Toward TechnoAccess: A narrative review of disabled and aging experiences of using technology to access the arts

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ABSTRACT

This paper presents a narrative literature review that addresses the issue of how disabled and aging people access the arts through technology. Our review synthesized 56 studies about disabled and aging people's experiences of access through technology, with a focus on methods used and accounts of user experiences/stories to inform a Canadian research and development initiative called *Accessing the Arts*. We urge designers and developers to consider the complex, multimodal sociotechnical relationships surrounding technology and access—or TechnoAccess—as they develop technology with disability, aging and access in mind. Although existing evidence offers ways to improve everyone's access to the arts, recommendations are provided for research around access and technology as an inherently politicized topic that must be informed by disabled and aging people's intersectional cultural experiences, including how they wish to use technology to access the arts.

1. Introduction

Disability arts and technology are political. Access to art through technology is a vital part of disability politics [1–6]. Early research suggests that the integration of technology into art and how it is curated and programmed can make art more accessible for disabled and aging audiences. For example, when theatre events are hosted using technology such as Zoom or Facebook Live, this can enhance the number of people who have access to the event, particularly among disabled and aging people. Technology can also enhance disabled and aging people's awareness of accessible arts events that are available to them. Such an insight led to the development of *Accessing the Arts* (ATA), a digital initiative co-created by Deaf and disabled artists across Canada led by Creative Users Projects (CUP) since March 2019. However, little is known about what disabled people go through to access the arts. The routes that aging people find to access the arts emerge as highly relevant to the question of arts access due to the demographic and socio-cultural significance of the "aging-disability nexus" [34]; not only are aging populations increasing globally but most people so categorized will age into disability whether or not they identify as disabled [7]. Thus, this narrative literature review aims to synthesize research about disabled

and aging people's sociotechnical experience accessing the arts, with a focus on methods and accounts of user experiences (UX) in order to refine and develop knowledge base of for ATA's human-centered design process.

By conducting a literature review, we increased our understanding of the capacities and limits of various technological developments and services designed to address disabled and aging people's information-seeking needs. We specifically noticed overlapping methodological, practical, and complex conceptual issues around situating users as designers and access as a dynamic and iterative process. Our thinking was effectuated by CUP's experiences in designing programming around users' creative interactions with, and development of, technology, as well as by crip technoscience and critical access theory. Crip technoscience is a branch of feminist technoscience enfolded in critical access theory which orients to disabled people's experiences with society and technology including that of designing for access, and speaks to disabled users' re-invention of the material-discursive world through hacking, tinkering, and re–invention [8–10]. With a specific focus on the complexities of cultivating sustainable infrastructures of technology and access among aging and disabled users' that meet their sociotechnical realities, we use this literature review to illustrate the contours of

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experiences with technology/access design and term this process "TechnoAccess."

2. Background: TechnoAccess

Informed by disabled users' experiences with technology, arts, and access, we use TechnoAccess as a methodological, action-based term to denote the desired outcome of multimodal works of technology development. For us, the desired outcomes go beyond legal compliance, adaptation or biomedical impairment repair objectives to include disability's intersectional facets (such as aging) and users' uneven "corporeal attunements" (from positive to negative to somewhere in between) in technology development. In reference to the disparately felt ethics and affects of digital labour, Amrute [11] uses the phrase "corporeal attunements" to describe "how bodies are trained, moulded and erased in the everyday operation of technological systems" (p. 59). With such transient embodiment in mind, TechnoAccess is not simply about using or adapting technology to enhance accessibility, or to access the arts. Instead, it aligns with critical access theory and practice and with digital labour theory to investigate and attend to the conditions of technological accessibility. TechnoAccess broadly and critically considers accessibility to be a complex, politically charged process–even when disabled and aging people are included in technology development. TechnoAccess, as we apply the term in this literature review, focuses on the dynamic processes of technological development led with disabled and aging people's ongoing, intersectional, and multimodal encounters with technology and access in mind. In other words, TechnoAccess is not focused on changing existing technologies by adapting, hacking, or otherwise altering technologies' intended function through their use by disabled people; instead, TechnoAccess describes the development of access-first technology creation processes from the ground up.

TechnoAccess as a practice draws on, and contributes to, the theoretical framework of crip[1] technoscience. In "Crip Technoscience Manifesto," Hamraie and Fritsch [15] offer a foundational description of disabled people's life-changing world remaking through technoscientific activism, anti-assimilationist technology-remaking, and critical design practices. Crip technoscience emphasizes disabled users' individual and community/culturally based knowledge and work "tinkering" with existing technology toward liberatory effects, or working with and through complex "frictions" in people's differing accessibility requirements [8] (para.1, 2, 5). Like crip technoscience, TechnoAccess rejects "TechnoAbleism" and follows critical access theory by resisting "barrier-free" and "universal design" philosophies that continuously position disabled and aging users as outliers. The term "TechnoAbleism," developed by Shew [16]; refers to the ways that technologists and designers may include disabled people as users only when the intention for the product is to rehabilitate or help people "overcome" disability (para 2). Since 2013, "talking back" to "TechnoAbleism" has been fundamental to the ethos of CUP, through which users have designed and developed multitude of critical responses that contribute to the wider work of TechnoAccess (Lam, personal communication, Dec. 10, 2020).

As Rice, Chandler and Shanouda explain, "barrier-free" and

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[1] In disability studies and activism, the term 'crip' is used in multiple ways and its roots align with queer theory and activism [12]. This expansive term is used by some disability communities to reclaim injurious language, to signal resistance against norms of all kinds, and to bring into being and to value disability culture, politics and history. Used as a verb, 'crip' has been described as an intentional "inducement to wince," ([13]; p. 15) and can mean "to open up with desire for the ways that disability disrupts" [14]. In their writing on crip technoscience, Hamraie and Fritsch [15] describe disabled knowing and world-making through critical design practices that "expand possible futures for disabled people" (p. 22).

"universal design" approaches have long been problematized in critical disability scholarship for the ways they situate the "problem" of disability in an individual's body rather than in the relationship between bodies and the environments they inhabit, thus individualizing and pathologizing what might be more rightfully/productively thought of as a social and spatial justice problem: that of building an accessible world [9,17–22,38,39]. And, although philosophies and practices of "barrier-free" and "universal design" spring from early, culture-shifting activism that influenced legislation about technology accessibility (such as the Americans with Disabilities Act in the United States, or the Accessibility for Ontarians with Disabilities Act in Canada), Hamraie's [9] work uncovers a troubling development: the "buy-in" for accessible technologies (among policy-makers, commercial interests, developers) often requires that they be designed and marketed as those that make things better for "everyone" (p. 19). A uniform conception of "everyone" universalizes corporeal experiences of digital labour and narrows the possibilities of human-centered design. This conception also marginalizes disabled and aging people when its proponents mobilize such neutral language to avoid referring to aging and disability (and the stigma associated with these words), which has the effect of re-centering the needs and interests of non-disabled, non-old users. Thus, our articulation of TechnoAccess joins crip technoscience and critical access theory in rejecting the ableist and techno-optimistic mantras of "overcoming" disability via technology-as-savior [23] and of "accessible design is good for everyone" ([9]; p. 19).

Ultimately, TechnoAccess is a set of practices that invite technology creators to connect and reframe context-specific experiences of technology and access at every stage. Creators and developers can adopt TechnoAccess elsewhere in keeping with users' sociotechnical realities, including but not limited to efforts to resist "TechnoAbleism." As a development-driven practice for ATA, TechnoAccess refers to actions and pathways that push past techno-fix approaches and instead cast a critical view toward an abundance of emergent, human- and difference-centered design practices that include, and are informed by, disabled users' digital labour and their place in sociotechnical worlds, including what it means to cultivate sustained, hospitable, access to the arts through technology. TechnoAccess is about "bringing bodies into the story of technological development" through "corporeal attunement" ([11]; p. 59). For ATA, this means bringing into and centering disabled and aging people (and others who are non-normatively embodied) in development processes to work through possible design solutions to the sociotechnical problem of building an accessible world. Neither hacking existing technology nor simply including accessibility stakeholders in solution-focused design is enough to constitute TechnoAccess. Rather, TechnoAccess broadly scopes the ongoing sociotechnical lives and corporeal realities of people's intersectional experiences, understanding that access is contingent upon social, structural, and technical barriers that are felt unevenly among users.

Using the concept of TechnoAccess, we reviewed published accounts of technology and access development for aging and disabled people between 2015 and 2020, mapping their approaches and considering the possibilities that emerge when disabled and non-disabled artists, technologists, designers, and research participants create technology to improve access among disability and aging communities. While all studies reviewed reported on developing technology *for* disabled and/or aging people, disabled/aging people's involvement was often unreported or was not the focus of the study. Through TechnoAccess, we are exploring possibilities that emerge when disabled artists, technologists, and designers create technology to improve access among their communities, and so here we begin with a literature review that gives some insight into technology development for aging and disabled people between 2015 and 2020.

3. Objectives

Objectives of this literature review were to: capture methods and

theories applied in UX research aimed at disabled and aging users; learn from stories about how these groups engage in information seeking/use; and explore UX design practices around new and existing platforms for disabled and aging people. Our analysis included considerations of TechnoAccess based on qualitative, anecdotal experiences that influence platform design. This study has helped us form a stronger articulation of this term and attenuated our understanding of its contribution to crip technoscience. We synthesize the literature review research, focusing on methodological approaches (prototype testing, co-curatorial design, personalization, collaboration) and practical accounts of UX (anecdotes, stories) in order to critically inform the co-design of online platforms by disabled and aging designers, artists, and users for disability communities, such as ATA. We argue that existing evidence offers pathways to improve everyone's access to the arts, but there remains much work to be done to generate a more politicized, intersectional TechnoAccess practice surrounding UX and platform development with potential to improve arts access in ways that centralize disabled, aging, and other marginalized people's multimodal experiences with technology.

4. Methods

This narrative review followed a systematised search process summarizing and critiquing a body of literature in order to identify, explain, and provide perspectives on disabled and aging people's access experiences. We chose this type of review following an initial, nonsystemic review of 25 articles (January 2019) that began with terms such as "disability," "access" and "arts." The resulting literature focused on assistive technology (AT) and aging, caregivers, and families, which demonstrated that additional identifiers (beyond "disability") needed to be incorporated into our broader inquiry about what disabled and aging people experience in order to access the arts, given that disability is embodied, intersectional, politically-informed, and entangled with aging [7,24–27]. The preliminary search also taught us that investigation into actions and affects of disabled people accessing the arts is rarely researched. Instead, our searches generated information about UX, information-seeking, and navigating healthcare platforms (in-person and online) that, ergo, facilitate arts access.

4.1. Research questions

With TechnoAccess in mind, and following critical disability studies traditions that aim to understand and trouble the politics around specific practices [36], including practices of critical accessibility mapping [10, 20,28,29], the research questions guiding this review were: What experiences and processes do disabled and aging users go through in accessing information and services? What frameworks are being developed (or in place) to support disabled and aging users in accessing information and services? And, what are the experiences and preferences of disabled and aging users in gaining access to information, services, and ultimately, the arts?

4.2. Review design

According to Stewart et al. [41] the purpose of a narrative review is to provide a comprehensive overview of the research available on a particular topic and to place this synthesis into disciplinary perspective and broader context (p. 549). To do this, we conducted structured searches in February and March 2020 using four major databases: Sociological Abstracts, PsychInfo, Social Work Abstracts, and JStore. The search terms, including "disability + arts + information seeking," "user experience + aging," "disab* + user experience + aging," "disability + caregiver + user experience," and "disability + user experience + ethnography," found 983 articles, allowing for a thorough identification and synthesis of relevant literature.

4.3. Selection criteria

Articles were included in this review if they were published between 2015 and 2020; were written in English; reported on information-seeking practices; used qualitative methods; included thick description and/or stories of people's experiences (or "corporeal attunement") [11]; and focused on disabled and/or aging adults. The focus on disabled and/or aging people allowed for a range of studies that included people given a variety of labels (by researchers) and/or claiming their own identities such as: extreme users, d/Deaf, blind/low vision, autistic, home-bound, intellectual disability, and physical disability, among others. Articles were excluded if they were written in languages other than English; reported on technology development not related to information seeking; used entirely quantitative methods; and focused on research results without the inclusion of disabled and/or aging people's experiences.

After reviewing the abstracts (n = 983) and excluding articles that were not within the scope of this research (n = 927), a selection of studies (n = 56) was read in full and coded independently by two authors using MAXQDA2020 software. Coded information included author names, publication date, article title, journal name, and abstracts. Authors read each article and coded them based on five themes (see Table 1): 1) Methods (methods used in each study); 2) Platform development (descriptions for platform development); 3) Stories (from users about using technology); 4) User experiences (accounts of user experiences from researchers observed by researchers); 5) Connections (connections between people and technology); and 6) Invisibility (those whose identities were absent, forgotten, or not accounted for—in other words, made invisible—in the research). We watched for the sixth theme knowing that people who do not have access to stable Internet connections, funds to access technology, or a desire to engage with technology are often disappeared from studies of the types we were gathering. The data were compared, and minor discrepancies related to coding under headings were identified and discussed, and the results from the literature coding revealed concomitant themes described below.

5. Results from the literature review

5.1. Methodological frameworks for accessibility

Studies that specifically designed methodological frameworks to attend to access tended to involve disabled, mad,[2] and older people in the design and to use exploratory approaches, such as ethnography (Cubellis, 2018; Wilbers, 2015). Amongst exploratory studies were those geared at very specific groups. For instance, Young et al. (2020) engaged in a life-story intervention for Deaf sign language users who experience dementia, finding that personal and communal stories are a primary means by which Deaf people convey to non-Deaf people the meaning and richness of Deaf culture.[3] Young et al.'s (2020) life-story work teaches us that Deaf people's lifelong experiences of visual/gestural language is very different from non-Deaf understandings of

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[2] We use the word "mad" following users or former users of mental health services and other people with non-normative ways of thinking and feeling who have reclaimed the term for political purposes. This word is central to the evolving disciplinary field of Mad Studies, which offers critical inquiry into mental health and madness in ways that foreground the oppression, agency, and perspectives of Mad people, both past and present, to challenge dominant understandings of "mental illness" [30,37].

[3] Deafness is a cultural identifier, and Deaf culture refers to the recognition that those occupying Deaf-worlds do so through a shared vernacular language (e.g., ASL), cultural artifacts, art, social organizations, and a shared experience of the historical power relations that exist between hearing and Deaf people among other commonalities [31,32].

Table 1

- Reviewed and coded articles.

References	Methods	Platform development	Stories	Experiences	Connections	Invisibleness
Abela, A., Farrugia, R., Vella, A. M., & DeGiovanni, K. (2016). Familialistic countries need a family-inclusive service when caring for people with mental health problems - the case of malta. *Families, Relationships and Societies,* 5(2): 313–331. doi:https://doi.org/10.1332/204674315X14365326675064	✓	✓				✓
Alkema, G. E. (2016; 2017). Bringing the pieces together: Person-centeredness is key to transforming policy and services. *Generations (San Francisco, Calif.),* 40(4), 94–100.				✓		
Allen, J., Hutchinson, A. M., Brown, R., & Livingston, P. M. (2018). User experience and care for older people transitioning from hospital to home: Patients' and carers' perspectives. *Health Expectations,* 21(2), 518–527. https://doi.org/10.1111/hex.12646			✓	✓		
Andréasson, F., Andreasson, J., & Hanson, E. (2018). Developing a carer identity and negotiating everyday life through social networking sites: An explorative study on identity constructions in an online Swedish carer community. *Ageing and Society,* 38 (11): 2304–2324. doi:10.1017/S0144686X17000551	✓	✓		✓		
Aptekar, S. (2015). Visions of public space: reproducing and resisting social hierarchies in a community garden. *Sociological Forum,* 30(1), 209–227. https://doi.org/10.1111/socf.12152	✓			✓	✓	
Baldwin, P. J., Evans, J., Etherington, N., Nichols, M., Wright, V., & McDougall, J. (2015). Youth with disabilities talk about spirituality: A qualitative descriptive study. *The Qualitative Report,* 20(7): 941–958. Retrieved from http://ezproxy.lib.ryerson.ca/login?url=https://search-proquest-com.ezproxy.lib.ryerson.ca/docview/1704359655?accountid=13631	✓			✓	✓	✓
Bari, S., Tisci, R., Burlando, R., & Keller, R. (2018). Caring for autistic adults. A qualitative analysis under the lens of capability approach. *Italian Sociological Review,* 8 (2): 243–264. Retrieved from	✓	✓		✓	✓	
Bennett, J., Froggett, L., Kenning, G., Manley, J., & Muller, L. (2019). Memory loss and scenic experience: An arts based investigation. *Forum: Qualitative Social Research,* 20 (1), 1–27.	✓	✓		✓		
Borawska-Charko, M., Rohleder, P., & Finlay, W.M.L. (2017). The sexual health knowledge of people with intellectual disabilities: A review. *Sex Res Soc Policy,* 14, 393–409.	✓	✓		✓		✓
Braley, R., Fritz, R., Van Son, C.R., & Schmitter-Edgecombe, M. (2019). Prompting technology and persons with dementia: The significance of context and communication. *The Gerontologist,* 59(1): 101–111.	✓			✓		
Brenman, N.F., Hiddinga, A., & Wright, B. (2017). Intersecting cultures in deaf mental health: An ethnographic study of NHS professionals diagnosing autism in D/deaf children. *Cult Med Psychiatry,* 41, 431–452.	✓	✓		✓	✓	
Burrows, A., Mitchell, V., & Nicolle, C. (2016). Let's spend some time together: Exploring the out-of-box experience of technology for older adults. *International Journal of Mobile Human Computer Interaction,* 8(2): 69–82.	✓	✓	✓	✓		
Castilla, D., Garcia-Palacios, A., Miralles, I., Breton-Lopez, J., Parra, E., Rodriguez-Berges, S., & Botella, C. (2016). Effect of web navigation style in elderly users. *Computers in Human behaviour,* 55(Part B): 909–920. https://doi.org/10.1016/j.chb.2015.10.034	✓	✓		✓		
Castilla, D., Botella, C., Miralles, I., Bretón-López, J., Dragomir-Davis, A. M., Zaragoza, I., & Garcia-Palacios, A. (2018). Teaching digital literacy skills to the elderly using a social network with linear navigation: A case study in a rural area. *International Journal of Human-Computer Studies,* 118, 24–37. https://doi.org/10.1016/j.ijhcs.2018.05.009	✓	✓		✓		
Cook, E. J., Randhawa, G., Guppy, A., Sharp, C., Barton, G., Bateman, A., & Crawford-White, J. (2018). Exploring factors that impact the decision to use assistive telecare: Perspectives of family care-givers of older people in the united kingdom. *Ageing and Society,* 38(9): 1912–1932. doi:10.1017/S0144686X1700037X	✓	✓		✓	✓	✓
Cubellis, L. (2018). Care Wounds: Precarious Vulnerability and the Potential of Exposure. *Cult Med Psychiatry* 42, 628–646.	✓		✓	✓		
Davidson, A. (2015). A collaborative action research about making self-advocacy videos with people with intellectual disabilities. *Social Inclusion,* 3(6): 16–28. https://doi.org/10.17645/si.v3i6.412	✓	✓	✓	✓		
Deloria, R., & Wolbring, G. (2019). Neuro-advancements and the role of nurses as stated in academic literature and Canadian newspapers. *Societies (Basel, Switzerland),* 9(3), 61. doi:10.3390/soc9030061				✓		
Dew, A., Smith, L., Collings, S., & Dillon Savage, I. (2018). Complexity embodied: Using body mapping to understand complex support needs. *Forum: Qualitative Social Research,* 19(2).	✓		✓	✓	✓	
Di Nuovo, A., Broz, F., Wang, N. et al. (2018). The multi-modal interface of robot-era multi-robot services tailored for the elderly. *Intel Serv Robotics,* 11, 109–126. https://doi.org/10.1007/s11370-017-0237-6	✓	✓		✓		
Fisher, J., Lawthom, R., Mitchell-Smith, Z., O'Neill, T., & McLaughlin, H. (2019). 'neither a professional nor a friend': The liminal spaces of parents and volunteers in family support. *Families, Relationships and Societies,* 8(2): 249–266. doi:10.1332/204674318x15233473046566	✓					
Gurley, K. A. (2016). *The accuracy of self-reported data of an aging population using a telehealth system in a retirement community setting based on the user's age, gender,*		✓		✓		

(continued on next page)

Table 1 (*continued*)

References	Methods	Platform development	Stories	Experiences	Connections	Invisibleness
employment status and computer experience [Doctoral dissertation, University of Maryland]. ProQuest Dissertations Publishing.						
Hall, A. K., Bernhardt, J. M., Dodd, V., & Vollrath, M. W. (2015). The digital health divide: Evaluating online health information access and use among older adults. *Health Education & Behavior,* 42(2), 202–209. doi:10.1177/1090198114547815				✓		
Heyman, B., Lavender, E., Islam, S., Adey, A., Ramsay, T., Taffs, N., & the Xplore Service-User and Carer Research Group. (2015). The journey effect: How travel affects the experiences of mental health in-patient service-users and their families. *Disability & Society,* 30(6), 880–895. https://doi.org/10.1080/09687599.2015.1030067			✓	✓		
Hill, N.L., Mogle, J., Colancecco, E., Dick, R., Hannan, J., & Lin, F.V. (2015). Feasibility study of an attention training application for older adults. *International Journal of Older People Nursing,* 10, 241–249. doi:10.1111/opn.12092	✓	✓	✓	✓		
Inal, Y., Rızvanoğlu, K., & Yesilada, Y. (2019). Web accessibility in Turkey: awareness, understanding and practices of user experience professionals. *Univ Access Inf Soc,* 18, 387–398. https://doi-org.ezproxy.lib.ryerson.ca/10.1007/s10209-017-0603-3	✓	✓				
Kim, M.J., Lee, C., & Contractor, N.S. (2019). Seniors' usage of mobile social network sites: applying theories of innovation diffusion and uses and gratifications. *Computers in Human Behaviour,* 90, 60–73. https://doi.org/10.1016/j.chb.2018.08.046.	✓			✓	✓	
Kolavalli, C. (2019). Whiteness and food charity: Experiences of food insecure African-American Kansas city residents navigating nutrition education programs. *Human Organization,* 78(2), 99–109. https://doi.org/10.17730/0018-7259.78.2.99				✓		
Lansdell, G., Saunders, B., Eriksson, A., Bunn, R., & Baidawi, S. (2018). Enhancing the rights and well-being of people with acquired brain injuries in the criminal justice system: Some findings from a qualitative study. *Australian Journal of Social Issues, the,* 53(2): 88–106. https://doi.org/10.1002/ajs4.41	✓					
Latikka, R., Turja, T., & Oksanen, A. (2019). Self-efficacy and acceptance of robots. *Computers in Human Behaviour,* 93, 157–163.	✓			✓	✓	
Lim, C. S. C., & Newell, A. (2016). User-sensitive Inclusive Design for Technology in Everyday Life. In S. Kwon (Ed.), *Gerotechnology 2.0: Research, Practice And Principles In the field Of Technology And Aging* (pp. 157–179). Springer.		✓				
Llouquet, O. (2017). Blind and online: An ethnographic perspective on everyday participation within blind and visually impaired online communities. (pp. 117–126) transcript Verlag.	✓	✓	✓	✓	✓	
Martin, L., Ouellette-Kuntz, H., & McKenzie, K. (2017). The power of population health data on aging and intellectual and developmental disabilities: Reactions of knowledge users. *Journal of Policy and Practice in Intellectual Disabilities,* 14(4): 268–278. https://doi.org/10.1111/jppi.12196	✓			✓		
Merilampi, S., Koivisto, A. and Sirkka, A. (2018). Designing serious games for special user groups—design for somebody approach. *Br J Educ Technol,* 49(4): 646–658. doi:10.1111/bjet.12631	✓	✓				
Mirza, M., Hasnain, R., & Duke, K. (2018). Fostering community-academic partnerships to promote employment opportunities for refugees with disabilities: Accomplishments, dilemmas, and deliberations. *Societies (Basel, Switzerland),* 8(3), 86. doi:10.3390/soc8030086		✓		✓	✓	
Moller, Schneider, & Steel. (2019). Spotlight on siblings: Considering social context in home modification practice. *Societies (Basel, Switzerland),* 9(2), 30. doi:10.3390/soc9020030		✓				✓
Niemeijer, A. R., & Visse, M. A. (2016). Challenging standard concepts of 'humane' care through relational auto-ethnography. *Social Inclusion,* 4(4): 168–175. https://doi.org/10.17645/si.v4i4.704	✓	✓				
O'Rourke, G. (2016). Older people, personalization and self: An alternative to the consumerist paradigm in social care. *Ageing and Society,* 36(5), 1008–1030. doi:10.1017/S0144686X15000124				✓		
Opel, D. S., & Rhodes, J. (2018). Beyond student as user: Rhetoric, multimodality, and user-centered design. *Computers and Composition,* 49, 71–81. https://doi.org/10.1016/j.compcom.2018.05.008		✓				
Ørjasæter, K. B., & Ness, O. (2017). Acting out: Enabling meaningful participation among people with long-term mental health problems in a music and theater workshop. *Qualitative Health Research,* 27(11): 1600–1613. https://doi.org/10.1177/1049732316679954	✓	✓	✓	✓	✓	
Owren, T. (2019). Nine rules of engagement: Reflections on reflexivity. *Qualitative Report,* 24(2): 228–241.	✓					
Renaut, S., OGG, J., Petite, S., & Chamahian, A. (2015). Home environments and adaptations in the context of ageing. *Ageing and Society,* 35(6), 1278–1303. doi:10.1017/S0144686X14000221				✓		
Rushton, P. W., Mortenson, B. W., Viswanathan, P., Wang, R. H., Miller, W. C., Hurd Clarke, L., & CanWheel Research Team. (2017). Intelligent power wheelchair use in long-term care: Potential users' experiences and perceptions. *Disability and Rehabilitation: Assistive Technology,* 12(7): 740–746. https://doi.org/10.1080/17483107.2016.1260653	✓			✓		
Sáenz-de-Urturi, Z., García Zapirain, B., & Méndez Zorrilla, A. (2015). Elderly user experience to improve a kinect-based game playability. *Behaviour & Information Technology,* 34(11), 1040–1051. https://doi.org/10.1080/0144929x.2015.1077889		✓		✓		
São José, J. M. (2016). Preserving dignity in later life. *Canadian Journal on Aging,* 35(3), 332-347. https://doi.org/10.1017/S0714980816000398	✓		✓	✓	✓	

Table 1 (*continued*)

References	Methods	Platform development	Stories	Experiences	Connections	Invisibleness
Spann, A., & Stewart, E. (2018). Barriers and facilitators of older people's mHealth usage. *Human Technology,* 14(3): 264–296. https://doi.org/10.17011/ht/urn.201811224834	✓	✓	✓	✓	✓	
Stokke, R. (2016). The personal emergency response system as a technology innovation in primary health care services: An integrative review. *Journal of Medical Internet Research,* 18(7), e187. https://doi.org/10.2196/jmir.5727		✓		✓		
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communication and information-seeking behaviours (p. 624). An important implication of this work is that sociotechnical developments for care environments with Deaf community members must consider users' alternative/Deaf histories "that cannot be summarised as the same as others only without the ability to hear" and that tend to be conveyed through visceral, embodied storytelling (p. 273). In other words, the adaptation or universalization of hearing people's technologies may not serve groups such as the Deaf people living with dementia represented in this study, who constitute a distinct user group. For this group, TechnoAccess practices might more suitably involve prototype testing, co-curatorial approaches, personalization, and collaboration as useful, culturally appropriate storytelling methods for improving access. Methodologically, such exploratory group-based methods also have implications for supporting people with memory loss in social settings, where the key purpose of organized activities may be to access the arts.

5.2. The role of prototype testing for user design

Online platform development processes for access largely gestured toward TechnoAccess by including disabled and aging users in prototype development and testing. However, such studies also suggest that including these users is not enough to influence how software solutions are designed. The strongest TechnoAccess considerations during the design process attempted to develop technologies based on user communities described needs (Castilla, 2016; Merilampi et al., 2018; Traina, 2018; Sáenz-de Urturi et al., 2015). For Llouquet (2017), this meant gathering descriptions of blind and visually impaired people's corporeal, sensory engagement with technology. To do this, Lloquet (2017) joined several Facebook groups run by blind and visually impaired people over

two months to learn the needs of stakeholders who might be interested in their emergent assistive technology (AT). Castilla (2018) conducted a pilot test of eye tracker software with two 79-year-old participants who had similar characteristics to the target sample to inform the creation of an experimental prototype for 46 other participants. Some studies' prototyping methods reflect a user-centered design process (Sáenz-de Urturi et al., 2015). Allen et al. (2017) used semi-structured interviews to learn about older people with chronic health conditions transitioning from hospital to urban health-care settings. Here, the methodological, conceptual, and affective merged as accessibility-driven UX was understood as more than a project of inclusion, but instead as a sociotechnical process that referred to impacted communities from the ground up to discover how users felt about, and interpreted, meanings of their experience (p. 520).

5.3. Accessing the arts through co-curatorial approaches

A basic working principle in UX studies involves casting participants as co-creators, which surfaced as another way of involving disabled and aging users in the development of technology with access in mind. During in-depth interviews with music and theatre workshop participants in a Norwegian mental health hospital, participants engaged in weekly rehearsals as co-creators (Ørjasæter & Ness, 2017). Another study, designed in part to help intellectually disabled people use mobile technologies and film self-advocacy videos, drew on the Capability Approach (Davidson, 2015, p. 17–19). This approach "focuses on what people can do rather than on their deficiencies" and offers people choice around participation (p. 19). Participants co-produced and shared mobile videos over three phases of data collection: a planning phase, an

action phase, and an evaluation/reflection phase (p. 19). Participants had trouble deciding what to focus on in their videos, but the author, Davidson, nevertheless explained that "to avoid pitfalls related to using mobile technologies is to position the participants in the role of producers of knowledge, rather than in the role of consumers of knowledge" (p. 18). These instances of co-production speak to the importance TechnoAccess places on positioning disabled and aging people with uneven corporeal attunements to technology development as *producers* of cultural knowledge as they strive to access both the arts and their place in sociotechnical worlds.

5.4. Personalization of access

Personalization of access came up in two distinct forms: a Design for All (DfA) ideology that aims to make everyday life activities accessible for everyone, and a Design for Somebody (DfS) approach that engages specific user groups as primary responders. In a study focused on developing accessible games and gaming as a rehabilitation tool, Merilampi et al. (2018) described these approaches clearly. In the gaming world, DfS is an iterative process that serves small user groups with highly individual needs and moves through many prototype phases (Merilampi et al., 2018; Sáenz-de Urturi, 2015). The prototype phase in Merilampi et al.'s (2018) study involved distributing scale-based questionnaires to participants and responding to their observations, such as the need for larger font sizes (p. 1045). Because one aim of this research was to show how users affected game playability, researchers asked participants to rate game sessions, with the understanding that keeping participants' moods "normal-to-moderately pleased'' would be key to a game's long-term success (p. 1047–9). According to the authors, "[a]sking the right questions is key: instead of 'what do you want?'" one should ask 'how would you like this solution to serve you?' and 'what should be changed?'" (p. 649). In so doing, games can be designed wherein individual settings (such as control method, graphics, etc.) can be adjusted and stored according to the user. In general, we found that studies taking a DfS or similar approach were examples of crip technoscience practices as they focused on adapting prototypes to a small group of users' capabilities rather than generalizing about how access might be experienced (Sáenz-de Urturi et al., 2015). These approaches are useful for those working at the axes of technology and access—or TechnoAccess—for their role in pushing past "barrier-free" or "universal design" through processes of affective personalization that begin in development phases or earlier.

5.5. Collaborative platform development

In contrast to personalization strategies, oftentimes developers made the case for collaborative platform development involving multiple stakeholders. Approaches such as AT that combine functional knowledge with consumer engagement are privileged and considered necessary for technological development (Moller et al., 2019, p. 2). Some projects, such as a teleconnection prototype for caregivers, value expertise from people in organizations (Zernial, 2015). This was the case for research that aimed to provide information for decision-makers responsible for acquiring AT (Thorstensen, 2019). For example, both disabled people and nurses were identified in having a stake in neuro-advancement (neuroscientific and neurotechnological advancements, such as AT and virtual reality) (Deloria & Wolbring, 2019). Deloria and Wolbring's (2019) scoping literature review on the topic revealed that many groups, including disabled people and nurses, must take part in neuroethics and neuro-governance discussions.

However, experts from organizations are not always the appropriate stakeholder group with whom to collaborate. For instance, part of the value of collaboration is the inclusion of people with lived disability and aging experiences and those with relational, affective experiences of disability and aging, including experiences of mobilizing to achieve access (i.e. carers, family). In doing life-story work with Deaf people

with dementia in care environments, Young et al. (2020) pointed out the importance of ensuring carers understand the alternative histories of Deaf people's lives. Such stakeholders might include support workers and families (Abela et al., 2016; Bari et al., 2018; Cook et al., 2018). These examples of collaborative platform development solidified the need for development based on a shared understanding that people's experiences with technology and access are contingent upon social, structural, and technical barriers that are felt unevenly among users. Therefore, as designers work through possible design solutions to the sociotechnical problems of building an accessible world, collaborations must include not only today's stakeholders, but those who can speak to the culturally and historically contingent nuances of such disabled and aging people's access.

5.6. Stories as illustrative of TechnoAccess

Stories emerge in the research as an effective way to relay nuanced, affective-rich moments of people's engagement with access and technology. Fisher et al. (2020) theorize liminality as an experience and affect, reminding us that the stories that inform users' access are never static. For instance, in an autoethnographic account Wilbers (2015) draws our attention to a moment where access emerged nearly unnoticed, prompting us to remember that access is not always obvious:

> Mom moves from the living room to the kitchen and pours herself a cup of the gourmet coffee I bought dad for Christmas. I follow her and watch as she stirs in a package of hot chocolate mix. I want to comment that she's ruining the integrity of the coffee by doing that, but then I notice how she's lifting her right foot and rubbing it against her left leg—a sign that she's hurting. I know the pain-relieving effects of the sugar will be comforting to her, so I keep the thought to myself (p. 95).

Disabled and aging people's access to the things they need (i.e. sugar) was regularly discussed by onlookers—family members, caregivers, and others with whom disabled people shared a connection. For instance, "keeping going" was cited as a much-needed mode of access by researchers (not a disabled user) (Ørjasæter & Ness, 2017). In part, "keeping going" referred to maintaining relationships by endeavoring to remain in contact with others through technology. To "keep going" also involved preserving dignity while aging (São José, 2016), attending to people's history of technology use (Hill et al., 2015), and resisting harmful metanarratives associated with technology development, described below (section 5.7).

Conversely, although connection coupled with a desire to "keep going" figured consistently in the literature (São José, 2016, p. 339), another theme shadowed our investigation: disconnection. Electronic communication was routinely praised for its role in sustaining relationships (Heyman et al., 2015; Lloquet, 2017; São José, 2016). Yet, at times this praise took for granted the assumption that people *want* to maintain their present relationships. One participant in Haymen et al.'s (2015) study of mental health in-patients commented on the affective impact of visits from her children:

> Interviewer: So how often do you see your children when you're here?
> Respondent: Twice a week at the moment.
> Interviewer: And how's that? Is it nice to see them?
> Respondent: Well, they're part of the problem.

This dialogue revealed that although the main purpose of technology development for disabled people tends to be connectivity in the interest of "keeping going," maintaining relationships is not always desired.

The literature also revealed stories of "computer anxiety," another "corporeal attunement" [11] that was underrepresented but underscored the importance of being able to get information needed to operate technology confidently (Allen et al., 2017; Burrows, 2016, p. 70; Spann

& Stewart, 2018). Burrows et al. (2016) discovered that some people relegated technology use to a support person, such as a family member, though this tactic was not always useful:

> I've got a friend who has the most marvelous garden but […] he's just lost his wife and he doesn't know how to use anything—she'd got all his plants listed on the computer, but he doesn't know how to find them (p. 75).

Despite apparent technology aversion that should be taken up as part of TechnoAccess, these stories reveal that access remains a practical and conceptual issue of affective attunement in a world that oftentimes pressures people to use new technology to connect.

5.7. Ableist metanarratives around technological development

More explicitly in line with TechnoAccess and its important address to "TechnoAbleism," some studies cautioned against cultural presuppositions of the "ideal(ized)" aging and/or disabled person: an "autonomous agent who seeks independence" (Niemeijer & Visse, 2016, p. 170). For instance, mental health recovery trends toward "recapturing one's role as a healthy and contributing citizen of one's community" (Ørjasæter & Ness, 2017, p. 1601). Similarly, São José (2016) points out that public policy for older people is often framed around narratives of "successful, active, and healthy aging" that strive to assimilate people into normalcy by emphasizing physical and mental prowess (p. 335). Technology and services that subscribe to ableist rhetoric of "healthy" and "successful" aging are examples of TechnoAbleism, and could compromise the dignity and experience of users unable to recover or participate in "healthy" and "successful" aging because of disability and impairment (as well as other markers of difference such as class). The literature confirmed our inkling that stories like this must be critically thought through from the viewpoint of TechnoAccess; following Shew [16,40]; we argue that researchers must be wary of recovery narratives and other harmful tropes that might drive sociotechnical change and technological development. Amid these stories, a participant in Lloquet's (2017) study reminded us that technology is not always a solution:

> People would say, 'Isn't it amazing what technology can do?' or 'isn't it amazing what medical science can do?' but they don't really know what is there …. There is a presumption that technology solves everything. The problem is that people assume that because the technology is there you can do anything (p. 121).

This participant supports arguments elsewhere that suggest technology is too quickly heralded as the fix to disabled people's problems, thereby discounting disabled people's creativity and use of technology [15,23,42]. In contrast, the relations between disabled people and technology invites a collaboration wherein disabled people design and use technology in ways that facilitate autonomy, self-directed desires for living, and even freedom.

Given our findings that suggest technology is not an inherent solution to problems of access, it is important to consider factors involved in choosing either low-tech or high-tech development routes. An example of such a choice was offered in McGoldrick et al.'s (2015) report on a cost-benefit analysis for a UK-based technology, called the Befriending and Re-ablement Service (BARS), that aims to support older people experiencing isolation and loneliness. Notably, after a series of interviews with BARS users that resulted in positive program reviews, McGoldrick et al. decided that "funding is so tight" it warranted a cost-benefit analysis (p. 60). The addition of a cost-benefit analysis in this assessment reminded us that the systems within which stakeholders live and work are often touched by austerity and neoliberal policies. Such policies drive "ideal(ized)" aging and/or disability metanarratives and their accompanying technological developments (Niemeijer & Visse, 2016, p. 169).

5.8. Social and structural barriers to accessing the arts

Disabled people's experiences accessing the arts are fraught with structural and social barriers that vary based on a person's positionality, and technological development must keep this in mind. Ørjasæter & Ness (2017) illustrated both types of barriers in describing experiences with people who have lost the right to make decisions after being brought into a mental health hospital's routine (p. 1607). According to the researchers, some respondents did participate in music and theatre workshops meant to take place outside of institutionalized routines as they had "room for people to experience symptoms, such as inattention, hyperactivity, impulsivity, panic attacks, lack of energy, flight of ideas, and dissociative symptoms" (p. 1604). In an attempt to resist the stigmatization participants might experience in institutionalized healthcare, the researchers placed importance on creating "illness free zones" in which patients were "no longer … considered ill but rather were singers, musicians, or actors" (p. 1607) and were "understood as whole humans" (p. 1604). Importantly, Ørjasæter & Ness (2017) pointed out that, traditionally, participants are not allowed to continue such arts-based activities after being discharged from hospital, impacting their access to the arts: "frequently switching between staying home and being hospitalized is a barrier to committing to leisure activities" (p. 1608). Ørjasæter & Ness's study has direct relevance to ATA because it tries to contend with the social barrier of dehumanization from within an institutional setting while simultaneously resisting the structural barrier of lack of access to community-based artistic practice that might make space for infrequent participation. Such barriers are examples of the complexly corporeal relations of access that often dictate which bodies can access the arts, and on what terms.

Different considerations are also given to access barriers to information for intellectually disabled people (Davidson, 2015). Borawksa-Charko et al. (2017) point out that people living with this label endure varying structural and social restrictions, which affect their information seeking processes, including the ways in which they might access formal and informal sexual health knowledge at the crux of this study. However, there was little mention of technology in this study, which further painted a picture of this group's sociotechnical reality: for many people with intellectual disabilities, friends and in-person social networks support their information seeking, yet social exclusion creates limited communication opportunities and leads to smaller social networks. This absence of technological intervention was contrasted by Davidson (2015), whose study focused on intellectually disabled people learning mobile technologies to produce their own digital resources for online advocacy. Davidson explained that some of this group's daily challenges around this technology use were "related to the labeling of their condition, which is attributed to them by the very science that should serve them" (p. 16). These examples make it impossible not to consider TechnoAccess as an intersectional, sociotechnical issue experienced unevenly among particular groups of people facing various structural, social, and technology barriers.

5.9. Longevity in accessing technology

Many studies focus on bringing technology to aging groups—another critical intersectional identity marker. We found that articles focusing on aging populations are often quick to point out the needs and concerns of their older participants whose corporealities change with age (Castilla, 2016; Gurley, 2017; Hill et al., 2015; Sáenz-de Urturi et al., 2015; São José, 2016). The literature reveals that this population's exposure to technology is increasing (Gurley, 2017), but the reasons given by older adults for taking up technology—or not—are complex (Burrows, 2016). Often these reasons were characterized by descriptions of "declining ability" or impairment such as deterioration of vision, hearing, and psychomotor skills (Burrows, 2016; Sáenz-de Urturi et al., 2015, p. 1041). However, experiences of impairment did not seem to hinder UX. One researcher spoke specifically about older people's experiences

trying the new technology of multi-modal robot interaction:

> When it comes to the elderly and recent technology, one of the most common assumptions is that they need simplified tasks and more time to learn. On the contrary, in our experiments, even if we did not provide a preliminary training, all participants were able to complete all services on their own at least once (Di Nuovo, 2018, p. 123).

Though Di Nuovo's (2018) statement reminds us not to underestimate users, her observation can also be contrasted with the finding that being able to get the information needed to operate technology confidently may impact people's sense of self-efficacy (Spann & Stewart, 2018). A 77-year-old study participant cited in Spann and Stewart's (2018) study said:

> I was good for the first few months, then I went away for a few days, and I couldn't have [the technology] with me …. Then I came home and I suppose it's like most things, you try it for a while and then you forget it (p. 275).

An apparent observation of success in the field is not enough to ensure a constant or longitudinal utility of technology for all people, and along with mental health experiences and other disability identifiers (described in section 5.1.), cements our finding that age is another intersectional interpretative relation of TechnoAccess.

6. Discussion

This literature review suggests that a vast array of technologies is being developed and evaluated based on user accessibility, though disabled and aging people's embodied experiences and "corporeal attunements" [11] to accessing the arts remains underrepresented in the process of designing these technologies. The goal of this narrative literature review was to synthesize research about disabled and aging people's sociotechnical experience accessing the arts. It is clear from the literature, and our focus on methods and accounts of UX, that people using technologies are navigating barriers, support systems, and complex sociotechnical terrain to experience access. And, in a North American context, disabled and aging people's access to the strong and growing legacy of disability, Deaf, crip, and mad arts is what ATA aims to build up and sustain.

Moreover, TechnoAccess is achieved when disabled and aging people's "corporeal attunement" [11] is called in to the development of technology, positioning disabled and aging users as either as designers, technologists, co-designers, or participants at the earliest stages of development. The literature reveals that TechnoAccess can take many forms that are already familiar to developers: storytelling, prototype testing, co-creation, personalization, collaboration, and others. These methods for technology design and development become practices of TechnoAccess when they are:

1. Informed by disabled users' intersectional experiences with technology, access, and their place in sociotechnical worlds;
2. Applied toward the broad, dynamic processes of technological development (rather than the more narrow scope of techno-fixes or "barrier free" or "universal design" projects);
3. Focused on embodiment and "corporeal attunements" [11] that center disabled and aging users' knowledges; and,
4. Developed based on shared understandings that people's experiences with technology and access are contingent upon social, structural, and technical barriers that are felt unevenly among users.

Taking TechnoAccess as its starting point, ATA's digital platform is being designed with and for disabled people to help us find accessible arts events across Canada. When the design process begins with disabled and aging people, we can develop technology and sociotechnical realities based on their experienced and expressed needs rather than by

relying on "tinkering" and "altering" valued by crip technoscience [15] or the more sinister curative imaginary driving "TechnoAbleist" pursuits (Shew, 2019). Through the literature reviewed here, we discover examples of the methodological, practical, and conceptual considerations of technology and access as important, overlapping features of digital projects. Many studies take a mixed method approach to research involving access to information and technology for disabled and aging groups, though prototype testing, co-curatorial approaches, personalization, and collaboration stood out as routinely used methods. In contrast, we found that more exploratory methods—including those that embrace storytelling, such as ethnography—explicitly facilitate the centering of mad, disabled, and Deaf people's "corporeal attunements" in inquiry [11].

Finally, stories offer pivotal insight into, and allow the design process to begin with users' experiences. The stories here demonstrate a myriad of politicized intersectional interpretive relations surrounding access [10]; p. 456): structural barriers such as lack of access to community arts (Ørjasæter & Ness, 2017), social barriers such as small social networks for people labeled/with intellectual disability (Borawksa-Charko et al., 2017), and the imposition of "successful aging" and other harmful metanarratives on older people's experiences with technology (São José, 2016). This review is an important reminder that disability and access is intersectional and experienced differently by different individuals and groups, and that cultural understandings of aging, blindness, d/Deafness, and mental health impact users' experiences and technological development—to say nothing of race, gender, sexuality, and other identity and social status markers that were not uncovered in this review but undoubtedly impact UX and have the potential to conceive of TechnoAccess in new, important ways. For now, there is a need to consider the creation of the TechnoAccess-led ATA platform as an intersectional, multimodal task that must be treated as an open-ended process that reconceptualizes its own methodological approaches based on users' corporeal attunements and embodiment.

7. Limitations to the review

The most significant limitations to this review were: the number of articles reviewed (n = 56), their wideness in scope, and the limited space here for adequate coverage of evidence, such as describing each study's method and specific results [33]. Given these limitations, we were selective in choosing our themes, drawing on TechnoAccess and applying this concept to several spheres. Still, some fascinating arenas or research simply did not fit, and the result may be a misleading impression of universality. For example, though "computer anxiety" for aging people emerged as important, anxiety around technology use was not limited to older people: a participant in Haymen et al.'s (2015) study who identified as a service user between the ages of 25 and 30 described a fear of using telephone communication: "I'm not one for talking on the phone. I get scared" (p. 888).

8. Future research

We urge designers and developers to consider the complex, corporeal, multimodal relationships surrounding technology and access—or TechnoAccess—as they develop technology with disability and aging in mind. Though our inquiry focuses on a specific arts-related platform, the literature in this review solidifies some key considerations for technology development and access across sectors:

a. Access is not always obvious. Users' experiences of disconnection, "computer anxiety," and pressure to keep up with technological advancement should be included in broad conversations about technology and access.
b. Access also pertains to people who are left behind as technology advances. And social and structural barriers that impede access are felt differently by various users and user groups.

c. Technology is not always the solution to the multifaced barriers to access that disabled and aging people experience.

d. "TechnoAbleism" [40] and its tropes emerge in technology design for disabled and aging groups, especially where there is pressure for technology to take on a curative role propelled by neoliberal notions of progress (such as "healthy" and "successful" aging, above).

As we finalized this narrative literature review, ATA researchers also completed 10 focus groups with disabled and Deaf artists from across Canada (N = 51). In addition to the considerations above, preliminary findings from these focus groups reveal stories and recommendations for designers and developers to consider the complex, multimodal relationships surrounding technology and access—or TechnoAccess—as they develop technology with disability, aging and access in mind. These include:

a. Recognition that users have valuable knowledge and insights to share and contribute, and that their contributions should be recognized through payment and as paid consultants;

b. Data about the accessibility of an event or venue is important, but not the first barrier to overcome: sociotechnical experiences that have reinforced the belief that artistic experiences were not created with disabled people in mind means they do not seek out art to begin with; and,

c. For disabled people who have made extraordinary efforts to become artists and/or patrons, it is still an uphill battle with no easy path forward because their efforts have an impact of a transient nature, and do not necessarily make it easier for future disabled artists and patrons.

These three points speak directly to people's experiences accessing the arts, adding directives and nuance to the existing literature, including CUP's reports.[4] These insights remind us that disabled and aging people's knowledge is a crucial part of technological development *by* and *with*—rather than *for*—these groups. And that their experiences accessing the arts include sociotechnical nuances, "corporeal attunements," and histories that can critically contextualize future technological developments.

9. Conclusion

This narrative literature review, paired with preliminary focus group findings, aimed to understand methodological, practical, and conceptual frameworks that have been developed to serve disabled and aging UX, including key factors and considerations of TechnoAccess with potential to improve ATA. Our findings reinforce disability as an intersectional, embodied experience and reveal that both individually and as collectives disabled and aging people face, and respond to, several barriers to technology development that are not limited to arts access. Stories of access experiences demonstrate that developing technology is not a singular, easily achievable task but is a complex multimodal, sociotechnical endeavor entangled in complexities of relationships, identity, embodiment, and social and structural barriers. We urge technology designers and developers to consider the intricate crossings of technology and access—or TechnoAccess—in their bids toward new tech-based ventures. Although existing evidence offers ways to improve everyone's access to the arts, access and technology remains a politicized topic that must be informed by disabled and aging people's cultural experiences which account for their multimodal encounters with technology, access and the arts.

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[4] CUP periodically publishes reports that expand on this data. Reports are published on its website: https://creativeusers.net/.

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