenges, and preferences of diverse users when participating in research studies. Through three forms of data collection (an interview and content analysis of a relevant document and observation), the following research questions were addressed:

1. What are recommended practices for diverse users to participate in research studies from the perspective of a special education and disability services professional or a person with disabilities?
2. What are recommended practices for creating accessible websites that reduce barriers for people with cognitive disabilities?

Both perspectives of question one and question two were addressed with just the interview. However, the document and observation analysis also echoed what was discovered during the interview. Question two was addressed in the interview, document, and observation, which are summarized in the Themes and Findings section. Several recommendations are helpful for more than one type of disability, which was heavily evidenced in the interview and document analysis. The observation focused exclusively on cognitive disabilities, and though there are several subcategories, it was slightly less holistic (across all disabilities) compared to the interview and document analysis. However, cognitive disabilities can impact people broadly, compared to other disability types such as sensory (vision, hearing) or motor/physical. For example, cognitive disabilities can decline with age, which is part of being human (WHO, 2024).

4.1. Themes and findings

This study revealed two themes central to improving the user experience of diverse users in research settings: *Challenges and Frustrations for People with Disabilities* and *Advice or Guidance for Improving Information Design*. The challenges and advice themes had the most frequent

occurrences across all three forms of data collection and have additional crossover in the literature regarding some specific design considerations (Mitchell et al., 2006; Nikivincze & Ancis, 2018). This study found that by reducing the number of challenges and applying the advice shared in this study, people with disabilities may have a more inclusive opportunity to participate in research studies.

The study's findings confirm that in today's information environment, accessible website design is more prevalent than accessible survey design. The interview and observation data note this lack of accessible survey and usability testing design. Although accessible website design is more prevalent in the literature and this study's findings, it is inadequate for survey or usability testing design. More research is needed to fill this gap in the literature.

This study brought out challenges of research study designs. For example, although the literature discussed the need for accessible survey design, none of the studies provided their survey instruments or described the accessibility designs of the survey instruments. It felt like a contradiction to not include those instruments in a study that used such instruments to improve information designs for people with disabilities. Additionally, with the variety of disability types, it is nearly impossible to design a survey or website that mitigates all challenges for all people. However, looking at the criticality of the challenges and addressing those on the higher count end of the spectrum, can alleviate a lot of issues for a lot of people. This is a lesson learned that will be applied to future survey and usability testing designs. This goes with the inclusive mindset that UX designers strive to maintain as their job is to empathize with their end users to design usable interfaces.

From the interview phase (which addresses RQ 1 and RQ2), recommendations include avoidance of long surveys, assuming a person with a disability represents all people with a disability and overtaxing any one person with research study requests (and by extension, survey, and usability testing requests). Rewarding people for their research study or usability testing participation is recommended even if it's just being entered into a drawing or being awarded points that can accumulate over time (for a gift card or prize). Survey tool and digital books may claim to be accessible (as discussed in the literature and interviewee phase) yet that is not always the case. From personal survey taking experience, the interviewee finds Google Forms is more accessible than SurveyMonkey, though all online surveys have limitations, and offered some solutions. For example, to circumvent survey design challenges that impact people who use screen readers when taking surveys, it is recommended to not repeat the same survey instructions at the top of each page which helps lessen the amount of text read by the assistive technology.

Breaking up surveys into shorter segments, utilizing a progress bar, and prioritizing keyboard accessibility are recommendations in the interview, document analysis, and observation (and addressed RQ2). Research question two is also answered with recommendations from the document and observation analysis. From the document analysis, specific web accessibility design considerations are based on 12 disability personas. As a tool, these personas are a static way to demonstrate the user experience for a person with a specific disability who uses technology or the web. These recommendations by disability type are applicable to online survey design and there is considerable crossover of advice among the various disabilities represented in the document. For example, the use of plain language will help people with deafness, dyslexia, autism, and aging. From the observation phase, findings mirror the advice from the interview and document analysis, however the observation prioritizes a simple user interface and designing for people with cognitive disabilities as it will help the most users (with and without disabilities). The personas are a static way to demonstrate the user experience for a person with a specific

disability who uses technology or the web. Clearly, the quality work put into its creation held to the standards expected for this organization (known for its accessibility work). The variety, similarities, and contrasts among disability types were a reason for the document selection and why it will be consulted in the future. Challenges or barriers for people with cognitive disabilities include complex layouts, long paragraphs or texts, unusual words, and media you can't stop or turn off, and thus, simplicity and readability are critical design tenets.

Web-based product creators have a responsibility to design products that are usable by everyone and should follow internationally accepted accessibility standards (Section508, WCAG, etc.). Though web-based product vendors may attempt to apply web accessibility standards, those practices are not universally applied. According to the literature and this study's findings, there are still issues with current web accessibility practices and a lack of scholarly literature that highlight inclusive practices for survey and usability testing designs. A summarized list of these findings is below:

- A vendor-supplied accessibility compliance statements (e.g., VPAT) does not mean the product (e.g., a website or online survey tool) is usable by people with disabilities.
- Some Web-based products still lack WCAG compliance.
- People with disabilities are often over tested or taxed with usability and user testing requests for research studies.
- Usability and user testing protocols often lack inclusivity in design, where people with disabilities are asked to catch any errors possible rather follow a structured set of tasks or objectives and lack flexibility in adapting protocols to meet accommodation needs.
- Some surveys fail to give people with disabilities inclusive ways to provide meaningful feedback and are not compatible with assistive technology use.
- Although some studies report people are compensated for their time when participating in surveys or usability tests, this is not always the case and alternative ways to reward user testers is recommended when cash compensation is not possible.
- Accessible website design is more prevalent (than survey design) in the literature, it is inadequate for survey or usability testing design. More research is needed to fill this gap in the literature.

4.2. Limitations

Although this study increases the understanding of the user experience for people with varied disabilities, the research was limited by conducting one interview rather than four or five interviews where a greater degree of triangulation could provide a deeper understanding. Additionally, these subsequent interviews could include people with disabilities other than Autism, ADHD, and mobility difficulties in order to have a more diverse pool of disability types (which will be done for a later phase of this research). The observation focused on cognitive disabilities, and the study could benefit from subsequent observations that covered other disability types. With more time and funding, future studies could also develop survey and usability testing prototypes to use during the interviews to get participants' feedback on specific techniques or features within those designs to iterate improvements.

5. Conclusion

Findings from this study provide a deeper perspective of the positive and negative aspects that affect the daily life of a person with disabilities. Reducing the challenges and applying the advice in this study facilitates universal and human-centred design frameworks that may help increase online survey accessibility for people with disabilities who participate in survey and usability testing. Disability-focused and universal designs also have broader implications as many of the design considerations can increase access and satisfaction more broadly.

This enriched understanding will assist researchers and designers in approaching diverse users during survey and usability testing of web-based products such as websites or electronic books. Although this study highlights accessibility challenges and guidance on improving web-based experiences for the disability community, more research is needed. Beyond accessible websites, research on designing accessible surveys and usability tests is needed, as well as more survey tools that are compliant with accessibility standards. The combined analysis of this study brings forth preliminary design considerations, practical advice for survey and usability testing with the disability community, and new questions for future research on inclusive instrument design.

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Appendix A: Semi-structured interview questions

1. How should we talk about disabilities?
2. What is the general attitude of a person with disabilities in taking surveys or doing a usability test of website?
3. How should survey questions be framed for people with disabilities? (Especially the demographic questions when they are being asked if they have a disability and which one(s)?)
4. What are experiences for a person with disabilities when taking a survey?
5. What are experiences for a person with disabilities when undergoing usability testing?
6. How can researchers best interact with people with disabilities in order to more effectively design products or services?

7. What would you consider are the professional practices that can help survey and usability study designers to assist people with disabilities to overcome obstacles when participating in studies?
8. Do you have recommendations on where to recruit for survey or usability testing? (Groups or associations to send surveys or interview requests?
9. Do you have any questions for me?

Appendix B: Observation protocol template of live webinar on disabilities and web accessibility

7.1. Part 1

7.1.1. Descriptive notes

LOCATION: Online via WebEx platform

Webinar title: Cognitive Disabilities and UX

Note the number of attendees, the date, and start time of the webinar.

7.1.2. Reflective notes

Describe any reflective notes during part 1.

7.2. Part 2

7.2.1. Descriptive notes

Introduction of Webinar (include moderator and speaker); Describe the tone, number of participants viewing, etc.; Describe content presented, order, etc.

7.2.2. Reflective notes

Describe speaker's tone, manner, etc.

7.3. Part 3

7.3.1. Descriptive notes

Webinar ending description: describe conclusion, future, etc; Describe Q & A session.

7.3.2. Reflective notes

Describe tone, rapport with audience (and their questions); Describe any wrap up comments from moderator or speaker; Record end time.

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Appendix C: Interview codebook

Table 1: Interview Codebook

Theme	Code Name [Short]	Definition	When to use	Example of a segment of text
Feelings or attitudes	Frustration or challenges, missed opportunity [Challenges]	Any negative feeling or action	Use when describing how participants felt or use of their own expression	Constantly asking the same person for feedback: "that takes away from their human experience because they are spending all their time testing" (line 356)
Feelings or attitudes	Positive experiences, benefits, or rewards [Positive]	Any positive feeling or action	Use when describing how participants felt or use of their own expression	"Seeing success is an amazing thing when everything is so hard, and so we tend to celebrate smaller successes" (lines 123-124)
Retrospective opinions	Advice	Descriptions or guidance of solutions or fixes to known problems	Use when describing alternative or better approaches to consider in design or practice	"I think it's important to hear from people with disabilities. So, I do think surveys are good" (line 325)
Discipline, industry, or Community at-large aspects	Process, technique, or standards [Process]	Describes the way something is done previously or currently and any evidence or basis for that way of doing	Use when describing systematic and known methods or processes	Graphic organizer
Discipline, Industry or Community at-large aspects	Terms, Policies [Terms]	Describes new or important terms or policies that shape the discipline or community	Use to gain an understanding and background information	"It is divergent of the neurotypical set up…neurodiversity is a person who is neuro divergent. A group is neuro diverse by having a variety of people with a variety of experiences. That is how those labels are applied." (line 277)

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Theme	Code Name [Short]	Definition	When to use	Example of a segment of text
Discipline, Industry or Community at-large aspects	Accessibility	Describes accessibility considerations, practices, challenges, and benefits	Use when the topic is exclusively about accessibility practices	"A lot of companies who say that their website or app or service is accessible. It's only accessible at the very bare minimum. You know, they've done the least amount possible which doesn't necessarily make it accessible for real in the real-world setting" (line 328)

Appendix D: Document content analysis matrix

Table 2: Document Content Analysis Matrix

Disability	Challenges	Advice	Quote
Blindness	Websites and apps that are incompatible with a screen reader and content that depends on sight; Can't use a mouse	Use meaningful heading structures, semantic values in source code, programmatic form associations	"I need full support for assistive technologies, so the information can be reliably conveyed back to me" (Deque, 2023, Malik persona)
Mobility	Can't use a mouse, partial use of keyboard; Features and interactions that are only designed to work with the use of a mouse	Features that are fully operable using keyboard or voice commands only	"I need full keyboard and voice support, as features or interactions that only work with the mouse are totally useless to me" (Deque, 2023, Cindy persona).
Deafness	Most multimedia content creates significant barriers, but so does written content (inability to hear the language); Walls of text with little whitespace, multimedia content that is not captioned or transcribed	Captions and transcripts for audio and video, sign language interpretation, CART, plain language	"I need support with multimedia files online, but I also enjoy pages and screens that are both easy to scan and read" (Deque, 2023, Brian persona)
Dyslexia	Struggles with most forms of written content; Content complexity, text density, uneven spacing between words, insufficient sparing between paragraphs; Big	Line readers, text-to-speech, multi-sensory learning	"I need support with differentiated learning opportunities and do better when pages are

Disability	Challenges	Advice	Quote
	walls of words with little whitespace, fully justified text, and small, hard to read fonts	opportunities and dyslexic-friendly fonts	supported by visuals and have legible fonts. (Deque, 2023, Lenny persona)
Colorblindness	Struggles when it comes to perceiving information conveyed through color alone or poor contrast; Complex graphs and charts driven by colors, contrasts that are too weak or too subtle	Sufficient color contrasts, information based on more than just colors and other visual cues	"I need support with strong color combination, so I can perceive contrasts and not miss any critical information" (Deque, 2023, Matt persona)
Autism	Thinks in images rather than words (perceived info differently than most people); Inconsistent navigation patterns, lack of while space, and fixed layouts	Consistent layouts, larger font sizes, plain language, minimal clutter and distractions	"I need flexibility in the way I am allowed to use the interface, as I like to do things in very specific ways" (Deque, 2023, Nicky persona)
Low vision	Vision loss with age has affected his ability to read; Depends on big screens, screen magnification software; PDF documents that won't reflow properly, small-sized text and mobile sites without pinch to zoom	Truly responsive web interfaces and applications, CSS based layouts, adaptive fonts, contrasts	"I need support with flexible layouts and legible fonts, so I can resize the text to a size that works well for me" (Deque, 2023, Rakesh persona)
Anxiety	Hard time dealing with stressful situations and easily finds herself feeling defeated when things don't go the way she expected (affects the quality of her online experiences); Dark, anti-patterns that create false senses of urgency and feed into her anxiety are difficult	Not feeling rushed into tasks or interactions, and being provided with clear instructions to succeed	"I need support with clearly defined expectations on sites and apps, as I can get easily anxious or give up." (Deque, 2023, Ying persona)
Vestibular disorders	Permanently damages nerve system affecting overall sense of balance; Sensitive to animations, scrolling effects, and can get dizzy or develop a migraine when there is too much movement; Parallax effects and other invasive scroll-triggered animations that can induce dizziness or nausea	Clear notifications, warnings, or efficient ways to opt-out of unwanted, or unnecessary animations	"I need ways to shield myself from animations and scrolling or parallax effects that can make me feel sick" (Deque, 2023, Jason persona)

Disability	Challenges	Advice	Quote
ADHD	Easily distracted on the Web; Disruptive websites that make heavy use of pop up or modal windows; Distracting, or busy interfaces that make focusing on content more complicated than it needs to be	Clearly streamlined sets of options on the screen, to help avoid going down unexpected rabbit trails	"I need support with clear content structures, so that I can successfully stay focused on the job to be done" (Deque, 2023, Joyce persona)
Aging	Early signs of dementia, osteoarthritis, and Alzheimer's plus declining senses of hearing and sight; More easily consumed when experiencing online content; Long-winded, confusing, or overly complex interfaces that lead to convoluted interactions	Simple interfaces, clear expectations, larger, more legible fonts, strong contrasts, and white space	"I need simple, easy to use pages because when it gets too complicated, I just don't know what to do" (Deque, 2023, Kim persona)
Photo-epileptic sensitivity	At risk for seizures when she unexpectedly runs into flashing or blinking content online; This makes her nervous when browsing the web, especially social media; Ends up needing anywhere between 6 to 10 hours of bed rest when content triggers a seizure	Obvious warnings before being presented with flashing, blinking or strobing materials	"I need to feel safe online, trusting that I won't run into content that may cause me harm when I least expect it" (Deque, 2023, Lynn persona)

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