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Technological socialities: The impact of information and communication technologies on belonging among deaf and hard-of-hearing people

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Abstract

This review article examines how different types of communication technologies, from the specialized medical to generic social devices, influence belonging and sociality among deaf and hard-of-hearing (DHH) people. The emphasis is on DHH adolescents and young adults who may be impacted differently across countries, given state-specific policies regarding the status of sign language and deaf education, and based on different availability, affordability, and accessibility of communication technologies. We introduce different perspectives on deafness, ranging from pathological to cultural, a heuristic on which we build to explore DHH socialities as complex and evolving. We then analytically review ethnographic research on how cochlear implants impact DHH people's belonging to the "deaf world" and/or the "hearing world," and how they navigate between these worlds. Then we move on to technologies such as text messages and social media, which enable DHH people to extend their socialities beyond local communities. Belonging is a fluid phenomenon, and technologies which are in a constant process of innovation and development may influence it in complex ways. We argue that to explore questions of belonging, identity, and sociality among DHH people, and

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how they are shaped by technologies, (visual) ethnographic methods are particularly productive.

KEYWORDS

cochlear implants, communication technologies, deaf and heard-of-hearing people, deafness, social media, video applications, visual ethnography

1 | INTRODUCTION

Historically, deaf and hard-of-hearing (DHH) people have had an ambiguous relationship with communication technologies; despite many of them being open toward and active in technological innovation, they were often disappointed by its processes and outcomes (Holmström & Bagga-Gupta, 2013). DHH people were, for example, key participants in early telecommunications research, yet the resulting technology—the telephone—eventually served primarily to hearing people while the needs of DHH people were set aside (Mills, 2010). Most recently, cochlear implant (CI), a bionic device implanted in the head to provide DHH people with some kind of “hearing”, has been developed specifically for their communication purposes (Friedner & Helmreich, 2012). Additionally, DHH people now use a plethora of information and communication technologies (ICTs) such as text messages and vlogs on smartphones and laptops. These technologies are essentially different: while ICTs are generic, CI is a specialized apparatus intended to remediate deafness which requires surgery and long-term care under medical attention. Nevertheless, both kinds of technologies represent an important part of communication for DHH people and influence their socialization in various ways. Placing CI and ICTs in conversation is fruitful to address the following question: How do DHH people, especially adolescents and young adults, view various communication technologies, and how do these devices shape the ways in which they relate to each other, their family members, and societies at large?

Technological devices for DHH people are sometimes described as “tools” that serve to increase the social and political participation of DHH people in hearing communities (Leigh, 2014; Turner et al., 2017). However, such a utilitarian view suggests that technology has no impact on people and their identities, and it does not do justice to what it means to be together, as a community, within technologically mediated societies (Willson, 2012). Social media and blogs, for example, have been found to contribute to a sense of collective identity among DHH people and social activists (Ellcessor, 2018; Lomicky & Hogg, 2010). Exploring how the Internet influences social relations of DHH people, Valentine and Skelton (2009, p. 50) maintain that there is “a need to understand the role of the Internet in the everyday life of different social groups; how people develop relationships with it, and the connections between ICTs and the capabilities people need to fully function in a society.” Such scholarly work indicates that communication technologies are far more than passive tools in the hands of their users; rather, they subtly impact on people's socialities and their personal and communal identities.

In this article, we consider how different types of technologies—specifically CI, text messaging and social media—impact DHH people and their socialities (Blume, 2013). Taking this query as our guiding question, we analytically review qualitative studies of communication technologies and their presence, use and influence among DHH people, especially adolescents and young adults. We highlight what Friedner and Kusters (2020a, p. 41) call “deaf anthropology,” a field that offers “diverse analyses of what it means to be a sensing, communicating, and social person in the world” and “argues for deafness as providing ontologies and epistemologies that are valuable and worth preserving.” Following this view, we emphasize ethnographic studies, since ethnography—a hallmark method of anthropology—provides richer, more nuanced understandings of deafness and subjectivity than some other methods. Additionally, ethnography is open to including a range of visual methods, which are specifically attuned to the needs of DHH people (O'Brien & Kusters, 2017). We therefore argue that ethnography is most appropriate for studying the impact of technologies on identity-positions and sociality among DHH people.

The literature for this review was found through online databases AnthroSource, PubMed, Google Scholar and the databases of journals of communication, technology, deafness, disability and medical anthropology. We used search words *deaf**, *ethnograph**, *technolog**, *social media*, *phone*, *young* and *cochlear implant** in various combinations. In the literature we found, “deaf” and “hard-of-hearing” were often mentioned together. Deaf people are a highly heterogenous group, including in terms of various degrees of hearing loss, but they also have similar needs, for example, in terms of education (Anglin-Jaffe, 2015). To reflect this diversity—and similarities—we use the term “deaf and hard-of-hearing” (DHH) people throughout this review. We focused mainly on the works published since the review on deaf communities by Senghas and Monaghan (2002) appeared in the *Annual Review of Anthropology*. The past 2 decades are also most relevant for our topic, as in this period ICT use increased significantly across all demographic groups and around the world (International Telecommunication Union, 2019). Before discussing the found literature, we first present the most common understandings of deafness as pathology or culture, and discuss the complex notion of belonging in connection to DHH people.

2 | APPROACHING DEAFNESS

2.1 | Deafness as pathology

In medicine, deafness is defined as a sensitivity to sound which can be evaluated by combining elements of pitch and frequency, measured in Hertz, and loudness or intensity, measured in decibels (Meadow-Orlans, 1980, p. 3). The World Health Organization (World Report on Hearing, 2021, p. 36) sets the threshold for “normal” hearing at 20 dB. People who are not able to hear as well as someone with thus defined “normal hearing” are said to have a hearing loss. “Hard of hearing” people have mild to severe hearing loss, usually communicate through spoken language, and can rely on various hearing aids, while “deaf” people have profound hearing loss and use sign language for communication. Hearing loss may be caused by various infections, accidents, and aging, but it has also been seen a pathogenic disorder when its causes are linked with genetic factors (Boucher et al., 2020; Shearer et al., 2014; Sheffield & Smith, 2019). Such an understanding of deafness, grounded in biological difference, is prevalent in the fields of medicine, public health, epidemiology, and psychology. As we show later, the understanding of deafness as pathology has been contested by DHH people, activists, and social scientists who argue that the boundaries between deaf, hard-of-hearing and hearing are much fuzzier and porous, also as an effect of hearing technologies.

The medical understanding of deafness contributed to the stigmatization of sign language; in India, sign language has even been described as a contagious “virus” and its use therefore discouraged by medical and other professionals working with DHH people (Friedner, 2018). In the 19th century, many Western societies tried to “overcome” deafness by attempting to normalize DHH people through the so called oralist approach (Watson, 1998). This education method teaches communication through speech and lip-reading with the “intent of fixing, rehabilitating and minimizing the distance between the normal and what is seen as pathological” (Bauman & Murray, 2014, p. xvi). During the 20th century, oralism was exported elsewhere, to countries such as Trinidad and Tobago where formal education system was introduced within the context of British colonialism, at the detriment of already existing local sign languages (Ali et al., 2021). Simultaneously, hearing aids were developed in an attempt to “treat” deafness (Hoppe & Hesse, 2017). These devices aimed to compensate for hearing loss by “gaining” in decibels, to achieve or significantly improve communication through speech. Both oralism and hearing aids were thus presented in opposition to sign language use.

A most recent development in this direction is CI, a bionic inner ear implant through which deaf people can be provided with some sort of hearing. CI was first developed in 1950s in France and the United States of America (US), and by 1980s it was sufficiently advanced to be considered for widespread use (Blume, 1999). While global production of CI meets less than 10 percent of the global need, countries in the global West countries are among those with the highest level of cochlear implementation (WHO 2019). In the Netherlands and Belgium, for example,

all newborns are systematically screened for hearing loss in the first week of their life, and between 80 and 95% of diagnosed children receive CI (Bruijnzeel et al., 2017, p. 288). Although CI is nowadays widely available across the global South, it is not always easily accessible. In Nepal, for instance, CI remains out of reach for many deaf people, especially those with lower economic background, as “a single CI costs more than an average individual’s lifetime income” (Graif, 2018, p. 58). In some countries, such as India, the quality of CI remains substandard, and CI implementation and maintenance may drive low-income families into further poverty (Friedner, 2021; Friedner et al., 2019).

Ethnographic studies have argued that hearing produced with the help of CI cannot be equated with hearing of a non-DHH person, as the device shapes the quality of sound (Friedner & Helmreich, 2012; Lloyd & Bonventre, 2020). Moreover, more than a measurable sensitivity to sound, hearing is a phenomenon which changes from one person to another, through time, and according to specific experiences of individuals with auditory devices (Lloyd & Tremblay, 2021). Yet in medical and popular discourses CI is often promoted as a “cure” for deafness (Copeland & Pillsbury, 2004; Garud, 2008; Mauldin, 2019). This trend has been found in countries around the world, from USA (Foss, 2014), India (Mohanty & Mishra, 2020), Japan (Valentine, 2001), Australia (Power, 2005), Israel (Kisch, 2012) to China (Lytle et al., 2005). Online, CI is propagated through “inspiration porn” in the form of viral video clips showing DHH people’s touching reactions after being implanted and receiving “the gift of sound” (Lloyd & Bonventre, 2020; Saunders, 2016, p. 5).

Recently, genetic counseling has been introduced to future parents to inform them of the benefits of testing for various genetic conditions, including deafness (Cabanillas Farpón & Cadiñanos Bañales, 2012). Focusing further on the biology of deafness, the contemporary medical discourse describes hereditary hearing loss as a “neurosensory disorder” which can be found by searching for specific “deafness genes” (Friedman et al., 2020). Currently, gene therapy for deafness is being experimented with on animals, but clinical use remains out of reach (Ren et al., 2019).

2.2 | Deafness as culture

Social scientists have long argued that the medical discourse of deafness as disability to overcome, or a disease to be treated, marginalizes DHH people (Blume & Hiddinga, 2010; Lane, 2002; Mauldin, 2019). Anthropologists maintain that deafness is “not merely an absence of hearing” but it is “at least in part, a social construction” (Senghas & Monaghan, 2002, pp. 69–70). Similarly, critical disability scholars and activists underline the importance of shifting the emphasis from the body toward how people with impairments or disabilities cope with socially disabling conditions (Hamraie, 2013). As Skelton and Valentine (2003, p. 455) write, a social model of deafness recognizes that hearing loss is “compounded by exclusionary social attitudes, practices and the production of an environment in which not being able to hear becomes a disability.” Critical disability scholars do not try to deny the physical basis of deafness, but also do not aim to cure it; instead, they highlight the political cultural and historical experiences of deafness, and seek to transform normalizing discourses and inaccessible environments such that they would accommodate DHH people, and people with physical disabilities generally, as equal members of societies (Hamraie, 2017).

The difference between these understandings of deafness has been marked in written language with the term “d/Deaf”. While “deaf” is linked to the medical definition of deafness, “Deaf” expresses the social construction of identity and the primary use of sign language (Skelton & Valentine, 2003). As we discuss further in the following section, proponents of notions such as “Deaf culture” (Padden, 1980), “Deafhood” (Kusters & De Meulder, 2013; Ladd, 2003) and “deaf ethnicity” (Lane et al., 2011) have argued that high proficiency in sign language is an integral aspect of belonging and sociality among DHH people. In recent years, however, a sharp distinction between the two approaches has been criticized for emphasizing the bodily aspects of deafness (Winance, 2016) and through questioning the category of “the social” (Friedner, 2020). In this review, we build on the later criticism by extending “the social” to include not only people but also material objects such as various technologies (Ahlin, 2018; Pols, 2012).

3 | DEAF BELONGING AND SOCIALITY

Belonging is an ambiguous and complex notion that generally describes the practices, processes and feelings of fitting in with a particular group of people (Wright, 2015). Knut Lundby (2011, p. 1221) defines belonging as people's relation to a particular "social collectivity" through which they learn certain norms of behavior and gain communicative and cognitive competence, such as language, that enables them to construct meaning in similar ways. This definition makes belonging closely associated with the notion of sociality, "the dynamic matrix of relations through which persons come into being" (Long, 2015, p. 854). Sociality, like belonging, is then implicated in the making of personal and collective identity. Additionally, belonging has a strong affective dimension: to belong somewhere is to fit in a specific social environment and feeling content and comfortable about being there (Atheron, 2009).

DHH belonging has been shaped through the shared experience of oppression through the discourse of disability (Hiddinga & De Langen, 2019; McGuire, 2020). In response, deaf community has taken shape as a kind of "biosociality" (Rabinow, 1999), a particular way in which people relate to themselves, the state and others based on a certain biomedical diagnosis. Deaf community has been described as a productive reaction to a particular practice of biopower produced and exerted in the medical setting (Friedner, 2010). In the context of deafness, "as the body becomes a key site for exerting power, it also becomes an important site for examining how subjects, identities and communities are created through power" (Friedner, 2010, p. 342).

Belonging is constituted through "claims to sameness and difference" (Wright, 2015, p. 395), as people share aspects of their identity with other members of the same collective while differentiating themselves from non-members (Lundby, 2011). To foster belonging, deaf people engage in what Michele Friedner (2015) calls "sameness work", or the work of adjusting expectations and negotiating differences of class, caste, religion, gender, geography and education among themselves (see also Friedner & Kusters, 2020b). South Asian deaf people in the UK, for example, described the importance of being included in deaf community where their ethnic and religious differences are diminished (Atkin et al., 2002). In this way, deaf people come to define themselves as primarily deaf and belonging to a deaf community. Further, deaf community includes anyone who is interested in deafness and deaf issues, such as sign language interpreters, and also children of deaf adults (Marie & Friedner, 2021; Mellett, 2016). Among DHH people, however, sameness work is usually grounded in the shared experience of sign language, education, and vocational training.

Sign languages have been described as complex sites of "ideological frictions" where belonging is contested and through which socialities are created, disrupted, and may be broken (Friedner & Kusters, 2020a, p. 39; Hoffmann-Dilloway, 2021). While proficiency in sign language is significant in making claims of belonging (Hiddinga & De Langen, 2019), the great diversity of sign languages and differences in fluency caution against viewing all DHH people as members of a homogenous group (Ali et al., 2021; Hiddinga & Crasborn, 2011; Hiddinga & Research Collective "Beyond Hearing. Cultures Overlooked", 2021; LeMaster & Monaghan, 2004; Monaghan et al., 2003; Perniss et al., 2008; Pfau & Zeshan, 2016). Friedner and Helmreich (2012) emphasize that sign language per se is not a defining characteristic of the deaf nor the main aspect of sociality for all DHH people. Rather, language is important to transmit social practices, norms and aspirations that are essential to belonging (Reilly & Reilly, 2005; Wilkens & Hehir, 2008). For example, creative signing has been useful to constructing deaf identities through narratives and poetry performance in South Africa (Morgan & Kaneko, 2020). Poetry and storytelling played an important role in the history of sign language debates, offering a counter-narrative to the negative stereotypes of deaf people as intellectually and linguistically limited (Esmail, 2008). Fostering belonging through interaction via sign language among DHH people is particularly important because a large majority (more than 90%) are born to hearing parents without previous experience with deafness (Mitchell & Karchmer, 2004). Sign language is thus key as a medium through which deaf people learn about the information, skills, and tools of a specific "being in the world" (Friedner, 2011, p. 89).

Social studies about DHH people often focus on "the social" as a key site of negotiations of belonging in terms of stigmatization as well as integration, recovery and even cure (Friedner, 2019). However, research among deaf churchgoers in India indicates that engagements other than with people, such as with God, the Divine, or the Spirit, may be

significant for DHH as a form of sociality “beyond the social” (Friedner, 2019). Recently, the notion of sociality has been enriched by considering how objects such as technological devices may co-create socialities (Long, 2015) and influence self-identification (Bat-Chava, 2000). In what follows, we illuminate how different communication technologies shape deaf socialities, belonging and identities.

4 | COCHLEAR IMPLANT (CI) INTERFERENCE

Despite its worldwide adoption and promotion, CI produces ambivalent reactions among DHH people. To the surprise of the medical community, not all DHH people accept it with open arms, often because it is grounded in the medical understanding of deafness which many perceive as stigmatizing (Blume, 1999). Proponents of “deaf futurism” claim that CI implanted people are experimentative human-machine interfaces who serve the advancement of neuro-enhancement technologies (Lee, 2016; Mills, 2010). More often, DHH people fear that CI may lead to re-invigorating oralism through active discouragement from health professionals, educators, and trainers to use sign language, all while multinational companies push for technical improvement and expansion of CI (Blume, 2013). CI has even been described as a technology of “linguistic genocide”, aimed at eradicating the DHH people through the obliteration of sign language and the closing of deaf residential schools (Friedner, 2018; Kusters et al., 2015; Padden & Humphries, 2005; Sparrow, 2010). Reminding of eugenics, CI has therefore been regarded with much suspicion and even hostility from DHH people around the world (Bradfield, 2021; Johnston, 2004; Sparrow, 2005).

Undoubtedly, CI complicates the divide between deaf and hearing people. Based on their choice of switching the CI off or on, DHH people may identify themselves as “culturally deaf”, “culturally hearing”, or as having a “bicultural” identity, and they even switch between these identities and communities (Bat-Chava, 2000; Johnson, 2020). The CI, then, complicates the over-determined boundary between deaf and hearing worlds (Kisch, 2008; Kusters, 2010; Lloyd & Tremblay, 2021; McGuire, 2020; Monaghan et al., 2003). A study among young DHH in South Africa showed that deaf identity is “a complex ongoing quest for belonging”, in which DHH people try to accept their deafness while trying to find their own voice in the mainstream hearing society (McIlroy & Storbeck, 2011, p. 494). A bicultural “dialogue model” could thus describe deaf identity better than the dichotomous view of deafness as either pathology or culture (McIlroy & Storbeck, 2011).

But how, specifically, do people with CI relate to other people with different levels of hearing? Particularly, how do children and young people form relationships and experience (dis)belonging with deaf and hearing peers and adults? Parents of DHH children are faced with the dilemma of whether it is acceptable and ethical to choose the cochlear implant surgery for their deaf children (Blume, 2010). Across different national contexts, health professionals advise the parents to opt for a CI as soon as possible and thereafter focus on speech development. Emphasizing hearing over signing ignores how “early access to sign language is needed for optimal development, whether or not children benefit from hearing aids and cochlear implants” (Snoddon & Underwood, 2013, p. 537). Nevertheless, health professionals may discourage the use of sign language and ascribe any potential problems with auditory processing after implementation to non-compliance rather than to technological failure (Mauldin, 2014). Parents, who generally have little experience with deafness, often follow the instructions to focus on speaking, yet in this way they may contribute to stigmatizing deafness and hinder DHH children's adoption of deaf identity (Valentine & Skelton, 2007).

The segregating and stigmatizing impact of specific educational policies on DHH people is confirmed by ethnographic studies from around the world. In Sweden, the educational system has emphasized hearing over visual or tactile technologies, thus marginalizing DHH pupils with and without CI (Bagga-Gupta & Holmström, 2015). Similarly, in India, teachers, government bureaucrats and clinicians promote CI and perceive sign language and socialization among DHH people as detrimental to their integration into the hearing society (Friedner, 2018). Among a Bedouin minority in Israel, children who are singled out as candidates for CI become segregated from kindergarten onwards to enter mainstream schools, which limits their opportunities for communication with deaf signers (Kisch, 2012).

Questions of identity and belonging are particularly poignant in adolescence, when individuals develop their identity as independent young adults. DHH adolescents may feel a “transition shock”, as they learn to cope with living

in the hearing world on their own (Valentine & Skelton, 2007). Young people with CI may be successful academically within mainstream education but may struggle with social interaction (Xie et al., 2014). DHH adolescents with CI are a highly heterogeneous group, and they may adopt and express either a hearing, hard-of-hearing and deaf identity with varying intensities according to different situations through their manipulation of CI (Rich et al., 2013; Wheeler et al., 2007). However, their choosing for signing may be seen as a failed transition into the hearing world, while their successful transition into the hearing world may be read as a failure by the deaf community (Valentine & Skelton, 2007). Such polarization between deaf and hearing could be challenged by supporting bi-cultural education and identity. Yet educational, medical and popular discourses on deafness rarely envision the possibility of both having the CI and using sign language (Power, 2005).

Identities of DHH people are multiple, complex and contingent (Ahmad et al., 2002). Deafness thus intersects with various sexual orientations (David & Cruz, 2018; Moreman & Briones, 2018), genders (Kisch, 2012), ethnicities and classes. In China, the government has been “civilizing” DHH people who belong to various ethnic minorities through free distribution of CI and the promotion of spoken Chinese and Chinese Sign Language at the cost of local sign languages (Hofer & Sagli, 2017). In the US, health professionals routinely expect a higher rate of non-adoption of spoken language among ethnic minority families of children with CI (Mauldin, 2019). In Ecuador, clinical treatment of DHH children, including through cochlear implementation, was found to be contingent on parents' socioeconomic status (Huiracocha et al., 2015) while in sub-Saharan Africa, deaf women face triple discrimination because of deafness, gender, and poverty (Kiyaga & Moores, 2003). These examples raise questions about how the introduction of CI intervenes in belonging for DHH people, especially children, who are marginalized in multiple ways.

To add to the complexity of this situation, long-term influences of CI on DHH socialities have not been researched in depth. Thus far, studies of sociality among young DHH people with CI are mainly based on quantitative measuring tools such as Deaf Acculturation Scale, questionnaires and (semi)structured interviews, which are sometimes conducted only with parents. Effects of CI implementation have been studied mainly in the fields of psychology and communication with the aim of determining the impact of CI on quality of life and integration among hearing people and within mainstream education (Hallberg et al., 2005). However, as they do not provide a contextual understanding of children's identities and social integration, clinical assessments used to evaluate the success or failure of CI are inadequate (Mauldin, 2019). Because it brings attention to contexts and nuances, ethnography, and especially visual, is most relevant to examining identity positions among young DHH people (Bagga-Gupta & Holmström, 2015). Ethnographies are particularly valuable in exploring the challenging transition from childhood to adulthood within the hearing world, particularly as it becomes complicated by the systematic introduction of CI (Valentine & Skelton, 2007, p. 110). Besides investigating how the complex territory of socialities may be linked with depression and suicide in this sensitive period (Carter & Mireles, 2016; Turner et al., 2007), ethnographies could evaluate how DHH people may use affect, such as humor, as a coping strategy (Cirkelyte, 2020).

5 | ICTS EXPANDING AND INTENSIFYING DHH SOCIALITIES

Besides CI, generic ICTs have importantly shaped communication of DHH people in the past several decades. Short text messages (SMS), email and online platforms have been increasingly adopted by DHH people of all ages and backgrounds (Barak & Sadovsky, 2008; Graif, 2018; Maiorana-Basas & Pagliaro, 2014; Singleton et al., 2019; Valentine & Skelton, 2009). Short text messages transformed DHH socialities similarly as the telephone revolutionized the communication of hearing people (Ellis & Kent, 2011, p. 90). In their overview of SMS use among DHH people, Power and Power (2004, p. 341) describe SMS as “the first communication technology that has broken the barriers between Deaf and hearing individuals”. In Norway and the US, DHH teenagers increased their communication with hearing family members and other hearing people through SMS (Bakken, 2005; Okuyama, 2013). This technology made it easier for them to establish friendships based on personal preference rather than hearing status, share information and participate in social events. Such influence of SMS on the socialities of DHH children and adolescents

is particularly important since they generally experience more loneliness and have fewer friends than their hearing peers (Moeller, 2007).

Like hearing people, DHH people switch between different types of ICTs for different purposes, using SMS for social interactions, telephone typewriters for longer communications, and computers for personal and business email (Pilling & Barrett, 2008; Power et al., 2007). With the expansion of social media platforms, the opportunities for DHH people to extend their socialities beyond their immediate social and geographic environment have increased more than ever before. Online platforms and applications such as HandTalk and Prodeaf are particularly attractive to DHH users because they enable sharing of information and connection through vision (Guimarães & Fernandes, 2018). Online blogs such as “Deaf World as Eye See it” and “Deaf Eye for the Hearing Guy” testify of how important vision is for DHH people (Lane et al., 2011).

For children and adolescents, school is a crucial site of socialization which further impacts on their academic achievement and wellbeing. DHH students may find face-to-face interactions with their hearing peers difficult, but the interaction with all peers becomes significantly better through online modes of communication (Omar, 2014). Social media afford sharing visual information and chatting synchronously and asynchronously, and documents and screens can be shared through online video calling platforms. These technologies minimize communication challenges and thereby enhance in-class participation and improve performance among DHH students (Chen, 2014; Kožuh, 2014). Information and communication technologies thus support DHH students in forming relations with other students and enable “easier access to interaction with peers, increasing their sense of community and belonging” (Toofaninejad et al., 2017, p. 152).

Information and communication technologies that support video calling and sharing of visual content have a particularly strong effect on DHH socialities. In Poland, Facebook intensified the bonds between DHH people with similar ideologies, as it enabled them to easily organize offline gatherings, including for social activism (Zdrodowska, 2016). Similarly, Facebook has considerably influenced deaf college students in the US; through this platform, they could relate with multiple communities and learn more about their own families, social norms, current events and perspectives on various social issues (Cuculick, 2014). As Cuculick (2014, p. 123) notes, “such learning is key for social participation and productive citizenship.” Supporting these findings, a study from Brazil found that social media were important for DHH youth who were geographically distanced from other DHH adolescents to better learn the sign language, engage in political movements and form friendships and intimate relationships with both DHH and hearing people (Guimarães & Fernandes, 2018).

Further, social media and other communication channels are useful to transmit and promote deaf art and performance, as for example, through www.signlab.live, an interactive online platform for literary culture in sign language. Literature and theater have a transformative effect on DHH people, and sign languages, with their emphasis on the visual, offer a fresh perspective to art (Lindgren et al., 2008). This could be especially valuable since art therapy, a helpful method in addressing complex emotions, is often unavailable to deaf people because of the “language barrier” (Hoggard, 2006; Horovitz, 2007). Additionally, video-based ICTs have been used effectively to reach the most isolated DHH people during the COVID19 pandemic; in Wuhan, China, Disability Support Network volunteers used WeChat to disseminate important information to DHH people through videos; this contact between DHH people and volunteers was crucial to provide medical supplies when necessary (Dai & Hu, 2021).

However, DHH people may also struggle with ICTs, for example, if they lack the appropriate skills to use these devices, or if video captions are lacking or inaccurate (Lang, 2021; Pilling & Barrett, 2008). As the captions feature remains under-developed, DHH people struggle in creating captions for their own videos in sign language and thus reach hearing people (Mack et al., 2020). To amend this, an American DHH celebrity has advocated for closed captioning of streaming video services through Twitter, an activity which Elizabeth Elcessor (2018) calls “connected celebrity activism.” This is a particular kind of DHH sociality that links celebrities and DHH people through social media with a common activist purpose. Additionally, for text-based ICTs like social media and email skills such as reading and writing are necessary, and this may create new stratifications within deaf community (Bowe, 2002; Kožuh & Debevc, 2020; Zdrodowska, 2016). As DHH people often develop their sign language skills significantly better

than their written skills, they may not feel equally confident in online written discussions which may have important consequences especially on how DHH people relate to hearing people online (Saunders, 2016).

Although the Internet has been hailed as the technology that helps to diminish inequalities among people, the inequalities that exist offline are often reproduced online (Schradie, 2020). DHH people may start social relationships online as equal with hearing people since their hearing status is not immediately brought to light, yet their disclosure of deafness tends to result into similar discrimination that occurs offline (Saunders, 2016, p. 3). "Online disinhibition", a notion suggesting that people more readily express their (negative) views online than offline, may lead to "cyber-audism," or online discrimination of DHH people (Saunders, 2016). For young DHH people, such interactions may have negative, even tragic consequences (Bauman & Pero, 2011; Hadjikakou & Panayiotis, 2012). Thus, although use of personal computers has been shown to have a positive influence on friendships for DHH students, their reliance on online socialities should not be exclusive (Blom et al., 2014). Rather, Blom et al. (2014) suggest that for DHH students—just like for hearing students—a combination of online and offline social interaction is most beneficial.

Video-based ICTs are well accepted among the DHH people, and we suggest that these devices could benefit further research with, among and by DHH people. Given the visual character of sign language, ethnographic photography, documentaries, and visual material which can be produced on smartphones and webcams are much more effective in conveying messages of DHH people (Hiddinga & Blume, 2012; O'Brien & Kusters, 2017). With young people, photo-elicitation has been described as a particularly useful method of research as well as of participant empowerment (O'Brien, 2018; Pfister, 2020; Valente, 2019). Such ethnographic research could in turn inform technological innovation and design that would be geared specifically toward DHH people (Blume, 2013). Including DHH people in the design process of applications and ICT features, such as improvements for creating video captions, grounds these technologies in DHH needs. This would be a more socially inclusive approach than requiring DHH people to adjust to the existing technology which is "only marginally useful to them" (Guimarães & Fernandes, 2018, p. 2148).

6 | CONCLUSION

The aim of this literature review was to investigate how belonging and socialities among DHH people around the world are shaped by CI, a specialized medical device, and by generally accessible and available ICTs like text messaging and social media. We found that while many DHH people have adopted CI, others have also argued strongly against it. These specialized technologies are grounded in a medical understanding of deafness as a pathogenic disease. Within this framework, technologies are mostly considered as tools that aim to cure a dysfunctional or diseased body, with little consideration of how their introduction might impact their users' identities and socialities. As Lupton and Seymour's (2000) found, the use of technologies is intrinsically related to the meanings ascribed to these technologies; when these frameworks of meaning imply helplessness, dependence, and difference—as it is often the case of technologies developed for people with disabilities—their potential users may outright reject such technologies to avoid further stigmatization.

By contrast, the reviewed studies showed that generic technologies such as social media have been incorporated with less tension into the lives of young DHH people. These devices, too, do not necessarily and automatically increase equality and inclusion for oppressed minorities such as DHH people, but may also reproduce inequalities and discrimination. Yet ICTs, especially various online platforms which allow for the creation and sharing of visual content, have opened new opportunities for socialization among DHH people well beyond their local networks. As they do not emphasize DHH people as disabled or diseased, ICTs generate a more open space for the flourishing of deaf community, allowing for a myriad of possibilities to produce, express and spread an identity which accounts for deafness as just another identity marker among many others.

Future research may deepen the theoretical understandings of the role of communication technologies in relation to deafness. Ethnographic methods, especially visual ethnography which can capture sign language communication most effectively, offer a rich resource and are particularly well suited to explore the lifeworlds of DHH people, their family members, and others with whom they interact. Knowledge produced through participatory methods could

have important practical implications: including DHH people in the design process of applications and ICT features would better ground technologies in DHH needs. This would be a more socially inclusive approach than requiring DHH people to adjust to the existing technology, which has been developed with hearing people as the target audience in mind. Further ethnographic research could facilitate this process of democratizing communication technologies and making them more respectful and inclusive of DHH people.

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CONFLICT OF INTEREST STATEMENT

The author declares that there is no conflict of interest that could be perceived as prejudicing the impartiality of the research reported.

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