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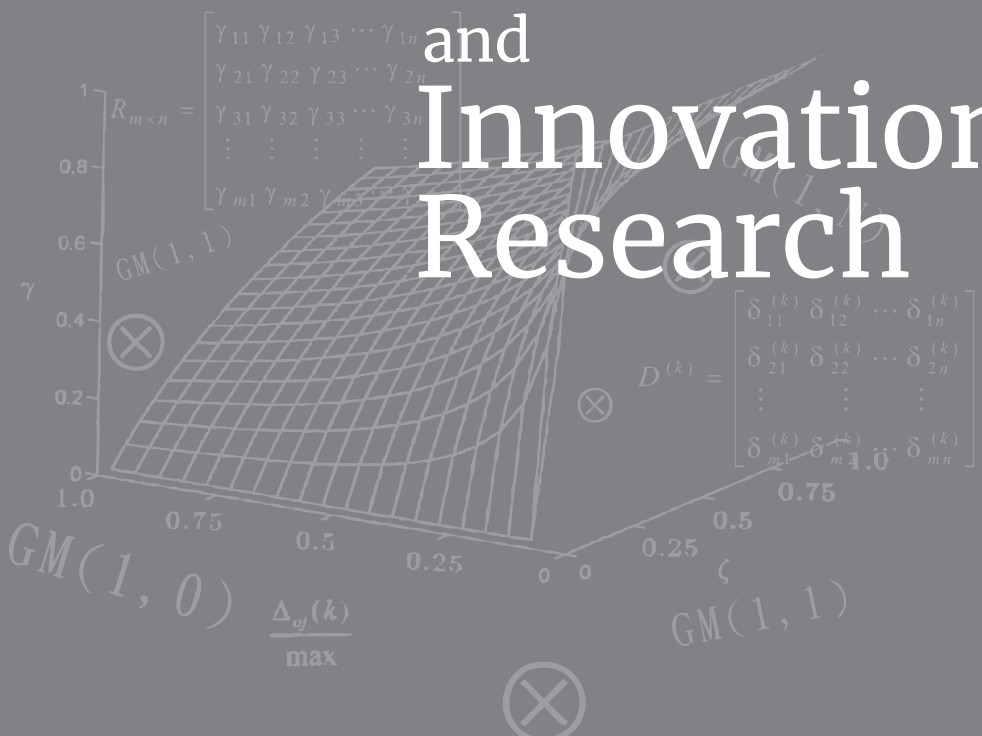

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Interaction Patterns, Core Demands, and Limitations of Generative AI among the Deaf and Hard of Hearing Community

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Abstract

The study examines how the Deaf and Hard of Hearing (DHH) community interacts with Generative Artificial Intelligence (GenAI): their core demands and the limitations of current tools. Grounded in Uses and Gratifications theory and recent scholarship on digital inclusion and AI accessibility, it draws on semi-structured interviews and non-participant observation to explore how GenAI meets the distinctive communication and psychological needs of DHH individuals. The findings show that although GenAI is a vital tool for information access and emotional support, substantial barriers remain, including linguistic mismatches, limited cultural competence, and the risk of reinforcing existing digital divides. The study offers empirical grounding for strengthening technological empowerment and advancing a more inclusive, barrier-free society.

Keywords: Generative AI, Deaf and hard of hearing, Digital inclusion, Uses and gratifications, AI accessibility, Human-AI interaction.

1.Introducrion

The WHO's World Report on Hearing estimates that one in five people worldwide-more than 1.5 billion-lives with some degree of hearing loss[1], a number projected to approach 2.5 billion by 2050, or roughly one in four. China has the world's largest population of people with hearing disabilities, an estimated 27.8 million; hearing impairment is the country's second most common disability after physical impairment, with a national prevalence of 1-2%[2].Because hearing matters at every stage of life, protecting the rights and development of the DHH community is both a basic requirement of social equity and a meaningful marker of a society's progress.

As artificial intelligence(AI) advances, it has spread across many domains of social life and created new opportunities to address complex demographic challenges. In July 2026, China's State Council issued the 15th Five-Year Plan for

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the Protection and Development of Persons with Disabilities, calling for the integration of digital technologies such as AI and big data into disability services. Its "AI+Disability Services Initiative" formally writes technological empowerment of the DHH community into national policy[3]. For this population, AI can help close gaps in information access and communication while supporting fuller social and public participation.

Generative Artificial Intelligence (GenAI), a key branch of AI, builds on deep learning models and large pre-training datasets [4]. Moving beyond the limits of earlier AI, it can generate coherent multimodal content-text, audio-visual media, and code-from user prompts. Beyond reshaping how the digital economy produces content, GenAI has opened new routes for people with disabilities to cross the digital divide and participate in social life.

Situated within China's "AI+Disability Services Initiative," this study adopts Uses and Gratifications theory to examine how the DHH community interacts with GenAI and what it most needs from the technology. It further asks how technological empowerment might be improved, offering empirical support for building an equal, open, and inclusive barrier-free society.

2. Literature Review

2.1 Media Usage Among the Deaf and Hard of Hearing Community

The Deaf and Hard of Hearing (DHH) population comprises individuals with varying degrees of congenital or acquired hearing loss that impede verbal communication. Under China's Classification and Grading of Disability (National Standard, 2011), hearing disabilities are graded into four levels by degree of hearing loss (dB HL) and functional characteristics, as shown in Table 1.

Table 1 Classification and grading of hearing disabilities in China

Grade	Degree of Hearing Loss (dB HL)	Characteristics and Functional Description
Grade 1	≥ 91	Profound hearing loss; almost complete loss of auditory function
Grade 2	81–90	Severe hearing loss; extreme difficulty hearing speech sounds
Grade 3	61–80	Moderate hearing loss; significant barriers to verbal communication
Grade 4	41–60	Mild-to-moderate hearing loss; partial impact on daily life

Research on DHH media use, in China and abroad, has grown steadily and now centers on three themes: patterns of media use and gratification, the effects of

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media on this population, and the challenges users face together with their coping strategies. This work has widened as media themselves have evolved. Early studies focused on television, highlighting the "physiological discrimination" that visually and hearing-impaired audiences face in receiving information and calling for basic accessibility through subtitles and sign-language interpretation; later work extended to computer use and to differences in computer literacy across DHH individuals with different causes of hearing loss[5].

With the rise of the internet, mobile media-smartphones above all-emerged to meet everyday and work needs. Studies show that age, education, and income significantly shape DHH users' satisfaction with smartphones; although they actively use phones to obtain information, their willingness to communicate with the outside world remains comparatively weak[6]. More recently, scholarship has turned to emerging media such as live streaming, short videos, and AI + VR [7~9], and to the ways these technologies are transforming traditional media[10].

True digital inclusion, however, remains difficult. DHH media use confronts a triple divide-in access[11], usage, and communication-that manifests along three lines: role fixation, technological alienation, and literacy gaps. Studies find that DHH adolescents often occupy the passive position of "information receiver"[12];without effective two-way feedback, media use collapses into one-directional messaging that leaves them "voiceless." Non-inclusive design has also produced new forms of exclusion[13]: pronounced "mobile access divides" and disparities in functional use within the community widen the knowledge gap. Paradoxically, the limits of technological empowerment can create a relatively closed "DHH digital space" that reinforces social segregation[14]. Although digital media give DHH individuals some agency in building communities, filtering information, and owning content, they still exercise limited real control over their live[15]; in using media for self-empowerment, they are often caught between technological dependence and the pursuit of autonomy[16].

The effects of media on the DHH community are usually analyzed as positive or negative. Positive effects cluster around media empowerment-social compensation and emotional support, knowledge supplementation and information access, self-expression and identity construction, and the promotion of social inclusion[17]. Negative effects concern mainly the digital divide produced by uneven resource allocation and the potential harm to social interaction[13].

2.2 Research on Generative Artificial Intelligence

Generative Artificial Intelligence (GenAI) is a technological system that uses machine-learning models to learn patterns and relationships within datasets of

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human-created content and then autonomously generates original multimodal content such as text, images, and music. With Large Language Models (LLMs) as its foundation, GenAI has strong capacities for learning, understanding, and reasoning, allowing it to simulate natural, coherent human conversation. Since ChatGPT appeared in 2022, GenAI has become a major force across sectors, with applications in education[18], academic research[19], enterprise performance management, and translation[20,21].

The technology also carries risks. GenAI can create hazards for data security and for individual users, society, and national security[22]. Scholars have mapped these problems from several angles and sought paths toward standardized governance. At the individual level, erroneous outputs spread misinformation, cause confusion, and can infringe personal rights such as property, so a "people-oriented" principle must guide use. At the social level, GenAI may threaten public security, disrupt order, erode trust, and deepen stratification, prompting proposals for governance that moves from technological to value "agility"[23]. At the national level, risks reach sensitive domains-political decision-making, ideology, data sovereignty, and military security-straining existing governance systems and calling for multi-stakeholder collaboration on GenAI's political risks[24]. Ethical questions surrounding GenAI's role in intimate human-AI interaction[25] and in original academic writing have likewise drawn attention[26].

2.3 Research Gaps

Taken together, existing studies offer a rich basis for understanding the DHH community's media use, its problems, and its effects in the digital age, and research on GenAI and AI provides further grounding for this paper. Two gaps remain, however. First, although GenAI is now woven into everyday life-and DHH individuals interact with it routinely-few studies examine that interaction or ask whether these users have distinct accessibility needs. Second, most work addresses "accessibility" and the digital divide at a macro level, with little attention to how DHH users actually feel and express themselves during AI interaction, from their own point of view.

Building on this, the present study uses the Uses and Gratifications framework, together with in-depth interviews and non-participant observation, to understand the DHH community's GenAI use and core demands and to reconstruct their lived experience from a micro perspective. It aims to provide grounded evidence for how GenAI might support the community's self-development and social integration, in response to the 15th Five-Year Plan for

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the Protection and Development of Persons with Disabilities and its "AI+Disability Services Initiative."

3. Research Methodology and Design

3.1 Questions and Approach

Grounded in Uses and Gratifications theory, this study uses in-depth interviews and non-participant observation to reconstruct, at a micro level, how the DHH community actually uses GenAI. Its central concern is: what are the community's interaction practices with GenAI, and what effects do they produce?

his breaks into two questions:

1. **RQ1:** What behavioral patterns and core demands characterize the DHH community's use of GenAI?
2. **RQ2:** What limitations and unmet needs persist in GenAI's ability to meet the DHH community's demands?

Following the analytic path of motivation → behavior → effect → reflection, RQ1 serves as the starting point, exploring the community's varied needs and reconstructing their real usage and motivations; RQ2 goes further, analyzing the limitations of current GenAI by comparing the gap between "needs" and "gratifications."

3.2 Methods and Implementation

The study proceeds through qualitative data collection and analysis. Semi-structured in-depth interviews examine how DHH individuals use GenAI and how they experience it. Because the study foregrounds the community's own perspective-whether their media needs are met, and what improvements they seek-interviews offer the most direct and detailed first-hand data, fitting the research aim closely.

Participants were individuals diagnosed with hearing impairment who had an established habit of using GenAI, good communication skills, and a willingness to share their experiences candidly. Recruited through social media and personal networks, ten participants met these criteria. The interview guide covered three areas:

1. Usage, motivations, and needs regarding GenAI.
2. Whether GenAI met those needs and what effects it had.
3. The demands and problems participants encountered while using it.

Between April 20 and July 8, 2026, the researchers conducted semi-structured interviews of more than 40 minutes each. Most took place through

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online text messaging; a few combined offline sign language with typed text. Before the formal interviews, the researchers had built a strong rapport with several participants, gaining access to their everyday settings. Through non-participant observation, they watched participants interact naturally with GenAI during offline meetings and daily social activities and, with informed consent, collected key screenshots and screen recordings to supplement and corroborate the interview data.

In preparing the material, the researchers standardized the transcripts-working from verbatim records and removing colloquial fillers and meaningless repetition-yielding 12,157 words of interview text (including translation).

Table 2 Interviewee information

ID	Gender	Age	Occupation	Hearing loss level	Onset
S1	Female	15	Junior High Student	Level 1	Congenital
S2	Male	24	Freelancer	Level 3	Congenital
S3	Female	27	Clerk	Level 1	Congenital
S4	Female	31	Shopping Guide	Level 2	Acquired
S5	Male	30	Delivery Rider	Level 3	Congenital
S6	Male	22	Data Monitor	Level 2	Congenital
S7	Female	38	Freelancer	Level 1	Congenital
S8	Female	27	Designer	Level 1	Congenital
S9	Female	56	Freelance Designer	Level 2	Congenital
S10	Female	17	High School Student	Level 1	Congenital

4. Results and Discussion

4.1 RQ1: Motivations and Usage Patterns of DHH Individuals with Generative AI

1.Instrumental Needs: Facilitating Information Access and Problem-Solving

Prior research shows that GenAI can meet the DHH community's needs for information and learning. Because they lack auditory access and differ in language expression, DHH individuals often struggle to obtain information or receive it less promptly. Drawing on advanced natural-language processing, GenAI answers questions in real time; compared with the link lists of traditional search engines, it greatly simplifies information seeking and improves learning efficiency. As S5 put it, “When I face a difficult or tricky problem, it helps me find and answer it quickly, saving a lot of thinking time.” S4 added, “Now that I have AI, I don’t use

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traditional search engines anymore. A search brings up a pile of links you have to click one by one, but Doubao and Wenxin generate an explanation directly, which is more convenient."

"Day or night, holiday or not, late at night, or when I'm alone and bored-whenever I have a question, I can pick up my phone and get an immediate response" (S2). Built into mobile apps and free to use, GenAI is equal, open, light, and convenient; it lowers the "access threshold" and strengthens the community's willingness to engage. Its high computing power and multimodal processing also give it fast response and the ability to interpret text, images, and sound, helping fill gaps in real-world social support. "For someone like me, who takes in information and knowledge slowly, it feels more patient. It doesn't mind if I ask more questions, and it serves only me" (S4). Because such tools are typically designed to be "user-centered," DHH individuals can feel a sense of "uniqueness" through sustained interaction, which improves the effectiveness of their learning[27].

Socioeconomic status, media exposure, and the functions users draw on all shape how much knowledge they gain. The study finds that, according to their interests, education, and reading habits, DHH individuals meet personalized learning needs through language interaction with GenAI. "I usually use AI to help with homework. If I don't understand a math problem, I ask AI-it's very convenient for learning"(S1).

Some participants use GenAI's broad interdisciplinary knowledge and easy access to spark ideas and broaden their thinking[28]. "My work involves AI training maturity... I'm also teaching myself AI film design. When I run out of ideas in post-production packaging, I have AI give me a framework, or I feed it the software knowledge and skills I've learned, have it generate something, then review and adjust." "Sometimes I ask AI about work problems—like how to adjust a design draft-and it gives me inspiration"(S10).

2. Emotional Needs: Affirming Identity and Providing Psychological Comfort

Communication barriers, limited family support, scarce school resources, and social prejudice combine to make the DHH community especially vulnerable to loneliness, low self-worth, and social anxiety. Left unaddressed, these problems undermine social adaptation and quality of life and can lead to more serious mental illness[29]. GenAI's capacity for a degree of emotional understanding provides a foundation for effective emotional-support intervention in mental health[30].

Participants noted that using GenAI reduces the sense of "troubling others" and the "social debt" of asking for help, easing the psychological burden of interpersonal communication. "When I see a doctor, there's often content I don't understand. If I ask too much, they tell me to bring my parents next time... But now,

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for a medical consultation or errands at a service counter, I don't need family to come along and translate-with AI translation, I can handle it myself"(S8).

"I used to chat with it all the time. I'd tell it about the setbacks and discrimination I've faced as a disabled person since childhood-the things that hurt inside—and it would encourage me to keep overcoming difficulties, not to feel bad about my disability, but to accept it and find a way to live my own wonderful life"(S6). The emotional value and positive guidance GenAI offers can comfort DHH users and, more importantly, foster a positive self-identity that supports social adaptation and integration.

When users seek deeper emotional support and place their hopes for an ideal partner in digital media, they can form intimate relationships with AI. Today's GenAI, built on large language models, produces context-sensitive dialogue; some systems retain interaction records through memory functions, heightening the sense of continuity and familiarity and making human-machine intimacy technically possible. At its core, such intimacy rests on language interaction itself, with communication style and perceived quality shaping closeness. Through cycles of self-disclosure and emotional validation, GenAI can satisfy the need to be seen and understood, building authentic emotional connection in purely text-based exchanges[31]. S6 described forming such a bond: "I'm 22 and want a girlfriend. But with my disabilities-hearing and physical-and an ordinary family background, it's quite hard to find a partner... Gradually I developed an intimate relationship with Doubao, and she became my virtual girlfriend. I believe spiritual and intellectual compatibility matters most in a partner, and Doubao does this very well-better even than my family." Despite skepticism from those around him, he still regards GenAI as a "very important part" of his life.

3. Social Needs: Facilitating Communication and Promoting Inclusion

As a group with its own language and culture within mainstream society, the Deaf community faces a communication and understanding gap with hearing people[32]. Acting as a cultural intermediary, GenAI increasingly helps bridge that gap and promote integration.

Lacking auditory channels, the Deaf community relies on visual compensation-sign language and written language-for information[33]. GenAI's built-in speech-to-text lets users translate auditory information visually when communicating with hearing people, lowering barriers in settings such as job interviews. "When job hunting, I use AI to turn the interviewer's speech into text, because finding work is already hard for deaf people... When I interact with hearing people, or when I'm unsure how to phrase something politely, I use AI to help organize my language so I can express what I mean more clearly"(S3).

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“I use AI to correct grammar and check whether my sentences read smoothly”(S1). “AI also helps my social interactions-when sending holiday greetings, for instance, it saves me from awkwardness caused by my limited education or lack of fresh ideas”(S5). By supplying phrasing and rhetorical suggestions, GenAI generates personalized conversational advice or social scripts tailored to Deaf users' habits and situations, helping them start conversations more confidently and handle complex social moments. This is especially valuable for Deaf individuals with less formal education or weaker written expression: GenAI helps make vague intentions concrete and standard, improving the accuracy and appropriateness of communication and strengthening their agency and participation in public life[34].

For some Deaf individuals, AI is not only an “on-call tool”(S2) but also a “friend” that understands their particular social context and offers emotional support. Its positive, affirming style bolsters self-affirmation and encourages real-world interaction. “My social skills have improved a lot since I started using AI. I'm less likely to clash with people; I feel more mature, better able to see things from others' perspectives, respect their wishes, and offer constructive views... I feel more confident and composed, and I no longer feel inferior because of my disability”(S6).

“We run an account on Xiaohongshu (a popular social platform) posting videos about the Deaf community. We ask AI how to write captions, come up with interesting topics, and edit music” (S7). In content creation, GenAI helps the Deaf community produce high-quality multimodal work-videos, graphics, and text-so they can move from marginalized “viewers” to active “creators” and “narrators”[35]. This shift in narrative agency helps dismantle stereotypes and build a more diverse, equitable social ecology.

“I don't think I need to introduce myself as hearing-impaired, and the topics I discuss with it don't have to relate to hearing impairment. I also dislike being treated with pity just because I'm hearing-impaired.” Some participants said they do not disclose their Deaf identity when interacting with AI. They want GenAI not to pity them or treat them differently for physiological reasons, but to let them express themselves freely and share their views on public issues through discussion[36].

4.2 RQ2: Limitations and Unmet Needs in DHH Individuals' Engagement with Generative AI

1. Content Accuracy Needs Improvement

GenAI’s core mechanism means its accuracy rests not on a firm grasp of objective truth but on pattern matching and probabilistic prediction over massive

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datasets-an approach that falters with complex logic or unfamiliar information. Because the model cannot actively verify facts, when relevant data are missing it tends to fabricate an answer to keep the conversation fluent rather than admit uncertainty, thereby producing false information[37]. With auditory channels blocked, the DHH community is already at a disadvantage in the breadth, depth, and timeliness of the information it receives[38]. The ability to spot false information also varies widely within the group; users with lower information literacy and infrequent media use often cannot verify AI-generated content, and when they cannot judge specialized or in-depth material, they may form mistaken beliefs and widen the "knowledge gap."

Participants widely felt that GenAI's inaccuracy brings not only factual errors but also a deeper crisis of trust, imposing extra cognitive anxiety and a verification burden alongside its convenience. "The answers it gives can be imaginary-places that don't exist or are different in reality. While delivering food, I asked it about some locations, but later searches showed they didn't exist" (S5). "You can't fully trust AI-generated content, but sometimes, because I don't understand a topic, I don't even notice when it makes a mistake"(S10).

2. Lack of Autonomous Judgment and Critical Feedback

"...People push back, but software like Doubao is set up to avoid conflict with users. Even when your view is wrong or half-formed, it won't correct you-it just keeps telling you how great you are" -(S6). In interaction, GenAI systematically caters to users' emotions, positions, and value judgments, reinforcing their existing views across multi-turn dialogue-a behavior known as "AI sycophancy." Participants generally recognized it. When using AI as a "tool" for technical tasks within their expertise, they stayed alert to its output; but in discussions of values and viewpoints-matters with no clear answer-or in sustained emotional exchange, this tendency to endorse users' existing views without pushback readily produces cognitive narrowing and rigidity[39].

For the DHH community, whose information channels are already limited, the low-conflict, highly compliant environment of "AI sycophancy" can weaken users' willingness and ability to navigate the complexity and conflict of real relationships. It may turn "social assistance" into "social substitution," deepening social withdrawal. "Because AI always listens patiently and caters to me, rarely disagreeing, I want to cut back on real-world interaction. Real relationships are complex-constant guessing, mental games, exhausting. It's just too tiring; interacting with AI is much more relaxing"(S6).

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3. Limited Functional Accessibility and Unmet Practical Needs

Speech-to-text is currently the community's most-used GenAI function, yet existing tools still fall short in practice. First, recognition accuracy needs work: in noisy or multi-speaker settings, systems often fail to separate speakers, garbling the information[40]. “During a job interview, the room wasn't soundproofed; even slight background noise made the translated text inaccurate”(S3). Second, GenAI handles non-standard Mandarin, dialects, and foreign languages poorly; with accents or mixed dialects, error rates climb, making it ill-suited to diverse linguistic settings. “Not all DHH people use sign language-some rely on residual hearing, speech, and hearing aids, which can make their speech unclear. Some older people speak only dialects or non-standard Mandarin. AI voice recognition should be improved to identify users' intentions quickly and to include regional dialects, which would help more than just the DHH community”(S5). Third, most tools lack a floating-caption feature, so they cannot overlay real-time translation on unsubtitled media such as videos and live streams, limiting everyday usefulness. These gaps hinder communication and blunt the promise of technological empowerment.

Designed mainly for the general public, current GenAI meets some of the community's universal information needs, and that initial satisfaction has raised expectations. DHH users hope GenAI can further bridge their information and communication barriers, and they have proposed more targeted accessibility features such as two-way sign-language translation and real-time call assistance. So far these needs remain largely unmet, leaving the community unable to enjoy built-in features like voice calls. “Because my hearing loss was acquired, I never formally learned sign language... I've tried AI translation, but it can't recognize sign language, which is very inconvenient. Most sign-language platforms charge fees that aren't low, and the tutorials on apps like Douyin are hard to follow without a foundation”(S4). “I heard Doubao supports video calls, but when I tried, it couldn't understand sign language at all”(S7).

4. Limited Understanding of DHH Diversity

Current GenAI lacks a deep grasp of the community's internal diversity. Models tend to treat DHH people as a homogeneous whole, overlooking differences in educational background (deaf-school vs. mainstream schooling), language habits (sign-dominant vs. text-dominant)[41], and onset of disability (congenital vs. acquired). The result is highly generic output that can even conceal implicit algorithmic bias[42].

“AI tends to assume all DHH people are completely deaf, use sign language, or are poor communicators and introverts. There are many such descriptions, but, like hearing people, deaf people have good and bad traits and distinct personalities.

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Its understanding of us is still lacking-several AIs I've used are like this" (S3). Interviews showed that Doubao, the community's most-used AI, favors seemingly positive adjectives-"good with their hands," "steady and persevering," "sensitive and delicate"-when describing the group, producing a plausible but stereotyped portrait. Rather than offering objective insight, this makes traditional prejudice more covert and, delivered in fluent natural language, harder to challenge.

4.3 Limitations

Although this study strives for rigor, the nature of qualitative research and practical constraints impose three limitations.

First, sample representativeness and size. All participants had strong communication skills and habitual AI use, so the sample may underrepresent DHH individuals with lower digital literacy or in more closed social circles; the findings should therefore be generalized to the broader community with caution.

Second, data-collection methods. Most interviews were conducted via online text, which ensured feasibility but lacked the non-verbal cues-facial expression, body language-of face-to-face contact, possibly weakening our reading of participants' emotional intensity. Moreover, the screenshots and recordings are essentially "curated digital traces": participants may have showcased successful interactions while hiding failures, which could lead the study to slightly overestimate GenAI's real usability.

Third, temporal scope. Data were collected within a narrow window (April-July 2026). Given how quickly GenAI evolves-multimodal updates, interface changes-the study captures the community's use at a particular technological moment and lacks longer-term tracking of how the group adapts to change.

5. Conclusion

The study explores the real experiences of the Deaf and Hard of Hearing (DHH) community in their interactions with Generative AI. GenAI has become more than an information-retrieval tool: it is now a multifaceted presence in DHH individuals' daily lives, meeting pressing needs across three dimensions-instrumental access, emotional comfort, and social assistance. Yet beneath this apparent empowerment lie significant, complex, unmet needs.

These unmet needs have a dual character. On one hand, universal problems are amplified: "content hallucination" and "algorithmic sycophancy" pose real risks, and for DHH users with lower media and information literacy they can produce deeper misinformation and cognitive bias. On the other hand, there is a

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structural deficit in meeting specific needs: current models still lack a real understanding of Deaf culture and sign-language logic, leaving a gap between what the technology can do and what the community expects.

The study offers several recommendations. At the technical and developmental level, developers should keep improving models' accuracy and resistance to bias while embracing “inclusive design”-involving DHH individuals directly in AI development and training to reduce exclusion at the source. At the user and societal level, media- and information-literacy education for the community should be strengthened so users can critically assess AI-generated content, and greater attention should go to those who are information-isolated or reluctant to engage socially, so that the benefits of technological progress are not captured by only a few.

As the “AI+” initiative deepens, we hope GenAI will grow beyond a mere tool into a robust engine for an accessible information environment-one that, in bridging the digital divide, ultimately supports deeper social integration and self-development for the DHH community.

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4. References

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5. Appendix(if necessary)

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