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Accessibility, Disability, and Inclusive Instrument Design: A Critical Literature Review Interrogating the User Experience of Online Surveys and Interviews

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Abstract

This literature review examines the current state of inclusive instrument design, highlighting a significant gap in the scholarly discourse. Research instruments, such as surveys, interview protocols, and usability tests, are typically developed with neuro-typical or non-disabled participants in mind. Through an exploratory approach, this critical review gathers literature from disability studies, education, information science, and social sciences to provide a broader perspective on inclusive instrument design. Key findings identify gaps, challenges, and recommended practices for accessibility and inclusivity in research study instruments and experiences. Three broad themes were identified, including frameworks and methodologies for accessibility or instrument design, challenges related to accessibility in instrument design, and general recommendations for inclusive instrument design and instrument accessibility. While some studies have adapted instruments for participants with disabilities, few have intentionally included these perspectives in the design process. Addressing this gap, this review presents strategies that can benefit diverse research study participants, regardless of ability. These insights support the adoption of inclusive survey, interview, and usability study design practices. By enhancing research experiences for individuals with disabilities, impairments, and chronic conditions, the study suggests that universal, human-centered design can improve user participation in research and its outcomes.

Keywords: accessibility; disabilities; human-centered design; literature review; survey design

Publication Type: literature review

Introduction

The scholarly communication and publishing lifecycle is a global practice and often includes literature reviews, surveys, interviews, and usability or user testing in product development. Publishing and information design is a process-oriented approach to sharing research outcomes and knowledge with the broader community. However, the process of getting user feedback through research study instruments (e.g., surveys, interviews, usability, or user testing scenarios) often ignores the needs and desires of people with disabilities, impairments, or chronic conditions who participate in those studies or who do not participate in those studies because of the lack of inclusivity in the instrument designs (Miller, 2024). Inclusive instrument design would help remove barriers experienced by people with disabilities or impairments when taking surveys, participating in interviews, and usability testing of information products. Although some survey tools offer accessibility features, their quality varies, and many barriers

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remain for individuals with cognitive, sensory (including vision and hearing), motor, and learning disabilities or impairments (Miller, 2024; Miller, pending-a). Inclusive survey design guidance is challenging to locate, as it is not yet the norm in most research studies (Aidley & Fearon, 2022; Goegan et al., 2018; Nikivincze & Ancis, 2018).

Before a scholarly or informational product is published online, the tools used to evaluate these products—such as surveys, interviews, and testing protocols—must be reimagined as inclusively designed instruments for universal applications and broad participation to ensure accessibility. Norman (2013) confirms that "[d]esigning for people with special needs is often referred to as inclusive or universal design. Those names are fitting, for it is often the case that everyone benefits" (p. 246). For example, larger text sizes or the ability to turn a feature on or off are benefits that everyone can appreciate, not just people with disabilities. How many people are excluded from participating in online surveys because the surveys lack an inclusive design? How can information products be usable when only a portion of the population is included in the testing or evaluation process?

These questions are applicable worldwide and are at the heart of disability and human-centered design movements. The slogans "nothing about us without us" and "design for all" were created long ago, asserting that policies should be developed with the people who will be impacted by those policies (Levinsky-Raskin & Stevens, 2016). These disability- and human-centered design approaches were adopted in their respective fields in the 1990s (Levinsky-Raskin & Stevens, 2016; Stephanidis, 2014). The former slogan was adopted by the disability rights movement and contributed to the passage of the U.S. Americans with Disabilities Act (ADA) in the 1990s (Levinsky-Raskin & Stevens, 2016). With the latter slogan, the human-centered design approach prioritizes the human at the center of the design process, focusing on accessibility and assistive technologies for people with disabilities, as well as a universal design approach for built environments (Stephanidis, 2014).

Objective and Boundaries

An inclusive instrument is usable by various users, including those with and without disabilities; however, research on the use of inclusive instruments is lacking. This review examines the recommended practices in the literature for surveys, interviews, and usability testing. It summarizes findings that can help provide an inclusive means for people with disabilities to be considered in the early design and testing phases used in research studies. Although this study focuses on literature in English and addresses U.S.-centric legal issues, the overall aim and recommendations for improving instrument designs are based on studies conducted in various countries and have implications for global use. This review also aims to summarize the findings of instrument design challenges and provide recommendations for instrument creators to consider when designing instruments for use by people with disabilities or impairments who participate in research studies that involve online surveys and usability tests.

This review is not focused on instrument design for specific disability groups only; instead, it summarizes recommended practices to make wide-use surveys more inclusive for everyone (a starting point to work from). Although this study will not be comprehensive of all people or all people with disabilities (and extended to include situational impairments and health conditions), the practices discovered in this review will lead to valuable insights that may apply to diverse users, regardless of ability, who participate in online surveys, interviews, or usability

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tests used in research studies. This, in turn, will inform a set of recommended practices that researchers can adapt or adopt in their studies to broaden their research participant population.

Rationale for the Study

Surveys used in research studies rarely account for participants with disabilities during the design of the instruments (Nikivincze & Ancis, 2018; Wilson et al., 2013). Participants with disabilities are primarily considered for studies conducted exclusively within the disability community, which is not intended for a broad audience, unlike the goal of this review. By designing instruments with such universal design techniques and preferences of the disability community in mind, research studies (and the information products created by those studies) will have a more inclusive set of recommended practices to follow in their design process.

Disability is a multifaceted and contested term. Everyone will experience a disability or impairment at some point, even if it is temporary (e.g., a broken leg is a temporary motor disability, aging can impact cognitive decline, and certain medical conditions can affect physical or mental functionality). Additionally, with 16% of the world's population and 25% of the U.S. population having disabilities (CDC, 2023), information products should be designed with accessibility and usability in mind from the outset. Although each person is unique in their abilities, and there are many categories of disability and impairment—including sensory (vision, hearing), motor, cognitive/learning, and temporary—this study's interest is in the larger, broader group to identify any overlapping preferences among the range of human conditions. This knowledge can inform recommended user experience and web design practices for a research study protocol or a topic of interest (e.g., an information product such as a website or digital book).

Significance of the Problem / Research Gap

This critical literature review documents the current literature on inclusive instrument design, specifically emphasizing surveys, interviews, and usability or user testing. This paper addresses an essential need for information design, where research remains focused on surveying or user testing with neurotypical or non-disabled populations. The review uses an exploratory approach to locate literature on the accessibility of surveys and interview protocols designed for broad use, as well as studies that detail whether such instruments were designed with the perspective of people with disabilities in mind.

The outcome provides relevant literature highlighting the successes and challenges of inclusive survey design, including studies evaluating research study experiences and instrument question formats and types. The outcomes will be helpful to researchers who want to design inclusive online surveys and interview protocols that may increase research study participation from people with a range of human abilities. Additionally, this review combines information science and disability studies, which makes a novel contribution to these fields. The review also recommends intentionally emphasizing the inclusion of people with disabilities in the instrument development process, an unexplored issue in information science, and informing the author's subsequent studies.

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Research Questions

This paper critically reviews existing literature to answer the following questions.

1. What are inclusive practices for online surveys and interviews that consider the perspectives of individuals who identify with a disability, impairment, or chronic condition?
2. What are the lived experiences of users with diverse abilities who participate in online research studies?
3. What are the preferred survey tools based on the perspectives of online research study participants with disabilities?
4. What demographic questions and formats are appropriate or preferred by people who identify with a disability, impairment, or chronic condition?

The results of this study will inform future designs for inclusive instruments to create positive experiences for study participants. The results of this study will be informative.

Overview and Definitions

The world population has 1.3 billion people (16%) who have a significant disability (WHO, 2023). For the U.S. population, it is higher at 25% of people having a disability (CDC, 2023); additionally, 80% of those people have an invisible disability (e.g., trouble reading and colorblindness). According to the World Health Organization (2023), "disability is a part of being human," and almost everyone will temporarily or permanently experience disabilities at some point in their life. Disabilities and impairments vary by type and severity, including but not limited to blindness, mobility impairments, deafness, dyslexia, color blindness, autism, low vision, anxiety, ADHD, and other sensory or cognitive impairments or conditions affecting ability ranges. Although there are various definitions of disability, including variations in medical and social language models, this review defines disability as "an interaction between an individual with an impairment and the environment, rather than as a deficit of an individual" (NCD, 1998, p.4). Health conditions, such as those arising from disease or injury (e.g., multiple sclerosis, joint-related pain, and mobility impairments), are related to disabilities that affect a person's ability to function without difficulty. Situationally induced impairments can arise from a person's location, specific activities they are involved in, or the environment they are surrounded by (Ashok & Jacko, 2009).

Usability is defined as the ability of something to be used by people with disabilities (Hasnain et al., 2015). According to Microsoft's Inclusive Design Toolkit (2016), disabilities/impairments can be visible (e.g., loss of a limb) or invisible (e.g., colorblindness) and can be permanent, temporary (e.g., broken arm), or situational (e.g., caring for a baby in one hand leaving only one usable hand). According to the Inclusive Design Research Centre (n.d.): "Inclusive design is design that considers the full range of human diversity concerning ability, language, culture, gender, age and other forms of human difference" (para. 7). Like inclusive design, accessibility also focuses on removing barriers; however, accessibility is narrower, concentrating on the design of products that enable people with disabilities to use and enjoy them (ADA, n.d.; Ocad University, n.d.).

Surveys are organized templates used to gather information through question-asking in scholarly and social inquiries (Nikivincze & Ancis, 2018). Web Content Accessibility Guidelines (WCAG) are

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technical and design guidelines used by web content authors to minimize difficulties faced by people with disabilities (Hasnain et al., 2015; W3C, 2024a). These WCAG guidelines were established by the Web Accessibility Initiative (WAI) group within the World Wide Web Consortium (W3C), are endorsed by the US government, and are considered a standard by the international community (W3C, 2024b).

There are 14 WCAG guidelines divided into compliance checkpoints and priority levels, which fall into one of four 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 (W3C, 2024a). These guidelines are used to verify the accessibility compliance of web content. Although WCAG is used worldwide, some additional standards and policies are also employed internationally, including the W3C Authoring Tool Accessibility Guidelines (ATAG), User Agent Accessibility Guidelines (UAAG), WAI's Accessible Rich Internet Applications Guidelines (WAI-ARIA), and ISO 24751 (DES, 2023, section 9.1). The goal of this study was not to review accessibility guidelines in detail; however, other researchers may be interested in referring to web accessibility auditing procedures used among these resources. For how WCAG relates to other international web accessibility guidelines used in other countries (DES, 2023, section 9.3).

These definitions provide context for the results discussed later. However, a note about survey design is generally warranted to help frame the results. Lumsden et al. (2006) provide a concise summary of the challenges of survey design in general and what is recommended:

> Sampling, measurement, and non-response errors are likely to occur when an online-questionnaire is poorly designed (note that coverage errors, on the other hand, are orthogonal to good-questionnaire design; mixed-mode delivery is suggested as a means to combat these errors). Individuals will answer questions incorrectly, abandon questionnaires, and may ultimately refuse to participate in future surveys; thus, the benefit of online-questionnaire delivery will be not fully realised. To prevent errors of this kind, and their consequences, it is extremely important that practical, comprehensive guidelines exist for the design of online- questionnaires. Many design guidelines exist for paper-based questionnaire design (e.g., American Statistical Association, 1999; Belson, 1981; Brewer, 2001; Fink, 1995; Jackson, 1988; Lindgaard, 1994; Oppenheim, 1992; Taylor-Powell, 1998); the same is not true for the design of online-questionnaires (Dillman, 2000; Norman, 2013; Schonlau *et al.*, 2001). (p. 3)

Lumsden et al. (2006) confirm that recommended practices for online survey design lack comparisons to general survey design. This is further complicated when the lack of a disability perspective is also not addressed, which would help make instruments more inclusive.

Methodology

This review aims to critically synthesize the literature on inclusive instrument design. The structure of this critical literature review follows the eight common systematic literature review steps as demonstrated in Xiao and Watson (2019):

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1. Formulating the research problem;
2. Developing and validating the review protocol;
3. Searching the literature;
4. Screening for inclusion;
5. Assessing quality;
6. Extracting data;
7. Analyzing and synthesizing results; and,
8. Reporting the findings.

Step one is addressed in the article's Introduction section, steps two through six are addressed in the Methodology section, and steps seven and eight are addressed in the Findings section and through the publication of this article.

Literature Search Methods and Evaluation

In addition to Xiao and Watson's (2019) approach to systematic reviews, this literature review was modeled after Quintero's (2022) systematic approach. Both approaches enabled an exploratory review of conceptual literature references, including high-quality book chapters, empirical studies, and case studies. Keywords were identified with feedback from library and disability services experts (who identify with disabilities) and related research in disability studies, user experience (UX), and human-computer interaction (HCI) fields.

The search expression included the following Boolean operations:

(accessible OR accessibility OR inclusive) AND
("survey design" OR "questionnaire design") AND
(disab*) AND
("online survey" OR "web-based survey")

Searches were completed in Spring 2024 using the default search fields in the following EBSCO databases: *Academic Search Premier*, *Library Literature and Information Science Full Text*, and *ERIC*. Searches were also performed on the Association of Computing Machinery's (ACM) website and Google Scholar. The databases were selected due to their broad subject coverage (not just disability-specific) and their intention to improve instrument designs and processes used in any research study, not just those focusing on people with disabilities. Thus, large, interdisciplinary databases and open-access sources, such as Google Scholar, were used to review how related fields address inclusive instrument design.

Initial database searches rendered the following results: 10 for EBSCO, 183 for ACM, and 13,200 for Google Scholar (this study only examined the first 100 articles returned), for a total of 293 results. The citations were added to Preferred Reporting Items for Systematic Reviews

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and Meta-Analyses (PRISMA), a literature review processing tool to facilitate the screening process.

Inclusion/Exclusion Criteria

The titles and abstracts of the 293 initial results were scanned for the search inclusion criteria: studies in English and those published from 2000 onward. From the results found, and after duplicates were removed (n=29), the remaining literature (n=264) abstracts were read in depth to narrow down relevant literature by 1) excluding studies that were strictly about children with disabilities (rather than adults) or had too narrow of a focus, and excluding studies where the full-text could not be obtained, and 2) including studies that had at least one of the following:

- Studies that include instruments or demographic questions in the text or appendix OR
- Studies that offer recommendations for online survey or interview protocol design OR
- Studies that evaluate online survey tools or platforms OR
- Studies that conduct survey design research for accessibility, usability, or inclusive purposes

Studies lacking the specified criteria were excluded (n=199). The remaining 65 studies underwent full-text review for quality assessment and were evaluated based on the publisher's information (journal, editorial boards, etc.), author background, and relevance to the proposed study. From this pool, studies were excluded due to incorrect outcomes (e.g., not describing recommended practices relevant to the topic), inappropriate settings (e.g., not related to information design), and incorrect populations, such as those focused on children (n=42). A holistic perspective on the literature search method and results is presented in the PRISMA flow diagram (Figure 1).

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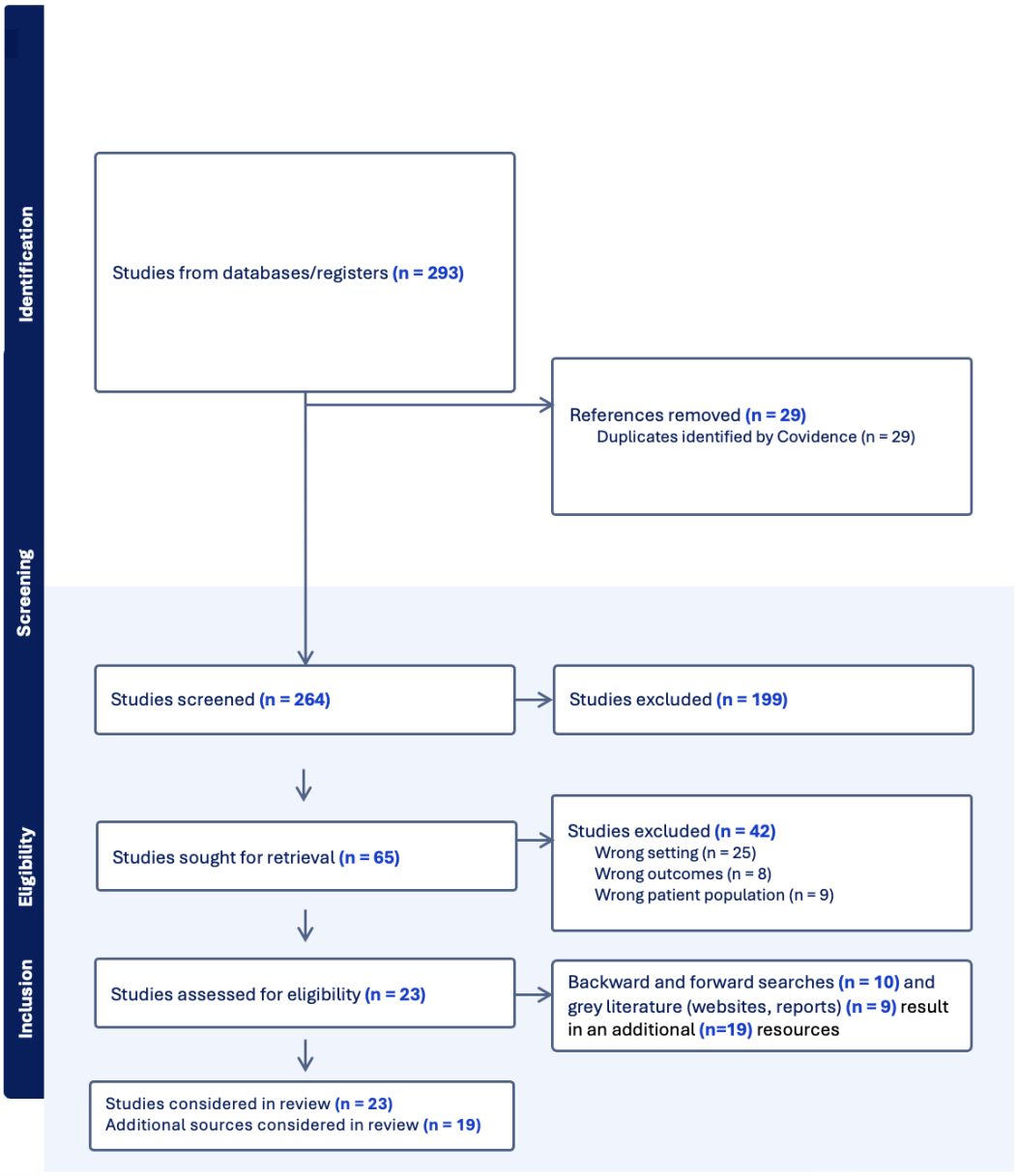

Figure 1. PRISMA diagram of literature review screening process

To further extract high-quality data from the literature, backward and forward searches of relevant sources were also conducted (n=10) and included as additional literature support. Inclusive design, user experience, web design, disability, and demographic question resources (including additional studies, websites, and reports) were also consulted as grey literature (n=9)

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and added as supplementary literature support. From this pool, 23 studies and 19 resources were identified as of high quality, totaling 42 sources. These sources have international audiences, including but not limited to authors with country affiliations from Austria, Brazil, Canada, Colombia, France, Germany, Italy, Scotland, the United Kingdom, and the United States.

Analysis and Reliability

All studies received the same procedural approach: a gathering of the resource citation, study summary, research question (if applicable), theories presented (if applicable), variables evaluated (if applicable), methods used, claims advanced, or research gaps identified. During the data extraction, color coding was used to highlight and identify common or differentiating themes. Other coding categories included instruments (survey length, format, and question types if used). Analysis employed inductive coding, a data-driven approach that derives codes from the data, and closed coding to refine and combine related codes (Asher & Miller, 2011). For quality control, several forms of external review were conducted to ensure reliability, including reviews by individuals who identify with a disability, impairment, or chronic condition. The research protocol was reviewed by colleagues prior to and during the literature extraction process, which included selecting keywords and databases, as well as the rationale behind the exclusion and inclusion criteria, to ensure a consistent approach. An initial draft of the article was reviewed by two colleagues whose feedback helped improve the analysis and writing. Another set of two colleagues also reviewed a final draft, which helped with iterative improvements to the clarity of the approach and assessment.

Three broad themes were identified: 1) Frameworks and Methodologies (for Accessibility or Instrument Design), 2) Challenges (of Accessibility or Instrument Design), and 3) General Recommendations (for Inclusive Instrument Design / Instrument Accessibility). Additional topics include relevant information on survey tool accessibility, demographic question development, and the importance of pilot testing and interview protocols.

Findings

The research in this critical review is exploratory, as its purpose is to identify new or purposeful research questions that can be used in subsequent research studies (Creswell & Poth, 2018; Lazar et al., 2017). The findings are divided into themes and/or subthemes. Then, research gaps are discussed.

Frameworks and Methodologies

Across the 42 sources of scholarly and grey literature on accessible or inclusive instrument design, several frameworks and methodologies were discussed. In order of frequency, these included:

# Articles	Framework discussed
(10)	universal design
(9)	participatory design
(9)	critical/disability theory
(8)	human-centered design
(7)	human-computer interaction
(7)	accessibility conformance evaluation

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(6)	user-centered design
(4)	case study
(4)	design for all
(3)	inclusive design
(3)	co-design
(3)	user experience
(1)	general logic models
(1)	theory for action
(1)	human behavior theory
(1)	evaluation methodology
(1)	mixed methods

Table 1 presents these frameworks and methodologies by study or source. The source numbers in Table 1 also identify which sources were included in the initial eligibility of 23 studies (source numbers 1 to 23) and 19 additional sources of scholarly and grey literature (source numbers 24 to 42).

Table 1. Table of Frameworks and Methodologies by Source

Source#Study/Source	Frameworks/Methodology
Aidley et al. (2022)	Universal design*
Alahmadi & Drew (2017)	User-centered design
Antona et al. (2009)	Design for all, human-computer interaction, participatory design
Ashok & Jacko (2009)	Human-computer interaction
Cawthon (2017)	General logic model, theory for action
Freire et al. (2008)	User-centered design, human-computer interaction
Friedman (2022)	Participatory design
Goegan et al. (2018)	Universal design
Haimerl & Riener (2021)	Human-centered design, user experience (UX)
Hasnain et al. (2015)	Universal design
Hughes et al. (2022)	Critical theory*
Lazar et al. (2017)	Human-computer interaction, participatory design, case study, human-centered design
Leporini et al. (2023)	Evaluation methodology

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Lewis (2009)	Human-computer interaction
Lumsden et al. (2006)	Case study
Miesenberger (2009)	Design for all, universal design, human-computer interaction
Nicolaidis et al. (2020)	Participatory design, co-design
O'Brien et al. (2014)	Participatory design
Petrie & Bevan (2009)	User experience (UX), user-centered design, inclusive design, accessibility conformance evaluation
Pigeon et al. (2023)	Participatory design, co-design
Vanderheiden (2009)	Universal design, design for all
Waller & Clarkson (2009)	Universal design, inclusive design
Wilson et al. (2013)	Case study*
Bojorquez et al. (2019)	Critical disability theory*, accessibility conformance evaluation
Dillman (2000)	Human behavior theory, case study
Gottliebson et al. (2010)	Universal design, design for all, accessibility conformance evaluation*
Henry et al. (2007)	Participatory design
Kroll (2011)	Mixed methods, disability theory*, participatory design
Mitchell et al. (2006)	Universal design, disability theory*
Nikivincze et al. (2018)	Universal design, accessibility conformance evaluation*
Parsons et al. (2001)	Disability theory*
Quintero (2022)	Participatory design, co-design, universal design, user experience, human-computer interaction, disability theory*, user-centered design
Rowland & Whiting (2016)	Accessibility conformance evaluation*
Hasso (2024)	Human-centered design
ISO (2019)	Human-centered design

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Microsoft (2018)	Human-centered design, user-centered design, inclusive design
NCDAE (2024)	Accessibility conformance evaluation
NCWIT (2020)	Disability theory*
NCD (1998)	Disability theory*, human-centered design*
University of Arizona (2024)	Human-centered design*
W3C (2024a)	User-centered design, accessibility conformance evaluation
WHO (2023)	Human-centered design*, Disability theory*

Note. * means inferred; principles of this framework/methodology are described, though the term may not be explicitly stated in the source

Universal design is a crucial principle in increasing survey accessibility and usability (Lazar et al., 2017; Nikivincze & Ancis, 2018). Human-centered design is another approach that focuses on problem-solving by building empathy for human behaviors and human needs (Hasso, 2024; ISO, 2019). This design approach can be applied to research studies; however, it is the responsibility of researchers to engage people with disabilities and strive to understand human diversity (Gottliebson et al., 2010). Additionally, the researcher must make accommodations in the survey and interview designs (Lazar et al., 2017; Wilson et al., 2013). Researchers and web designers should be educated on the needs of the disability community, and online survey designs must comply with accessibility standards to make them accessible to diverse users (Hasnain et al., 2015; Wilson et al., 2013). Universal and human-centered design frameworks are commonly employed in most user experience (UX) and human-computer interaction (HCI) studies. When coupled with surveys and user testing, it can appropriately measure attitudes, awareness, and feedback about user experiences. Participatory design is often used in conjunction with universal design and human-centered design research, as it involves stakeholders and researchers collaborating on the research and design process to ensure the needs of a population are met (Henry et al., 2007).

According to Lazar et al. (2017), the authors of *Research Methods in Human-Computer Interaction*, HCI is a complex research area that borrows and adapts methods from various fields to establish standards for acceptable research in HCI. Contributions to HCI research encompass empirical data, artifact contributions (including HCI systems research, interaction techniques, prototype design, toolkits, interfaces, mock-ups, and other related materials), methodological contributions (new approaches), theoretical contributions, dataset contributions, survey contributions, and opinion contributions. HCI and case study research tend to have smaller datasets, primarily because researchers recruit participants and create their own datasets (Creswell & Poth, 2018; Lazar et al., 2017). Findings from exploratory HCI research can be

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utilized to build prototypes that undergo evaluations of user behavior, tasks, and environmental accessibility. For example,

> Failure to consider user diversity during the design, development, and testing of applications leads to "technological exclusion"… the phenomenon of technological privilege [also] arises when certain users are provided with opportunities to benefit from applications while others are denied the same because of a failure to include their needs during the design process. (Ashok & Jacko, 2009, p. 4-1)

Cognitive barriers also intersect with HCI, where memory versus logic or cues influence a user's learning process for using technology (such as a cell phone), and how user interaction techniques are emerging to overcome these design challenges (Lewis, 2009).

There is a historical focus on HCI research aimed at improving the quality of life for humans. Modern design techniques encompass physical objects and virtual objects, interaction and interfaces, emotions, and attitudes, where "more and more aspects of daily life become subject to design" (Miesenbeger, 2009, p. 58). This ultimately makes it challenging to identify recommended practices in HCI and universal design, which is why case study research methodology is frequently employed in HCI research. A case study is an in-depth study of a specific instance or population (or a small number of instances) within a particular context (Creswell & Poth, 2018; Lazar et al., 2017). A close examination of such cases, which can involve a small number of participants, including as few as one, can be used to build understanding, present evidence of user behavior, or provide new insights. In case studies, statistical analysis is not the goal. "Instead, case studies employ careful analysis of carefully selected subjects to generate interesting and novel insights, ideally with an eye toward developing general principles that might facilitate understanding of other cases" (Lazar et al., 2017, p. 153).

Additionally, within HCI and case study research, surveys are often used in conjunction with other data collection methods, such as user requirements, focus groups, diary studies, usability testing, and interviews (Antona et al., 2009; Lazar et al., 2017; Yin, 2009). In HCI research, survey questions are typically structured as either open-ended or closed-ended questions with ordered or unordered response categories (Freire et al., 2009; Lazar et al., 2017). In all cases, questions should be carefully written to avoid bias and complexity in responses and phrased in a way that provides valuable feedback for analysis.

Challenges of accessibility and instrument design

Given the diversity of the population with disabilities or impairments—including those that are permanent, temporary, or situational—there are complexities in designing accessible and usable surveys (Lazar et al., 2017; Mitchell et al., 2006). Literature indicates that surveys for participants with disabilities have employed proxy respondents, assisted interviews, and incentives to address challenges in disability research (Kroll, 2011; Lazar et al., 2017; Mitchell et al., 2006; Wilson et al., 2013). Yet, existing practices still largely exclude people with disabilities from research studies (Hasnain et al., 2015; Kroll, 2011; Parsons et al., 2001). Reasons for exclusion from national research initiatives include a lack of alternative survey formats, inappropriate handling of proxy responses, inadequate interviewer training, and under-sampling (Hasnain et al., 2015). Given the range of disability types, it is nearly impossible to design a survey that addresses all disability categories (Hasnain et al., 2015; Lazar et al., 2017;

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Mitchell et al., 2006; Vanderheiden, 2009). However, the literature also discusses challenges for validity in research studies that exclude people with disabilities from general population studies (Aidely & Fearon, 2022; Nicolaidis et al., 2020). Considering the large percentage of the global population with disabilities,

> excluding people from research by conducting it in ways that may make it impossible for them to take part poses methodological problems. Reducing barriers to participation, therefore, means getting a broader and more representative range of responses and improving the validity of our findings. (Aidely & Fearon, 2022, p. 3)

Similarly, accommodations for people with disabilities are often utilized in educational contexts for class assignments or tests; however, the use of accommodations in research studies receives minimal attention (Goegan et al., 2018).

Survey Questions and Demographic Questions. There are several common problems with instrument questions, including the combination of two questions into one, the use of negative words in questions that can be confusing, biased wording of questions, and the inclusion of emotionally charged or "hot-button" words in the questions (Lazar et al., 2017). For demographic questions specifically, recommended practices include utilizing "select all that apply" questions; avoiding the use of "othering" language for write-in options; using skip logic when possible; providing opt-out options; providing a statement of purpose for collecting demographic information; alphabetically ordering survey items to eliminate ranked importance; and purposefully selecting demographic questions, modified for each survey use so you only ask for what is needed (Cawthon, 2017; Hughes et al., 2022; NCWIT, 2020; U.A., 2024). It is essential to note that asking participants to select demographic options that do not accurately represent them can lead to frustration, marginalization, and a lack of understanding of how to respond (Hughes et al., 2022, p. 233), which can decrease a participant's willingness to complete a survey or participate in an interview. Additionally, data collection for the disability demographic characteristic is lacking in computing research, and some individuals may self-identify as having a disability without a formal diagnosis (Hughes et al., 2022; NCWIT, 2020).

Survey Tools. Online surveys can be developed in-house or with existing web-based tools, including SurveyMonkey, SurveyPlanet, FreeOnlineForms.com, and Google Forms. These off-the-shelf or existing survey tools may not be the best; however, they enable surveys to be created quickly and are now the most commonly used format in survey research (Lazar et al., 2017). Until recently, online survey providers lacked experience in accessibility practices, though guidelines exist (e.g., WCAG, Section 508, and WAI-ARIA). Two studies have reviewed online survey tools, such as SurveyMonkey and Qualtrics, among others, and one study found that only one out of eleven tools was compliant with WCAG accessibility guidelines (Gottliebson et al., 2010; Nikivincze & Ancis, 2018).

Additionally, all 11 survey tools were deemed unusable by assistive technologies such as screen readers (Gottliebson et al., 2010). According to these studies, most accessibility issues arise during the implementation phase, as researchers often have limited knowledge of accessibility practices and rely on a survey platform to deliver accessibility standards (Nikivincze & Ancis, 2018). Hasnain et al. (2015) found that, despite many survey tool vendors claiming their platforms comply with WCAG guidelines, only some actually do. Testing some survey tools has also demonstrated this need for compliance (Gottliebson et al., 2010; Nikivincze & Ancis, 2018). This is supported by Freire et al. (2008), whose study of 613 web developers found that "few

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people are really aware of accessibility issues in web development" (p. 95), which is primarily due to a lack of accessibility training and is equally applicable to web development and survey design and development. Additionally, Haimerl and Riener (2021) found that existing survey tool vendors, such as LimeSurvey and SurveyMonkey, do not allow for customized survey methodologies, which would help address challenges faced by some individuals with cognitive or learning disabilities.

General recommendations for inclusive instruments

Despite this, there have been various recommended practices for designing inclusive surveys or interviews, which include use of concise and simple language (Friedman, 2022; Goegan et al., 2018; Mitchell et al., 2006; Nicolaidis et al., 2020; Nikivincze & Ancis, 2018; Wilson et al., 2013), brief questions and shorter survey lengths (Aidely & Fearon, 2022; Friedman, 2022; Mitchell et al., 2006; Nikivincze & Ancis, 2018), shorter recall periods and minimizing high frequency sounds (Mitchell et al., 2006), avoiding strict time limits (Aidley & Fearon (2022), using auto-saving functionality (Aidely & Fearon, 2022), prioritizing anonymity (O'Brien et al., 2014), setting the language of the survey for screen reader accessibility and allowing keyboard navigation (Aidely & Fearon, 2022), building in breaks for participant fatigue (Kroll, 2011; Mitchell et al., 2006), using multiple sessions as needed (Kroll, 2011; Mitchel et al., 2006), reducing the need to travel (Aidely & Fearon, 2022), addressing comprehension by rewording questions (Kroll, 2011; Mitchell et al., 2006; Pigeon et al., 2023), offering alternative methods or formats (Antona et al., 2009; Kroll, 2011; Lazar et al., 2017; Nikivincze & Ancis, 2018; Parsons et al., 2001), avoid presenting information as an image alone (Aidely & Fearon, 2022), streamlining question types and scales (Nikivincze & Ancis, 2018; Wilson et al., 2013), and layout changes such as large font sizes, high contrast, and adjusting the presentation of selections, questions, and scales (Lazar et al., 2017; Nikivincze & Ancis, 2018; Wilson et al., 2013).

According to Lazar et al. (2017) and Goegan et al. (2018), general advice for survey design includes having the survey participant acknowledge they are aware and give consent to take a survey for a research study, starting the survey with instructions, providing navigation to the user, grouping related questions or similar topics to help with cognitive load, starting with more interesting questions at the beginning to motivate people to complete the survey, leaving demographic or sensitive questions towards the end of the survey, and considering the survey length which impacts response rates. For usability testing, one participant with disabilities who has conducted hundreds of such tests says the process has typically been unstructured (e.g., find any errors you can), which can impact the perceived value of the request and the tester's (quality) time on task (personal communication from a participatory design study, June 2023). As discussed in this review, reducing design exclusions can "improve the experiences for a broad range of users in a wide variety of situations" (Waller & Clarkson, 2009, p. 19.1).

Methods: Pilot Testing and Recruitment Strategies. Once a survey or interview protocol draft is complete, it should undergo testing, such as a pilot study, user testing, or pretesting. For the pilot study, the interview questions, survey questions, and the interface of the online survey tool need to be tested with members of the target audience, including people with disabilities (Aidely & Fearon, 2022; Antona et al., 2009; Dillman, 2000; Friedman, 2022; Goegan et al., 2018; Lazar et al., 2017; Lewis, 2009). This user testing should also incorporate inclusive design, where researchers must be intentional about adaptive accommodations to tester preferences. For example, this may involve using a flexible format (e.g., in writing, over the phone, or via video chat) to report results and offer pre- and post-test meetings. The pilot test effort can help

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determine the validity of the study. The size of the pilot study will vary based on the goal of the more extensive study, where a goal of 200-300 responses could reasonably be achieved with a pilot study of 5-10 people (Lazar et al., 2017). Methods for increasing responses include anonymous surveys, which can lead to increased comfort in self-disclosure among survey participants (Lazar et al., 2017). Self-administered surveys, rather than interviews, tend to elicit more honest answers to sensitive questions (Lazar et al., 2017). Incentives such as cash or drawings for cash prizes also help increase response rates (Lazar et al., 2017; Miller, 2024; Mitchell et al., 2006). To further remove barriers, interviewer training should not only occur but also include strategies for sensitizing interviewers to the needs of people with disabilities, including how to utilize assistive technologies (Mitchell et al., 2006; Parsons et al., 2011).

Considerations by Impairment. Common challenges for individuals with motor or physical impairments include poor muscle control, fatigue, and difficulties with walking, talking, seeing, speaking, sensing, reaching, and grasping (Antona et al., 2009; Ashok & Jacko, 2009; Hasnain et al., 2015). Recommendations for reducing such motor difficulties include addressing access to buildings or hardware needed for interviews (which includes transportation requirements) and the required affordances for website use (e.g., keyboard and mouse use). For people who are blind or visually impaired, any written material should be provided to participants in an appropriate form, such as in Braille (if they know the Braille language), in an accessible electronic form if they use assistive technologies or computers, and with an appropriate typography (Antona et al., 2009).

For sensory impairments, noise levels (and a person's ability to adjust that as needed) and distracting elements in the space (physical or virtual) may affect a person's concentration (Ashok & Jacko, 2009). For individuals with hearing impairments, allow participants to communicate in their preferred manner, including lip-reading, the use of hearing aids, assistive technologies, or sign language. Some participants may require a sign language interpreter for interviews or focus groups; all participants are instructed to speak at a clear and understandable pace. For individuals with hearing disabilities since birth, many of whom struggle with reading and writing, it is crucial to present written material in a clear and simple manner (Antona et al., 2009; Hasnain et al., 2014; Lazar et al., 2017).

To address the generalizability problems often associated with people with learning or cognitive disabilities, it is helpful to initially work with a small group of users to design and test a system before evaluating it with a larger group of people (Antona et al., 2009). When involving users with autism, consider using images to help process survey and interview questions rather than text-heavy designs (Ashok & Jacko, 2009; Nicolaidis et al., 2020). Lastly, consider the language and terminology used when working with people of varying abilities, as some people prefer people-first language (e.g., people with a disability); however, blind people and Deaf people (*capital D intended*) generally prefer identity-first (e.g., blind person) and some people may not identify as having a disability (Lazar et al., 2017). Challenges related to impairment are also the focus of subsequent studies (Miller, 2024; Miller, pending-a; Miller, pending-b), which were prompted by the lack of literature on inclusive instrument design identified in this study. Such examples include addressing sensory or information processing challenges by supporting information on instrument pages with a combination of text, colors, and other visual cues.

Alternative Formats for Interviews or Usability/User Testing. As an alternative to traditional interview methods, research has demonstrated that online chat tools can be utilized to conduct interviews with participants who are blind (Antona et al., 2009). However, this would require

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the chat tool to be accessible to screen readers. Researchers who require participants to read or write during interviews or discussion groups should prepare materials in advance that are accessible to individuals with disabilities or impairments, thereby reducing barriers and potential feelings of embarrassment or discouragement (Antona et al., 2009). An alternative to online surveys is administering the survey over the phone or providing a paper copy, which are accommodations beneficial to individuals with intellectual or learning disabilities (Friedman, 2022).

For usability or user testing, older adults and individuals with disabilities may require more time to complete the process or tasks that comprise the usability test without experiencing anxiety or frustration (Antona et al., 2009; Lazar et al., 2017). In this case, it is crucial to consider the process, room, and equipment used, such as in-person vs. remote locations, based on the person. Other recommendations include adapting think-aloud protocols to address sensory impairments, as well as offering flexible session lengths and formats to prevent fatigue for individuals with physical or information-processing challenges. Additionally, the combination of formats (such as auditory and print) can create a more universally accessible research experience as people differ in how they perceive and comprehend information (Goegan et al., 2018).

Summary of inclusive instrument design practices in the literature

Several important and consistent practices that can create a more inclusive survey instrument are evident when examining the themes identified in the literature review, including grey literature. Methodological frameworks largely applicable to inclusive survey design include universal, human-centered, and participatory design. Theoretical frameworks encompass critical disability, human information behavior, and human-computer interaction theories. One of the most important considerations in survey design is providing participants with sufficient information to enable them to decide whether to participate. Inform survey participants of the consent process, potential risks and benefits, whether the survey is anonymous, and the time commitment required before they take the survey. This provides participants with the necessary information to make an informed decision about whether to participate. Also, please indicate whether accommodations are possible for participation using an alternative method and provide contact information for further inquiries. Offering alternative formats is another critical measure to address the accommodations and preferences of people with varying limitations, and it can help create a positive experience with research study participation.

Survey questions should have a mix of open-ended and closed-end questions with response categories (as seen in Lazar et al., 2017; NCWIT, 2020; U.A., 2024). Demographic questions should also be asked in various ways to gauge preference for answering such sensitive questions (e.g., self-identifying characteristics vs picking from a list of options). Surveys should also be pilot-tested before being launched to ensure they align with the study's goals. For the pilot phase, the survey instrument may be modified based on feedback from the pilot testers and undergo an accessibility or usability review by an expert. If possible, compensate people for their time (in a pilot and the survey). A concise version of the recommended practices in this Findings section is available in Appendix A.

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Research Gaps Across the Literature Findings

Although some studies have modified survey and interview instruments distributed to people with disabilities (Hasnain et al., 2015; Mitchell et al., 2006), few studies have focused on an intentional design process that incorporates the perspective of participants with disabilities. Most studies have focused solely on accessibility (Wilson et al., 2013) rather than examining both the accessibility and usability of surveys. This research gap informed the author's subsequent study (and forthcoming article), which utilized co-design to co-create a survey with people with disabilities, investigating their experiences with research studies, impairments, and chronic conditions. As recommended in the findings of this review, the follow-up study included diverse user testing, encompassing users with various abilities and technologies. Additionally, many studies examined came from the researcher's perspective with minimal feedback from the survey participants, which does not address the "nothing about us without us" and "design for all" movements that call for direct participation, involvement, and universal design principles. As a result of this finding, the author's forthcoming article on the co-design study made survey tool selection decisions based on user testing feedback from people with disabilities and expert reviews from accessibility specialists. Moreover, although some online survey tools have undergone accessibility evaluation (and with poor accessibility compliance scores) (Gottliebson et al., 2010; Nikivincze & Ancis, 2018), they were tools selected by the researcher rather than those preferred by people with disabilities and studies evaluating LibWizard, Microsoft Forms, Google Forms, and other survey tool products are lacking. Due to this gap in the literature, Miller (pending-b) is reviewing these missing survey tool products through automated and manual accessibility testing measures, including user testing with individuals with disabilities.

Information on demographic question formats, question types, and preferred answer options for the disability community is lacking in the literature. There are some references to this in the grey literature (information and reports found on websites) of nonprofits and disability services units within higher education. Still, these were not seen or referenced in the scholarly literature. Research studies should consider more ways to address inclusive instrument designs, which will help improve access to information and the researcher's data collection and results. Furthermore, survey accessibility conformance testing reported in the literature is lacking and limited in terms of which survey tools are examined. Further research is needed on instrument accessibility parameters for various types of disabilities. This research undertaking aims to further the advocacy and inclusive design of research study instruments by highlighting these gaps and addressing them in subsequent studies.

Discussion

This literature review uncovered answers to the research questions and identified remaining gaps. The critical review identified three broad themes from the exploration of the research questions, which included frameworks and methodologies (for accessibility or instrument design), challenges (of accessibility and instrument design), and general recommendations (for inclusive instrument design and instrument accessibility). Frameworks and methodologies used in accessible surveys or inclusive instrument designs include universal, human-centered, and participatory designs. These frameworks are typical for the UX and HCI fields, though they are also used in disability-focused disciplines. The literature also shows a growing interest in and application of HCI research, which uses various methods, including surveys, interviews, and usability tests.

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Considering research question #1 (RQ1) regarding inclusive practices, the findings reveal several challenges related to accessibility and instrument design, including common issues with survey questions, demographic questions, and survey tool options. Findings also show that given the range of disability types, it is nearly impossible to design a survey that addresses all disability categories and that some survey tool vendors claim to have accessible products. However, research shows a lack of accessibility compliance. Finally, the findings also provide some recommended practices for designing inclusive surveys or interviews, including the promotion of pilot testing with diverse users (with a range of abilities) and the use of assistive technologies that employ inclusive and adaptive testing methods based on tester preference, interviewer training, and effective recruitment strategies.

Regarding research question #2 (RQ2), the critical review revealed general depictions of diverse users' lived experiences in participating in online research studies. These were primarily discussed in the subthemes of *considerations by impairment* and *alternative formats for interviews or usability/user testing*. People with varying abilities, including ranges of motor, vision, or cognitive challenges, reveal that each person's experience is unique. Not all people with the same disability or impairment have the same experience (e.g., individuals with a hearing impairment may have different communication method preferences, such as lip reading, hearing aids, assistive technologies, or sign language). Researchers and survey creators who prepare alternative formats in advance can also impact participants' user experience, which can help reduce barriers and feelings of embarrassment for participants with disabilities. Thus, preparation, alternative formats, and a combination of formats (such as auditory and print) can create a more universally accessible research experience as people differ in how they perceive and comprehend information. However, the experiences of diverse users in the literature often seem to be presented from the researcher's perspective rather than the lived experiences of people with disabilities themselves. To gain a more accurate understanding, this perspective requires additional research.

Similarly, in response to research question #3 (RQ3), the preferred online survey tools discussed in the literature are mainly from the researcher's perspective or based on accessibility testing against the WCAG guidelines (which are both helpful) and show a lack of accessibility compliance among the survey tools tested in the literature. However, the review did not directly discuss the preferences of the disability community. Thus, it was a source of inquiry in the author's subsequent research to ask people with disabilities directly about such preferences. Lastly, for research question #4 (RQ4), the findings also show general recommendations for demographic questions and some references to example questions. However, the latter is discussed mainly in grey literature, and neither appears to be from the perspective of the disability community but rather from that of a researcher or an organization. This is a remaining gap, where scholarly sources with demographic question preferences are largely missing from the literature and is a point of co-design and participatory design inquiry in a forthcoming article by the author.

There are also implications for inclusive design that intersect with other cultural identities, especially when considering the sensitive nature of demographic questions often posed in research instruments. Aside from a disability status, surveys seek other cultural identity characteristics such as age, ethnicity, gender, language, and socioeconomic status. Although this study focuses on the cultural identity of individuals with disabilities, impairments, or chronic conditions, inclusive design—a design that ensures every person, regardless of their identity characteristics, can enjoy and use products or services—also applies to these other cultural

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identities when designing instruments and research studies. Thus, the intersectionality of this study has implications for inclusive design that extend to the broader cultural context.

Ultimately, practices for creating inclusive instruments are scattered across the literature, with some details found in accessibility studies, web design, and user experience design. A limited literature review in a single discipline would have revealed only a limited scope of recommended practices. Through a deeper review of literature across various disciplines, including disability studies, education, information science, and the social sciences, a more comprehensive set of recommended practices was curated and synthesized in this review (see Appendix A). The review also explored survey design recommended practices (from the perspectives of inclusive design and web design) and recommended practices for demographic question format and answer options (from the perspectives of HCI research and disability studies). Advice on asking about specific types of disabilities is challenging, as there are numerous different types and varying characteristics within each type. This review can potentially help address preferred question formats, survey and interview lengths, and accommodations used in instruments designed by researchers seeking to recruit members of the disability community. These practices are also beneficial for creating a more enjoyable research participation experience for all users, regardless of their identity characteristics, with both practical and social implications. As a result, the findings help illuminate how a universal, human-centered, and inclusive design approach to instrument development can benefit all participants in research studies.

Conclusion

This critical literature review identified challenges and provided recommendations for developing inclusive instruments. Inclusively designed surveys, interviews, and usability test protocols can help improve the experience of people with disabilities who participate in calls for widely distributed research studies. Such inclusive instruments can then inform the design of an information product, as this author intends to do with subsequent studies. Advice on how to ask about types is challenging as there are so many different types of disabilities, impairments, and chronic conditions. As a research implication, this review highlights the lack of research on preferred question formats, survey and interview lengths, and demographic questions used in instruments by the disability community.

The recommendations in this review have practical implications, as they have the potential to inform future designs of surveys, interviews, and usability test protocols that are more inclusive, creating a more accessible instrument design that a broad audience can use. Each survey will need to be tailored to the target audience of a study; however, starting with an inclusive design from the beginning will increase participation from a broader audience, including people with disabilities. As a social implication, the "nothing about us without us" and "design for all" approaches in the disability and human-centered design fields aim to bring advocacy to the critical issue of not only accessibility and usability but also human acceptance. Thus, other studies should consider incorporating a disability perspective into their research design by employing participatory, co-design, or community-based design methods. There are long-term implications if research study experiences and their instruments are designed with inclusive practices. For example, inclusive practices may increase access to study participation for marginalized groups, providing a more accurate representation of the user population and thereby enhancing data quality and validity. Additionally, inclusive practices applied in research studies may inform policymaking at an organizational or international level.

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The findings in this review prompted additional studies to address the research gaps identified. For example, accessibility conformance testing of survey tools not found in the literature review (e.g., LibWizard, Google Forms, Microsoft Forms, and Qualtrics) was conducted in a subsequent study (Miller, pending-a), which contributes to the scholarly discourse. Another subsequent study (Miller, pending-b)**, informed by the findings of this review, included people with disabilities as co-designers of surveys and demographic questions, where a survey prototype was based on the** review's recommended practices. These two subsequent studies were used to gain more design implications and understand user preferences before launching a wide survey about demographic question preferences. Understanding these user preferences and challenges may also benefit people without disabilities, increasing the accessibility, usability, and enjoyment of participating in online surveys and usability tests more broadly.

Collectively, this research undertaking aims to advance the advocacy and inclusive design of information products by providing guidance on recommended practices for inclusive instrument design, enabling access to knowledge, and creating positive experiences for as many people as possible. This enriched understanding may help researchers develop and utilize an inclusive instrument for testing products, such as online surveys, websites, or digital books. Starting the design of an information product with a human-centered mindset and inclusively designed instruments can increase the chances of creating more usable information products with social, practical, and long-term implications for designing with social impact. Improving design experiences for people with disabilities may lead to better experiences for a wide population.

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Appendix A

Recommended Practices for Inclusive Instrument Design

Based on findings from the literature review, the recommended practices for inclusive instrument design align with basic user experience (UX) principles, including affordances, simplicity, signposting, and providing people with the necessary information to make informed decisions. Although a list of recommended practices is detailed in the findings section of this article, this appendix provides a concise version, as well as an additional set of general practices to consider, which can help improve research study instruments (such as surveys, interviews, and usability test protocols) and website content.

Recommend Practices for Research Instruments (Surveys, Interviews, and Usability Test Protocols)

- Make informed consent a priority. Give participants enough information to decide whether to participate in the research study, survey, interview, or usability test. Inform survey participants of consent, risks, benefits, whether the survey is anonymous, and time commitments before participating. Use short, easy-to-read, and comprehend consent wording. Also, include whether accommodations are possible for participating with an alternative method and how to contact someone about that inquiry (if possible).
- Use a mix of open-ended and closed-end questions with response categories in surveys
- Question-wording of surveys and interviews (where applicable) should attempt to use simple language, avoid bias, avoid "othering" language, provide clear instructions and shorter survey length, group related questions, use contrast colors, avoid flashing effects, and use navigation aids.
- Only ask demographic questions that are necessary to the study (avoid asking unnecessary questions)
- It is helpful to pilot test surveys and interview or usability tests with people with disabilities or impairments and with assistive technologies before launching the study, which helps provide clarity on the process, removal of bias in the instruments, and accessibility conformance of the instruments (consider accessibility or usability review by an expert if possible; Account for or build in funding for expert evaluations and user testing through donations, grants, department funding, or partnerships when possible).
- If possible, compensate people for their time (in a pilot and the actual study). Even just the chance to win a drawing for cash or gift cards is better than nothing at all.

General Practices for Any Web Content (including Online Surveys)

- Readability: Consider word choice and avoid the use of abbreviations
- Headings: Use large font sizes, avoid the use of italics, avoid underlining non-hyperlinked words, and avoid the use of all caps
- Space: Consider the space around items, including good use of blank space and proximity to other items
- Layout: Left justify text (rather than justify), use bullets and chunking to help with readability, aim for no more than 60-70 characters per line, and avoid sentences starting at the end of the line
- Writing Style: Avoid long sentences and be concise

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- Contrast: Use color combinations strategically, such as light text on a dark background or dark text on a light background
- Links: Avoid creating links with the words “click here” or “read more” and instead describe and label what or where the link goes
- Icons: If using icons, also have words with icons or use words as links
- Underline: Only underline links and use italics or bold for emphasis instead of underlining

All of these considerations can help with cognitive load, which benefits everyone. Creating accessible content makes things easier to use for everyone, including people with and without disabilities.

Example Resources for Accessibility, Inclusive Survey, or Web Design

- Writing Resources for Readability https://hemingwayapp.com/
- Writing for Web Accessibility https://www.w3.org/WAI/tips/writing/
- Color Contrast checker https://webaim.org/resources/contrastchecker
- WAVE Web Accessibility Evaluation Tool https://wave.webaim.org
- Web Content Accessibility Guidelines (WCAG). https://www.w3.org/WAI/standards-guidelines/wcag
- Making Audio and Video Media Accessible https://www.w3.org/WAI/media/av/
- Running Usability Tests https://www.usability.gov/how-to-and-tools/methods/running-usability-tests.html

This set of *Recommended Practices for Inclusive Instrument Design* is available CC-BY Miller (2025) and made available as a curated list that researchers may choose to adapt or adopt if applicable to their study. The curated list of recommended practices is for researchers who hope to design with a more inclusive mindset from the beginning of the research study and instrument design process. If these recommended practices are used to design an instrument, the next step is to test the instrument for accessibility and usability. Consider using a multiple-method evaluation with automated and manual accessibility testing procedures (which includes manual methods by the researcher, user testers, and expert reviewers). Example procedures are available in Miller, pending-a.

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