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Perceptions of Adults With Hearing Loss About the Communication Difficulties Generated by the COVID-19 Preventive Measures: A Qualitative Study

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ABSTRACT

Purpose: The COVID-19 pandemic led to the implementation of preventive measures that exacerbated communication difficulties for individuals with hearing loss. This study aims to explore the perception of adults with hearing loss about the communication difficulties caused by the preventive measures and about their experiences with communication 1 year after the adoption of these preventive measures.
Method: Individual semistructured interviews were conducted via videoconference with six adults who have hearing loss from the province of Québec, Canada. Data were examined using qualitative content analysis.
Results: The study found that face masks and in-person work (i.e., in opposition to remote work) were important barriers to communication because of hindered lipreading and competing noise in many workplaces. In contrast, preventive measures that allowed visual information transmission (e.g., transparent face masks, fixed plastic partitions) were considered favorable for communication. Communication partners were perceived as playing an important role in communication success with preventive measures: Familiar communication partners improved communication, whereas those with poor attitude or strategies hindered communication. Participants found that videoconferences could provide satisfactory communication but were sometimes hindered by issues such as bad audiovisual quality or too many participants.
Conclusions: This study identified reduced access to speech reading and lack of general awareness about hearing issues as key barriers to communication during the pandemic. The decreased communication capabilities were perceived to be most problematic at work and during health appointments, and tended to cause frustration, anxiety, self-esteem issues, and social isolation. Suggestions are outlined for current and future public health measures to better consider the experience of people with hearing loss.

The COVID-19 pandemic led to the widespread adoption of infection prevention measures (Cirrincione et al., 2020; Ingram et al., 2021; Talic et al., 2021). Such public health measures included wearing face masks (Chaabna et al., 2021; Eykelbosh, 2021; MacIntyre & Chughtai, 2020), practicing physical distancing (Chu et al., 2020; Jones et al., 2020), using physical screens and barriers (Cadnum et al., 2021; Environmental Modelling Group, 2021), wearing transparent face shields (de Oliveira e Silva et al., 2021; Ha, 2020), and working from home (Beckel & Fisher, 2022; Lopez-Leon et al., 2020). However, concerns have been raised about the potential for these preventive measures to disproportionally impact individuals with disabilities (Annaswamy et al., 2020; Armitage &

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Nellums, 2020; Goggin & Ellis, 2020; Guidry-Grimes et al., 2020; Hall et al., 2022; Senjam, 2020). Notably, the estimated 430 million individuals worldwide living with disabling hearing loss (World Health Organization, 2021) may be particularly affected (Kataoka et al., 2021; Naylor et al., 2020; Pinsonnault-Skvarenina et al., 2021, 2022).

People with hearing loss heavily rely on visual cues to understand speech (Woodhouse et al., 2009), particularly in adverse listening conditions (Jesse & Janse, 2012). However, face masks may remove or limit access to visual information such as lip movements and facial expressions. This absence of visual cues can reduce speech intelligibility and speech processing even in individuals with normal hearing (Smiljanic et al., 2021; Truong et al., 2021; Truong & Weber, 2021). Thus, it is not surprising that face masks markedly deteriorate the speech understanding of people with hearing loss (Gutierrez-Sigut et al., 2022; Poon & Jenstad, 2022; Saunders et al., 2021). In addition to blocking visual cues, masks can alter speech signal acoustics (Goldin et al., 2020; Magee et al., 2020; Rahne et al., 2021). Studies have also highlighted the overarching consequences of mask use on communication and beyond: increased frustration, fatigue, anxiety, stress, as well as reduced interpersonal connectedness, willingness to engage in communication, reduced well-being, and reduced quality of life (Naylor et al., 2020; Oosthuizen et al., 2022; Pinsonnault-Skvarenina et al., 2022; Saunders et al., 2021). In contrast, transparent materials used in face shields, windowed face masks, and physical barriers allow for the transmission of visual cues and the use of speech reading. Although all types of face masks and face shields attenuate frequencies above 1 kHz (Corey et al., 2020), those using transparent materials have a higher level of sound attenuation (Corey et al., 2020; Cox et al., 2022). However, individuals with hearing loss still prefer transparent preventive measures, suggesting that the benefits of visual cues outweigh the drawback of sound attenuation (Oosthuizen et al., 2022).

Social distancing and telework led to an increase in the use of distance communication technologies, notably videoconferencing (Naylor et al., 2020). Pinsonnault-Skvarenina et al. (2022) found that adults with hearing loss have conflicting opinions on videoconferences and generally prefer written telecommunication (i.e., text messages and e-mails). Conversely, individuals with hearing loss rated purely auditory telecommunication technologies (i.e., telephone) as less effective and less enjoyable. The same study also found that, compared to individuals with normal hearing, adults with hearing loss reported significantly more communication breakdowns due to COVID-19 preventive measures. These communication breakdowns were associated with increased participation restrictions, negative impacts, and negative emotions. This study constitutes a follow-up to Pinsonnault-Skvarenina et al. (2022), in which data were collected using a quantitative questionnaire and some open-ended questions. We now aim to expand the findings of this previous study by further examining the perspectives of individuals with hearing loss in relation to COVID-19 preventive measures. Employing a qualitative approach enables a deeper exploration of subjective experiences, emotions, and nuanced insights that may not be fully captured through quantitative methods (Ivankova et al., 2006). While previous qualitative studies focused on specific communication challenges and contexts such as the use of masks (Poon & Jenstad, 2022), telehealth services, and digital technologies (Xu et al., 2023), this study takes a more comprehensive approach, examining communication on a broader scale. A recent literature review on the impacts of COVID-19 preventive measures on communication (Oosthuizen et al., 2022) revealed that all studies pertaining to people with hearing loss employed large-scale surveys instead of interviews (e.g., Galvin et al., 2022), with interviews only used in some studies on communication of health care practitioners (e.g., Hayirli et al., 2021). This study is one of the first to use semistructured interviews to explore more deeply the communication of individuals with hearing loss during the COVID-19 pandemic.

The objective of this study was to uncover how adults with hearing loss perceived communication while COVID-19 preventive measures were in place. The specific aims were to identify the barriers and facilitators to communication with preventive measures, and the perceived psychosocial impacts of impaired communication because of preventive measures. Doing so, this study hopes to provide valuable insights for health care professionals, policymakers, and service providers to enhance their support for individuals with hearing loss in situations where preventive measures need to be applied. This study focuses on the experiences 1 year after the widespread adoption of preventive measures as they were becoming increasingly prevalent in the public space. For instance, face masks were mandatory in enclosed public places in Québec since July 2020, roughly 1 year before data collection (Institut national de santé publique du Québec, 2022). This timeframe allowed participants to realize the long-term nature of these measures, thus shedding light on the emerging challenges and adaptations. Moreover, this study establishes a reference point to the early stages of implementation that could serve as a benchmark for comparisons in studies that may wish to investigate preventive measures over a longer period.

Method

Study Design

This study used a descriptive qualitative design with semistructured interviews and directed qualitative content

analysis. Semistructured interviews are a qualitative research method that uses a predetermined interview outline to explore specific topics while allowing the interviewees to speak freely about their experiences and perspectives to uncover unanticipated themes or ideas (Kvale, 1994). The open-ended nature of semistructured interviews allowed the personalized exploration of the lived experience of our participants with hearing loss, which form a diverse group of individuals which may report unique challenges, strategies, and adaptations in the context of communication during the COVID-19 pandemic. We used directed qualitative content analysis since we had a predetermined set of research questions (Hsieh & Shannon, 2005), that is, to identify the barriers and facilitators to communication with preventive measures and the psychosocial impacts of impaired communication. Based on these questions, we defined three broad deductive themes to explore: barriers, facilitators, and psychosocial impacts. We used a hybrid approach where codes and categories within these themes are defined inductively.

Researcher Characteristics and Roles

The study was collaboratively designed by a multidisciplinary group of researchers (A.P.S, A.S., J.P.G., A.B.M.L, and M.H.) with expertise in audiology, rehabilitation, and gerontology, encompassing both quantitative and qualitative research backgrounds. L.C. served as the main researcher, being responsible for data collection, processing, analysis, and for the preparation of the manuscript. At the time of the study, L.C. was a graduate audiology student, meaning that he had experience communicating with people with hearing loss and was aware of common hearing-related issues. While this background helped in facilitating the interviews (e.g., by being aware and applying communication strategies), it may also have introduced some preexisting assumptions regarding the impacts of preventive measures on individuals with hearing loss. Being aware of these potential biases helped L.C. to engage in self-reflection throughout the study. Team meetings between L.C, A.P.S., and M.H. were held on a regular basis, which helped ensure that personal beliefs did not unduly influence the data collection, analysis, and interpretation processes. L.C. had some previous experience in qualitative research, having collaborated in interviews and data transcription for other qualitative projects. For this study, L.C. received training and supervision by A.P.S. and by the senior author M.H., who has an extensive background in qualitative research in audiology.

Sampling and Participants

We recruited participants through purposive and convenience sampling from a previous study (Pinsonnault-Skvarenina et al., 2022), an online quantitative survey exploring everyday communication during the pandemic in individuals with and without self-reported hearing loss. Of the 172 individuals with hearing loss who participated in this previous study, 82 consented to being contacted for a follow-up interview and were contacted via e-mail. Because of unforeseen delays, these individuals were contacted 4–8 months after their initial involvement in the first study, which could have led to potential changes in their availability or willingness to engage further. Therefore, only six individuals expressed an interest in participating in the interviews.

Our final sample was composed of two groups: adults with hearing loss (n = 3) and hearing care professionals with hearing loss (n = 3). In the former, Participant 3 also had a school-aged child with hearing loss and was involved in a local advocacy group for children with hearing loss. Table 1 provides participants' sociodemographic information. All participants lived in the Canadian province of Québec and self-reported a moderate or severe hearing loss. Although self-reports of hearing loss may be unreliable and hard to validate, all participants were experienced users of hearing devices, suggesting that they had some level of understanding of their hearing condition. Nevertheless, the self-reported hearing loss presented in Table 1 should be interpreted not as a clinical criterion but as a heuristic representation of the participant's self-perception of their hearing status. Three participants used hearing aids in both ears, two used a hearing aid and a

Table 1. Participants' self-reported sociodemographic characteristics.

Participants	Sex	Age	Self-reported hearing loss	Hearing device	Years worn	Highest education	Health status	Health professional
Participant 1	Female	38	Moderate	2 HA	≥ 20	College	Very good	Yes
Participant 2	Female	30	Moderate	2 HA	≥ 20	College	Good	No
Participant 3	Male	35	Severe	2 HA	≥ 20	University	Good	No
Participant 4	Female	55	Severe	CI + HA	≥ 20	University	Passable	Yes
Participant 5	Female	59	Severe	2 CI	≥ 20	University	Very good	Yes
Participant 6	Female	44	Severe	CI + HA	16–20	University	Very good	No

Note. HA = hearing aid; CI = cochlear implant.

cochlear implant, and one used two cochlear implants. Many characteristics of our sample are unrepresentative of the diverse population that is adults with hearing loss, since all participants were experienced users of hearing devices, were younger or middle-aged adults between 30 and 59 years old, and had a higher education level.

Data Collection

Individual semistructured interviews were conducted in French by the first author (L.C.) via videoconference from June 2021 to September 2021. Data collection thus occurred roughly 1 year after face masks became mandatory in Québec (July 2020) and almost one and a half year after teleworking was encouraged by the government (March 2020). This also corresponds to 1 year after the end of the first surge of COVID-19 cases in Québec, which occurred from February to July 2020 (Institut national de santé publique du Québec, 2022). At the time of data collection, Québec was between its third and fourth outbreak and around half of the Québec population was vaccinated. Many restrictions were being lifted, but most preventive measures such as masks or physical distancing were kept in place. The participants were asked about their experiences with preventive measures since the start of the pandemic. The interviews had a duration ranging from 29 to 53 min, with an average length of 40 min.

Videoconferences were chosen instead of in-person interviews for safety reasons since data collection occurred while the pandemic was ongoing. The previous study by Pinsonnault-Skvarenina et al. (2022) suggested that videoconferences were appropriate for one-on-one communication with people with hearing loss. Nevertheless, to ensure optimal communication during the interviews, the interviewer was in a calm environment, had quality equipment and a stable Internet connection, and applied appropriate communication strategies. We opted to conduct interviews on the Zoom platform for its simplicity and popularity at the time. Participants were asked if they were comfortable with the platform when scheduling the interview, as we were open to other options if preferred. All participants reported some degree of familiarity with videoconferencing. Participants were instructed to be in a calm environment without distractions for the interviews. Most participants were at home, except for two participants who chose to be in an office at work. One participant asked a colleague to help them to set up the videoconference, but all participants were alone for their interviews. The interviewer had prepared some visual material (e.g., document with written questions) in case verbal communication was too arduous. However, this proved unnecessary in practice.

The interviewer used a predefined interview guide (see Appendix). One author (A.P.S.) wrote the first draft of the guide, and all the research team reviewed it. The guide served as a framework for the interviews, starting with an exploration of the participant's general communication experience during the pandemic, followed by more in-depth discussions regarding specific preventive measures, and concluding with general recommendations and a summary of the key highlights. The interviewer familiarized himself with it, discussed its content with A.P.S. and M.H., and rehearsed with colleagues through mock interviews. During the interviews, the interviewer ensured the response's validity through basic member checking by synthesizing, reformulating, and verbally repeating to the participant what they said, then prompting the participant to provide further details or comments.

Data Processing and Analysis

The interviews were audio-recorded and transcribed as a true verbatim to minimize information loss (Eppich et al., 2019). To ensure confidentiality and anonymity, information that could allow identification (e.g., place of work) was removed from the transcripts. Data analysis was performed using the original true verbatims in French. The verbatim quotes presented in the Results section were translated from Canadian French into English by L.C.

The verbatims were analyzed with the open-source software QualCoder (Curtain, 2022) using recognized principles of qualitative content analysis (Graneheim & Lundman, 2004; Knudsen et al., 2012). Our content areas were text samples in which the participants discussed their experiences with communication during the COVID-19 pandemic (e.g., specific interactions, common issues with preventive measures, broad psychosocial consequences). We deductively defined three main themes based on our research questions: barriers to communication, facilitators to communication, and impacts of communication difficulties. Content areas were read multiple times and an inductive approach was used to identify relevant meaning units, which were condensed into codes. From these codes, we used an inductive approach to identify categories and subcategories within each theme. To ensure the reliability of the analyses, final codes and coding tree were selected through an iterative process of consultation and consensus among authors. The first author (L.C.) performed the initial coding and categorization of the data, which were then validated by two other authors (A.P.S. and M.H.). When a disagreement occurred, it was discussed and resolved by mutual consensus.

Results

Our results show that the COVID-19 preventive measures had a detrimental effect on participants'

communication experiences. When asked about the barriers and facilitators to communication with preventive measures, participants identified multiple factors that they perceived as either detrimental or beneficial to their communication experiences. Participants also reported various consequences of these worsened communication experiences on their psychosocial well-being and on society at large.

Barriers to Communications

Barriers to communication identified by participants are listed in Table 2. Most barriers were associated with preventive measures, including challenges with regular face masks, transparent face masks, and telecommunication technologies such as videoconferences. Some barriers also involved personal factors, conversation partner characteristics, in-person work environment, and societal factors.

Personal Factors Affecting the Adaptation to New Communication Challenges During COVID-19

Participants recognized that characteristics of their hearing loss or hearing aids exacerbated the influence of preventive measures on communication. Two participants explained that some voices were harder for them to understand—deep voices for Participant 1 and high-pitched voices for Participant 2—particularly when lip movements and facial expressions were concealed by a face mask. All participants considered they had fully accepted their hearing loss and felt that they did not experience barriers to communication related to hearing loss acceptance. However, Participant 5 suggested that incomplete acceptance of one's own hearing loss in others may produce self-imposed restrictions to communication during the pandemic:

> Yes, if you're not comfortable and you're in a psychological stage where [. . .] you're still denying it a bit, you know, bargaining to make it better or if there's not much personal affirmation, you're going to have a lot of withdrawal. (Participant 5)

Conversation Partners' Factors Exacerbating COVID-19 Related Communication Challenges

Participants frequently reported that some characteristics of their conversation partners could act as barriers to effective communication (e.g., people speaking too softly or too fast) in challenging situations where preventive measures were present. However, participants mostly highlighted that their degree of familiarity with the communication partner's voice was a key determinant of communication fluency with face masks. Without lipreading, understanding people with unfamiliar voices, different accents, or different nationalities became more difficult.

The attitudes and communication strategies of the conversation partners could also pose a challenge, with most participants recalling encounters with people that were not cooperative in facilitating successful communication. Even when conversation partners were cooperative, participants sometimes found that the communication strategies used were inadequate. Common inadequate strategies included simply repeating what was said, often without slowing down and sometimes without raising their voice. Other common issues included overarticulating and using only a limited set of communication strategies. Participant 6 reported a general lack of awareness and understanding regarding how to effectively communicate with people who have hearing loss. Participant 5 reported that speaking too loudly through fixed plastic partitions could cause speech to appear increasingly distorted.

Challenges With Regular Face Masks

All participants stated that regular face masks (i.e., cloth or surgical masks) were preventive measures with the most negative consequences on communication. Participant 5 explicitly identified face masks as a barrier with a strong effect on communication and work: "...the use of masks really added a big burden to all work, and every communication was difficult." Even Participant 2, who had the mildest hearing loss in the study's sample, found that face masks significantly affected her communication. Participant 6 described how the arrival of face masks completely and instantly changed her communication experience because they prevented speech reading, which was crucial for her understanding: "From one day to the next, it was like black and white. [. . .] when they put on masks, I lost all facial expressions, I lost the person's mouth, that's what's important for me to communicate." Participant 3 was aware that face masks also attenuated speech but considered this to be a minor issue compared to the removal of visual cues. Participant 4 also noted that trying to understand other people wearing face masks required a lot more effort and energy: "...the mask doesn't just remove lipreading, it's the expressions too. Seeing just the eyes... I felt really disconnected, and trying to understand orally, it was too much ... it required too much energy."

Participants often reported asking people to temporarily remove their face masks for their conversation but noted that people were often not allowed or unwilling to remove their masks for safety reasons: "...most of the businesses I visited, people were not allowed to lower their masks, even with the plexiglass" (Participant 5). Some participants questioned this inability or unwillingness to remove face masks when other preventive measures were in place (e.g., fixed plastic partitions, physical distancing, face shields). The combination of masks with other preventive measures frequently led to frustration among

Table 2. Categories, subcategories, and codes for Theme 1: obstacles to communication.

Category	Subcategory	Codes
Personal factors affecting adaptation to new communication challenges during COVID-19		• Struggles with the acceptance of hearing loss
		• Difficulties with certain voices
		• Recent changes in hearing aids
Conversation partners factors exacerbating COVID-19 related communication challenges		• Unfamiliar voices
		• Uncooperative conversation partner
		• Inadequate speaking volume
		• Ineffective communication strategies
Challenges associated with COVID-19 preventive measures	Challenges with regular face masks (i.e., cloth or surgical)	• Tedious communication
		• Most disrupting protective measure
		• Hindered lip reading
		• Increased challenges with face shields or fixed plastic partitions
		• Increased challenges with physical distancing
		• Inability to remove masks in many situations
	Challenges with windowed masks	• Impaired sound transmission
		• Less comfortable than regular masks
		• Some visual information still blocked
		• Rarely used
	Challenges with telecommunication technologies	• Background noise during videoconferences
		• Poor audio and video quality in videoconferences
		• Technical difficulties in videoconferences
		• Difficulty identifying the speakers in videoconferences
		• Unfamiliarity with videoconference technologies
		• Videoconferences lasting too long
		• Videoconferences with too many participants
		• Higher concentration demand during videoconferences
		• Children at home during video conferences
		• Difficulties with telephone communication
		• Lower communication quality
Challenges with in-person work		• Frequent changes of teams and colleagues
		• Communicating with clients that also have a hearing loss
		• Challenges with group meetings
		• Suboptimal physical work environment
Societal challenges		• Delays in public health measures accounting for vulnerable people
		• Hearing loss being mostly an invisible condition
		• High prevalence of ambient noise in day-to-day life

participants, who reported a synergistic effect of masks concealing lipreading with other measures increasing sound attenuation:

> . . .the big problem with the mask is that we can't read lips. However, the visors and plexiglass cut the sound and it's impossible to recover that. [. . .] it's really these [combinations] I've been confronted with it several times and it's just impossible for me. (Participant 3, aggregated from multiple responses)

Some participants also reported that, while communicating from a certain distance normally has minimal impacts on communication, having to keep a safe distance while wearing face masks constituted a significant barrier to communication.

Challenges With Windowed Masks

Face masks with a transparent window were viewed positively by participants and were preferred over standard face masks. However, participants still reported challenges that limited their effectiveness and widespread adoption. One issue was increased sound attenuation, although participants often found that having access to visual information more than compensated for this. However, this access to visual information was often compromised by mask placement, fog, or light reflections, with many participants reporting asking their conversation partner to reposition their masks because of visibility issues. Another significant disadvantage of transparent face masks was discomfort, with issues of humidity retention, heat, and lack of breathability being commonly reported: "...they suffocate people. The air doesn't flow very well, and every time you try to talk, you suffocate" (Participant 3).

Despite the sound attenuation, missing visual information, and comfort issues, the most reported problem with transparent face masks was their limited use in the general population. At the time of the interviews, all participants had some experience talking to someone wearing a windowed face mask. The extent of this experience varied, with some participants expressing disappointment at how infrequently they were used:

> ...there should be at least one person per business with a transparent face mask, one or two people, I don't know. It's so very simple for the merchant, but my gosh no, I have never seen one anywhere around here. (Participant 6)

Participant 1 reported feeling that transparent face masks arrived tardively in educational and health care settings, stating that they should have been available in day cares and long-term care facilities much sooner. Participants linked the limited adoption of transparent face masks to their comfort issues and to their increased cost: "My advice would be to invest in the comfort of transparent face masks" (Participant 1).

Challenges With Telecommunication Technologies

During the COVID-19 pandemic, a common preventive measure was to switch from in-person work to telework, leading to an increased use of telecommunication technologies. Participants generally reported mixed feelings toward these technologies, stating that they could both facilitate and impair communication in different ways. Many communication challenges were related to poor video and audio quality: poor lighting, background noise, improper microphone placement, excessive movements, technical issues, and unstable Internet connections. Broader challenges included videoconferences lasting too long or having too many participants, which made it difficult to identify who was speaking, required more concentration, and resulted in a lower quality of exchanges. Participant 4 reported being severely affected by several of these videoconferencing barriers, but also found that communication with videoconferences was better than with the telephone, which she expressed being unable to use. Participants also mentioned challenges with adapting to new telecommunication technologies and platforms, citing a lack of familiarity, training, and time: "...there hasn't really been any training on how it works, so we try to help each other out. I think you have to be almost self-taught [...] but again ... you don't necessarily have the time" (Participant 1).

Challenges With In-Person Work

In-person work with preventive measures also presented several communication challenges. Participant 1, who temporarily worked in a long-term care facility with different coworkers each day, reported that the lack of familiarity with the voices of her colleagues combined with face masks posed a significant challenge. In-person team meetings were also challenging for participants since they were often coupled with physical distancing and masks: "We had meetings while maintaining social distancing, sometimes with eight people in a large room, very far apart, with masks" (Participant 5). Participant 3 reported acquiring a remote microphone system from their rehabilitation center, notably to help with group meetings. Some participants also mentioned that the physical work environment often made communication with face masks difficult, notably because of ambient noise or busy environment.

Societal Challenges

Some communication issues arose from socio-environmental factors. Participants often reported feeling overlooked by public safety measures and feeling like the needs of vulnerable individuals, such as those with hearing loss or with other disabilities, were an afterthought: "I think people with disabilities, not just my disability, [...] they are often forgotten" (Participant 6). Participant 3 also stated that children with special needs, such as his deaf daughter, were particularly disadvantaged and at risk for long-term harm. Participants often mentioned that hearing loss being an invisible condition often put them into situations where their communication needs were not taken into consideration. Participants also stated that the omnipresence of environmental noise in multiple settings where communication is required was one of the main barriers to communication alongside masks and other preventive measures.

Facilitators to Communication

Facilitators to communication identified by participants are listed in Table 3. Some facilitators pertain to

Table 3. Categories and codes for Theme 2: facilitators to communication.

Category	Codes
Personal factors improving adaptation to preventive measures	• Acceptance of own hearing loss
Conversation partner factors facilitating communication with preventive measures	• Interlocutor who is understanding
	• Interlocutor who has a familiar voice
Preventative measures with limited consequences on communication	• Face shields or fixed plastic partitions without masks
	• Physical distancing
	• Lower communication needs during the pandemic
	• Transparent windowed masks
Benefits of telecommunication for communication	• Many communication strategies available
	• Less background noise at home
	• Videoconferences transmitting visual cues
	• Videoconferences leading to positive communication experiences
Communication strategies used to alleviate COVID-19–related communication challenges	• Asking to repeat
	• Inferring meaning from context
	• Validating what was understood
	• Moving closer to the interlocutor
	• Moving somewhere calmer
	• Asking to remove the mask
	• Bringing someone when going out
	• Informing others of one's hearing loss
	• Explaining communication strategies

personal factors and conversation partner characteristics. In contrast to the significant barrier posed by regular face masks, other preventive measures were often viewed as facilitators to communication, with some participants stating that telecommunication even improved their communication experiences.

Personal Factors Improving Adaptation to Preventive Measures

Most participants reported that accepting their hearing loss enabled more positive communication experiences. Participant 1 said that hearing loss acceptance made it easier for her to acknowledge that preventive measures may further hinder communication: "Not everyone is willing to accept their hearing loss. Personally, I'm at the stage where I can say, 'Well listen, I use two hearing aids uh… with the visor, the mask, for me it might be harder.'" Hearing loss acceptance also allowed participants to tell others about their condition with more confidence. Participant 5 reported that her acceptance was linked to better self-assertion, which helped her express her needs. Participant 3 stated that he was now completely comfortable disclosing his condition to limit communication breakdowns.

Conversation Partners' Factors Facilitating Communication With Preventive Measures

While participants predominantly shared their negative communication experiences, some also expressed that positive experiences could arise when their conversation partners demonstrated understanding and actively made efforts to enhance communication. Several participants also found it gratifying when health care professionals took extra steps to ensure that communication was successful during appointments. Communication was often considered easier with familiar people, even to the extent of canceling out the negative effects of masks: "Well, my son, I can even understand him with a mask since I'm so used to his voice" (Participant 5).

Preventive Measures With Limited Consequences on Communication

Face shields, fixed plastic partitions, and physical distancing were seen as having limited consequences on communication when used as stand-alone measures (i.e., without a face mask). For example, Participant 3 noted that physical distancing without masks did not significantly alter communication. Also, the stay-at-home guidelines may have reduced the occurrence of situations where in-person communication is needed: "…well there was the grocery store, the screening tests, then we had to limit our contacts so… there wasn't much else [laughter]" (Participant 3).

Face masks with transparent windows were the preventive measure that was the most appreciated. All participants found that these transparent masks were effective in improving communication by providing access to visual information and enabling speech reading. Participants

generally considered transparent masks superior to regular cloth or surgical masks, with Participant 4 even exclaiming that they were "...amazing compared to the other masks." Participant 1 noted that windowed masks were beneficial for both verbal and nonverbal communication, as well as interpersonal relations and general well-being: "...it's the comment we hear the most often, 'Hey, it's good to see a smile!' You know? [...] And it makes me feel good to be able to smile and know that it was seen, you know."

Participant 5 found it very gratifying to see others wearing transparent masks around her despite them being less comfortable: "I appreciate their effort so much, because when I wear one, I find it's a bit hard to breathe." Participant 3 summarized the benefits of these masks:

> I also think that we should generalize the use of windowed masks. It may cost a little more, but it's such a game changer! Every time I see someone with a windowed mask, it improves my understanding so much, it requires so much less effort... (Participant 3)

Benefits of Telecommunication Technologies

Participants generally found that the use of telecommunication technologies for telework was beneficial for communication, and sometimes even better than in-person communications. For instance, Participant 2 felt more comfortable having telephone conversations from home where the environment was quieter than at the office. Videoconferencing was also seen as positive, since it allowed the transmission of visual information that would not be available on the phone. Participant 5, who initially had reservations about using videoconferences at work, found that they could lead to "very positive experiences" with her clients. Videoconferencing presented many challenges, but participants mentioned various strategies that could easily be implemented to improve the experience, such as closing the microphone while not speaking, speaking in turns, recording important meetings, stating names before speaking, and keeping meetings short. Other suggestions included lowering ambient noise, speaking slower, and minimizing movement while speaking.

Communication Strategies Used to Alleviate COVID-19–Related Communication Challenges

A commonly reported strategy was to inform the communication partner about the hearing loss: "That's the first contact, I say 'hello, I am hard-of-hearing' and there you go, that helps a lot of people" (Participant 3). Some participants also wore badges stating "I use lipreading" or informed medical clinics of their hearing loss before their appointments. These strategies were found to be effective but required a good level of self-assertion. Beyond simply mentioning their hearing loss, participants also frequently explained communication strategies. Participant 5 shared a positive experience of self-advocacy when she brought documentation to her pharmacy: "I felt really happy and involved to bring them these little flyers, because now I was not just speaking for myself, I was speaking on behalf of all the hard-of-hearing people."

Participants also commonly asked their communication partner if they would be comfortable to temporarily remove their masks in situations where clear communication was important, such as during health care appointments. Participant 6 generally found that health care service providers were inclined to remove their masks when other preventive measures (e.g., fixed plastic partitions, physical distancing) were in place. Some strategies were used to repair communication breakdowns, such as asking to repeat, requesting to speak slower, and specified which parts of the message were understood. To avoid communication breakdowns in the first place, participants reported having to often validate their understanding with their communication partner and to take steps to avoid background noise: "I said, 'Please, could you come with me?' And we moved to another, quieter place. I closed the door, and then I said, 'OK, what is it, what's going on, what did you want to tell me?" (Participant 5).

Many participants heavily relied on contextual cues to understand. Participants often gave the example of the grocery store where the ritualistic nature of conversations made communication easier: "When you come up to the register [laughter] it's always the same questions" (Participant 2). However, for more complex communications, some participants reported bringing relatives with them so they could repeat what was said with their familiar voice and while applying communication strategies. Participant 1 often brought her husband with her to the store, and Participant 2 did the same, but only for large and crowded stores. Similarly, Participant 4 enlisted the help of her sister for phone calls, and Participant 6 often brought her son when going out. Two participants also sought professional help because of the communication difficulties that arose during the pandemic. Participant 3 received assistance from his local rehabilitation center to obtain assistive devices for communication at work, and Participant 4 received support from a psychologist to help cope with the psychological consequences of communication difficulties.

Consequences of the Communication Difficulties

New or Exacerbated Negative Emotions and Psychosocial Effects

Feelings of embarrassment were commonly reported, such as Participant 5 sharing feeling embarrassed about

burdening her coworkers with her communication needs. Participant 6 shared that she was not always comfortable expressing her communication needs in public because she did not want to draw attention to her condition, comparing it to "putting a big spotlight on me." Many participants shared feelings of apprehension toward future communication situations and increased anxiety. For instance, Participant 4 shared her experience dealing with anxiety and panic attacks:

> Going to stores at the beginning of the pandemic, I … I had uh … panic attacks … even though I've never had any before in my life. Entering the store, I saw everyone with masks on […] I didn't feel well, I had to leave. (Participant 4)

Feelings of frustration and powerlessness were also commonly reported and seemed to be closely related. Participant 6 explicitly described the preventive measures as a significant barrier to communication that produced these feelings: "We already had trouble communicating, you know, and now it was like they were putting another barrier to communication, and a really, very, very, very significant barrier."

Issues with self-esteem also often came up. Participant 5 admitted that her impaired ability to communicate affected her self-esteem and stated that communication breakdowns were stigmatizing. Participant 4 felt that the communication skills she had learned over her lifetime were now rendered useless by the preventive measures used during the pandemic:

> I'm 56 years old, and all my life I've been taught to communicate with others, to use the strategies, everything. But with the pandemic, it's like "Woah, all the efforts I've made, it's all for nothing." That was very difficult, personally it was very difficult. I felt less capable, I felt useless … no longer able to communicate. (Participant 4)

Many participants reported that having to compensate for the preventive measures and the frequent communication breakdowns led to increased tiredness. Participant 1 talked about physical and mental fatigue: "We're in energy-saving mode … it's tiring." She also reported an augmentation in her tinnitus, which she attributed to her increased tiredness. Participant 5 recalled coming home from work much more tired than before. Some participants noted that communicating with people using face masks was the main energy consuming challenge and often explicitly stated that they withdrew and experienced more social isolation. Participant 5 noted that the isolation already experienced by people with hearing loss was now exacerbated by preventive measures. Participant 6 said that while she was usually outgoing, she now only went out when necessary.

Societal Repercussions and Work-Related Consequences

Some participants discussed how preventive measures implemented during the COVID-19 pandemic also negatively affected the communication of individuals with normal hearing. For instance, Participant 5 believed that the pandemic brought public awareness to communication challenges and hearing loss: "…the hearing impaired would say, 'Well uh … I have trouble with the mask.' And the hearing person would say, 'Well, me too.' Then that … that normalizes it."

While Participants 2 and 6 reported minimal consequences on their work due to their ability to easily transition to telework, Participants 3 and 5 reported an increase in the time or energy needed for work, and Participants 1 and 5 expressed that communication with colleagues and clients was more difficult. Participant 4 experienced the most consequences of preventive measures on her work, ultimately requiring a medical leave due to anxiety and burnout. Categories and codes for the consequences of the COVID-19–related communication difficulties are listed in Table 4.

Discussion

The objective of the study was to qualitatively explore the communication experience of individuals with hearing loss while COVID-19 preventive measures were in place. Particularly, this research aimed to identify the barriers and facilitators to communication, and the psychosocial impacts of impaired communication perceived by individuals with hearing loss. Semistructured interviews were conducted and analyzed using qualitative content analysis. Results indicate that face masks and in-person work were associated with multiple barriers to communication, while measures that allowed for the transmission of visual information (e.g., transparent masks, physical distancing) were mainly perceived as facilitators to communication within the context of the pandemic. Transparent face masks, despite being greatly appreciated by participants, also presented some limitations that hindered their effectiveness and widespread use. Conversation partners and telecommunication technologies were linked to both barriers and facilitators to communication. Participants used various strategies to counteract communication challenges caused by preventive measures, but nevertheless identified psychosocial

Table 4. Categories and codes for Theme 3: consequences of the COVID-19–related communication difficulties.

Category	Codes
New or exacerbated negative emotions and psychosocial effects	• Anxiety
	• Apprehension
	• Embarrassment
	• Tiredness
	• Frustration
	• Isolation
	• Powerlessness
	• Reduced self esteem
Societal repercussions of COVID-19–related communication challenges	• Widespread impacts
	• Increased awareness
Consequences of preventive measures on communication at work	• Communication difficulties with clients
	• Communication difficulties with colleagues
	• Medical leave
	• Requiring more time and energy
	• Minimal consequences

impacts of these challenges that affected their personal life, well-being, and work.

Conversation Partners as Facilitators and Barriers to Communication

Familiarity with a person's voice consistently made communication easier and was perceived as a key facilitator when speech reading was not possible due to face masks. Conversely, communication without speech reading was more challenging when interacting with unfamiliar individuals, so participants often relied on family members to facilitate communication in these situations. Because of this familiarity effect, and possibly other factors (e.g., closer physical proximity, awareness of hearing loss), communication with family members was not perceived as particularly challenging even with masks or in noisy environments. Studies showed that challenges associated with hearing loss can lead to collateral effects for the primary conversation partners (Kamil & Lin, 2015), particularly for the spouse (Scarinci et al., 2008). Hearing loss has notably been linked to limitations in social life, increased burden of communication, lower relationship satisfaction, and poorer quality of life. Therefore, while it can be beneficial for individuals with hearing loss to depend on family members or spouses to enhance communication outcomes, it is crucial to recognize that these primary conversation partners may also experience additional consequences.

Some barriers to communication associated with conversation partners could be addressed through increased awareness and education. For instance, poor communication outcomes were often attributed to a lack of understanding about hearing loss and use of suboptimal communication strategies (e.g., repeating without reformulating, speaking louder without slowing down, overarticulating). This lack of awareness may be exacerbated by hearing loss being an invisible disability that is often less well understood by the general population (Carlson et al., 2022). Awareness campaigns could improve communication outcomes by drawing attention to hearing loss and educating people on appropriate strategies to communicate with individuals who have hearing loss, especially during a pandemic (Pinsonnault-Skvarenina et al., 2021). The results also highlight the importance of being able to assert the communication needs or to mention the hearing loss, which can be a common difficulty for many individuals with hearing loss because of stigma (Hétu et al., 1990; Southall et al., 2011). Stigma was already a common issue surrounding hearing loss before the pandemic, with different types of stigma being reported in the literature: witnessed, anticipated, self-experienced, and internalized (Rawool, 2018). Although it is difficult to ascertain from the present results the exact influence of the COVID-19 pandemic on stigmatization of hearing loss, participants often reported an increased internalized stigmatization mediated by alterations in self-perception (Wallhagen, 2010). Participants indeed commonly reported feeling less competent and less able to communicate, in some case even feeling that their sentiment of self-efficacy they had built over the years through rehabilitation had been shattered. Wallhagen (2010) also pointed out that health professionals and the media often reinforce stigma and that conversation partners can have positive and negative impacts on stigmatization by employing "supportive" or "unsupportive" behaviors. Thus, awareness campaigns may work to decrease stigmatization and support individuals with hearing loss in accepting their condition and advocating for their communication needs.

Regular and Transparent Face Masks

Regular face masks (i.e., cloth or surgical masks) were found to be the most impactful preventive measure because they obstructed the access to visual cues for speech reading, rendering communication tedious. By comparison, other preventive measures that do not remove visual information (e.g., face shields, fixed plastic partitions, physical distancing) were most often seen as facilitators to communication, even though they often lead to an increased sound attenuation. However, when these measures were combined with regular face masks, the combination of sound attenuation and impaired speech reading was a significant self-reported barrier to communication. Some authors already postulated that face masks may have a compounding effect when combined with other preventive measures (Galvin et al., 2022; Pinsonnault-Skvarenina et al., 2022). This is indeed a sentiment that was explicitly stated by our participants. Thus, face shields, plastic partitions, and physical distancing were seen as facilitators when used instead of regular face masks, and as barriers when used in addition to face masks. Participants were often frustrated by the cumulative effect of multiple preventive measures and often reported asking their conversation partner to lower their mask for their conversation when multiple measures were present. However, using multiple preventive measures can be more effective at reducing transmission of infectious diseases (Cheng et al., 2021; Chu et al., 2020). Health care professionals should keep this in mind to determine communication strategies that are not only effective but also respect the needs of both the client and the professional to remain protected from potential infections.

Face masks with transparent windows, which allow access to visual information, were seen as a better option and were greatly appreciated by participants. However, they also noted issues related to sound attenuation, comfort, and hindered visual information caused by movement, fogging, and light reflections. Both standard and windowed face masks attenuate frequencies above 1 kHz, but this effect attenuation is consistently greater for transparent masks (Corey et al., 2020; Cox et al., 2022). The material used for the transparent window has a significant impact on sound attenuation, with less dense and thinner materials having lower sound attenuation (Cox et al., 2022). Windowed mask design could be improved by carefully considering material choice and performing acoustic tests. Also, since transparent face masks have a minimal impact on the lapel microphone used by assistive listening systems (Corey et al., 2020), they could be combined with an assistive listening system to improve communication in settings where communication with people who have hearing loss is frequent or of particular importance, such as medical or educational settings. However, despite their clear benefits, participants rarely encountered transparent masks in public settings, which they attributed to the issues with comfort, cost, and awareness.

In-Person Work and Telecommunication for Work

COVID-19 preventive measures had a significant effect on the working experience of participants, with face masks being perceived as increasing the burden of communication with colleagues and clients. This was exacerbated by the synergistic effect of multiple preventive measures, noisy environments, and frequent changes in coworkers. Participants generally reported that impaired communication while working was time and energy consuming, often leading to fatigue, embarrassment, and frustration. This was notably the case for the group of participants who were hearing care professionals, a field where the COVID-19 pandemic had some profound disruptions on the workplace and on the provision of services (Manchaiah et al., 2022). Participants also reported experiences ranging from positive to distressing with the use of telecommunication technologies for telework. While some found videoconferences to be facilitators to communication because they transmit visual information and allow individuals to work in a calm environment, some reported challenges with background noise, audio and video quality, needing to adapt to new technologies, too many participants, identifying who is speaking, and videoconferences lasting too long. Some videoconferencing platforms have options that could help alleviate these issues, such as noise suppression, live captioning, or "show video of the speaker." Other nontechnological strategies such as being in a calm environment or taking frequent breaks may also be helpful. In previous studies, videoconferences were associated with a broad range of experiences, but were mostly perceived as inferior to in-person communication by people with hearing loss (Naylor et al., 2020; Teece et al., 2022). For instance, the Saunders and Roughley (2021) study on teleaudiology during the pandemic revealed that although audiologists were satisfied with the quality of care provided, they were mostly concerned about the negative impacts on communication. Our findings support the idea that multiple factors can either facilitate or hinder communication in videoconferences, leading to variability in the potential experiences. This variability can notably be attributed to contextual factors (e.g., number of participants, duration), to technological factors (e.g., audiovisual quality, available options), and to individual factors (e.g., proficiency with the videoconferencing platform and options). Despite the widespread adoption of videoconferencing during the COVID-19 pandemic, most studies primarily focus on their use for telehealth

(e.g., D'Onofrio & Zeng, 2021). As such, there remains a gap in the literature on the use of videoconferences by people with hearing loss in work and social settings.

Communication Strategies Used During the Pandemic

Participants mentioned multiple strategies that allowed them to improve communication with preventive measures. Communication strategies can be divided into three types: anticipation, repair, and maintenance strategies (Gagné & Jennings, 2008). All three types were reported by the participants. For example, bringing a relative when going out is an anticipation strategy, asking the communication partner to repeat is a repair strategy, and validating what was understood is a maintenance strategy. Pinsonnault-Skvarenina et al. (2022) found that individuals with hearing loss use anticipation strategy more frequently than those with normal hearing during a pandemic. Participants in our study explained that the additional communicational challenges during the pandemic led them to adopt anticipation strategies that they did not use before, such as calling before an appointment to inform the clinic of a hearing loss, bringing a relative when going out, wearing a badge saying "I read lips," or providing others with documentation on communication strategies. It is worth noting that some of these strategies also demonstrated self-advocacy by the participants. Possible change in the type and in the frequency of communication strategies being used could be explained by some strategies being less effective with the preventive measures (e.g., looking at the communication partner's face being ineffective with masks). This is supported by a comment from Participant 4 stating that all the efforts she had made during her life to learn to communicate using various communication strategies were "all for nothing" and that she now felt unable to communicate.

One of the most frequently discussed strategies was to disclose the hearing loss at the start of conversations with strangers or people previously unaware of the hearing loss. According to the participants, this requires a good level of hearing loss acceptance. This is consistent with findings that disclosing hearing loss can lead to negative consequences such as stigmatization (e.g., Hétu et al., 1990) and self-stigmatization (da Silva et al., 2023). However, disclosing one's hearing loss can also lead to positive outcomes, such as providing an explanation for communication breakdowns so that they are not misinterpreted as other issues like not paying attention or cognitive conditions (Tye-Murray et al., 2009). Indeed, the decision to disclose one's hearing loss influences the visibility dimension of stigma as defined by Rawool (2018), simultaneously drawing attention to a condition that was mostly seen as invisible by the participants while mitigating the assumed disability arising from the communication difficulties. There are multiple factors that contribute to the decision to disclose or not one's hearing loss (Southall et al., 2011). However, in our study, two factors seemed to strongly determine if participants chose to disclose their hearing loss: (a) the burden of communication and (b) the perceived importance of the communication. First, participants tended not to disclose the hearing loss when they were able to get by relatively well in casual settings such as the grocery store but tended to disclose their hearing loss when communication breakdowns occurred. However, this was not always associated with improved communication, with participants often reporting that their conversation partner used inadequate strategies, if any. Second, participants also tended to disclose their hearing loss more often in more important settings, such as during health care visits. Stevens et al. (2019) found that primary care settings saw a high self-disclosure rate of 93% among people with hearing loss, but only 30% of health service providers made accommodations for their hearing loss. Our study also revealed that participants often experienced health care providers who did not adapt their communication to the hearing loss. Regarding health care, it is worth noting that some common communication strategies (e.g., speaking louder, using an interpreter) may sometimes raise concerns about confidentiality.

Consequences of Impaired Communication

The participants in our study reported various psychosocial consequences stemming from their communication difficulties during the pandemic, including anxiety, embarrassment, frustration, powerlessness, and reduced self-esteem. These emotions were already often associated with hearing loss before the pandemic (Bennett et al., 2022). Nonetheless, participants reported an increase or a new onset of these feelings during the pandemic, such as feelings of frustration and powerlessness arising from the inability to effectively communicate with others due to pandemic-related preventive measures. The pandemic has been associated with adverse effects on mental health and well-being among various populations such as individuals living with long-term physical health conditions. These individuals have reported similar negative emotions stemming from factors like social isolation and heightened health risks (Fisher et al., 2021). These findings suggest that different vulnerable groups may experience comparable mental health symptoms despite being affected through different channels, highlighting the necessity of accessible mental health services in such circumstances.

Participants often reported experiencing fatigue, mainly attributed to the communication challenges in their

work. Since all participants were currently employed, it remains unknown whether retired or unemployed adults with hearing loss experienced comparable communication-related fatigue or not. The communication difficulties seemed to have led to increased isolation and withdrawal, with participants reporting a lower willingness to engage in social activities. Previous research has shown that hearing loss is already associated with loneliness and social isolation (Shukla et al., 2020), which can increase the risk of dementia and late-life depression in older adults (Rutherford et al., 2018). Our results suggesting that social isolation was exacerbated during the pandemic are consistent with previous research (Saunders et al., 2021). However, it remains unclear to what extent various factors, such as frustration, embarrassment, increased fatigue, or stay-at-home guidelines, may have contributed to social isolation. Despite reporting increased social isolation, participants rarely reported feelings of loneliness. Given that our participants frequently discussed their interactions with work colleagues, spouses, family, and friends, it is possible that these regular social connections had a protective effect against loneliness. It is worth noting that since social isolation and loneliness were widespread issues during the pandemic, local and online communities often explored new ways to foster social connectedness and offer each other support during this time (Smith & Lim, 2020). This societal context may have provided a sense of community and support that prevented the feeling of loneliness despite social isolation. However, when it came to their communication difficulties, participants did not feel supported and often reported feeling forgotten, which may have contributed to their recurring feelings of frustration and powerlessness. Still, some participants thought that the pandemic led to an increasing level of awareness toward hearing and communication challenges.

These findings highlight the crucial role that effective communication plays in the psychosocial well-being of individuals with hearing loss and the negative consequences that can arise from new communication barriers being introduced. Clinicians working with individuals who have hearing loss should be aware of these consequences and consider evaluating the psychosocial well-being of their clients, particularly during times of crisis. Studies and guidelines have emphasized the importance of addressing the psychosocial consequences of hearing loss in audiological rehabilitation using approaches that are perceived as beneficial and acceptable to clients (American Speech-Language-Hearing Association, 2018; British Society of Audiology, 2016). Clinicians can work with their clients to identify strategies and interventions to mitigate the negative effects of barriers to communication, to address the negative feelings caused by communication challenges, and to refer to other rehabilitation services when needed. Recent guidelines have offered recommendations to ensure that the social–emotional well-being of the client is adequately addressed during the audiologic rehabilitation process using a family-centered approach and practices such as social–emotional assessment, goal setting, counseling, and monitoring (Timmer et al., 2023). Two of the six participants interviewed in our study sought rehabilitation services during the pandemic, indicating that rehabilitation interventions are indeed useful for individuals with long-term hearing loss when facing new barriers to communication in their environment.

Study Limitations

The main limitation of the study was its small sample size. Since the study was designed early on as a follow-up to a larger scale survey (Pinsonnault-Skvarenina et al., 2022), we chose to only recruit previous participants of that study. However, keeping only the participants with hearing loss and excluding those that did not consent to being contacted for a follow-up interview limited our target population to around 86 individuals. At this point, a higher sample size was expected, but only six participants were able to be recruited. This low response rate may be attributed to important and unforeseen delays (e.g., up to 8 months) between the participant's involvement in the first study and the recruitment e-mail for this study being sent. This could have led to changes in the availability or willingness to continue their engagement. There was also the possibility that some e-mails were inadvertently flagged as spam or overlooked.

While the sample size was small, we still found that the results showed a high level of agreement between participants. This could be attributed to the sample forming a homogenous group that is not fully representative of the diverse population that is people with hearing loss. First, all our participants were younger or middle-aged adults. It is possible that recruiting participants via e-mail skewed the sample towards this younger age. Since all participants were working adults, this allowed us to explore how the work of people with hearing loss was disrupted by COVID-19. However, our results cannot provide any insight on the reality of older or retired individuals, which may have a different perspective than our participants because of lifestyle difference, higher prevalence of hearing loss, and greater vulnerability to COVID-19. Second, the sample was predominantly composed of women. It is known that sex and gender differences can influence hearing loss factors and psychosocial outcomes (Reavis et al., 2023). Third, our sample only included individuals with moderate or severe self-reported hearing loss and who were experienced with hearing devices. This limits the generalizability of our findings to those with milder hearing

loss or to those who do not use or have limited experience with hearing aids. This is particularly significant as the severity of hearing loss and experience with hearing aids may be associated with reliance on lipreading for communication, which was heavily impaired by face masks. Fourth, all participants had a college education or higher, meaning that participants may have had more financial or social resources than average.

It is also worth noting that participants may not have only considered their own experience during their interviews, but also discussed their perception of the experience of other individuals with hearing loss, such as significant others, family members, members of their community, or even clients for the group of hearing care professionals. The recruitment methods may have introduced a participation bias, as those who chose to participate in the study may have different experiences or characteristics than those who did not. For example, some potential participants may have been reluctant to partake in videoconference interviews because of their hearing loss, which could have resulted in a biased sample composed of participants who had a more positive outlook on videoconference. Individuals who were more active in hearing loss advocacy could also have been more likely to participate in the study. Finally, the use of predetermined themes (i.e., barriers, facilitators, and impacts) can introduce bias in the interviews, analysis, and results. Participants may have been more likely to discuss experiences that fit within these themes, rather than discuss their experiences in a more open-ended manner. This could have led to an incomplete or skewed understanding of the experiences of individuals with hearing loss during the COVID-19 pandemic.

Conclusions

In our study, adults with hearing loss reported that COVID-19 preventive measures significantly impaired communication. Face masks were seen as the most impactful preventive measure, particularly when combined with other measures (e.g., fixed plastic partitions, physical distance) and noisy environments (e.g., at work, at the grocery store). However, measures that allowed for the transmission of visual information (e.g., transparent masks, physical distancing) were mainly seen as facilitators to communication in the context of the pandemic. Although participants greatly appreciated transparent face masks, they also thought some limitations hindered their effectiveness and widespread use (e.g., comfort, cost, fogging). Participants generally had a positive attitude toward videoconferences but noted that proper strategies were crucial (e.g., calm environment, good microphone, good connection, few participants). Awareness of hearing loss and knowledge of effective communication strategies by conversation partners were perceived as key determinants of communication quality. Overall, 1 year after the implementation of preventive measures, participants reported increased anxiety, fatigue, and social isolation because of impaired communication.

Author Contributions

Loonan Chauvette: Conceptualization (Supporting), Data curation (Lead), Formal analysis (Lead), Investigation (Lead), Visualization (Lead), Writing – original draft, Writing – review & editing (Lead). **Alexis Pinsonnault-Skvarenina**: Conceptualization (Supporting), Formal analysis (Supporting), Supervision (Equal), Visualization (Supporting), Writing – review & editing (Supporting). **Andréanne Sharp**: Conceptualization (Supporting), Methodology (Equal), Writing – review & editing (Supporting). **Jean-Pierre Gagné**: Conceptualization (Supporting), Methodology (Equal), Writing – review & editing (Supporting). **Adriana Bender Moreira Lacerda**: Conceptualization (Equal), Methodology (Equal), Writing – review & editing (Supporting). **Mathieu Hotton**: Conceptualization (Equal), Formal analysis (Supporting), Methodology (Equal), Supervision (Equal), Visualization (Supporting), Writing – review & editing (Supporting).

Ethics Statement

The study was approved by the aging-neuroimaging research ethics committee of the CIUSSS du Centre-Sud-de-l'Île-de-Montréal (CERVN 20–21-16; 2020-07-22). Informed consent was obtained from all participants involved in the study.

Data Availability Statement

The data sets generated and analyzed during this study are not publicly available because they contain information that could compromise the privacy of research participants but are available from the corresponding author on reasonable request.

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Appendix (p. 1 of 2)

Original and Translated Interview Guides

[Original French version]

Mise en contexte: Vous avez complété un sondage en ligne qui portait sur les effets de l'utilisation des mesures de prévention de la propagation de la COVID-19 sur la communication. Vous avez accepté de nous rencontrer pour nous parler plus en profondeur de votre expérience au cours de la pandémie. La présente entrevue vise donc à récolter vos commentaires à ce sujet. La rencontre devrait durer entre 45 minutes. Il sera possible de prendre des pauses en cours de route, si vous en ressentez le besoin. Avez-vous des questions avant de commencer?

1) Tout d'abord, pourriez-vous me parler en général de votre expérience au cours de la pandémie, par rapport aux mesures de prévention et à leur effet sur la communication

a. Comment ça s'est passé?
b. Comment vous avez trouvé cela?
c. Quelles sont vos premières réflexions?
d. Quelles sont les situations les plus difficiles que vous ayez rencontrées?

2) Plus spécifiquement, quelle a été votre expérience pour la communication (p. ex.: situations difficiles rencontrées et leur contexte) avec chacune des mesures de prévention suivantes:

a. Le masque
b. La visière
c. L'écran en plexiglas
d. La distanciation physique
e. Les technologies de communication à distance

3) Pour chacune des mesures de prévention mentionnées à la question précédente, voyez-vous des avantages ou des inconvénients particuliers pour la communication dont vous voudriez me parler? Est-ce que ces mesures étaient utiles ou nuisibles pour la communication?

4) Quels changements dans vos difficultés de communication avez-vous remarqué entre le début de la pandémie et aujourd'hui?

a. Comment l'évolution des mesures sanitaires a affecté votre communication dans le temps (ex. plexiglass, ajout des masques)?
b. Est-ce que les gens avec qui vous communiquez se sont adaptés depuis le début de la pandémie?
c. Est-ce que vous vous êtes adaptés aux mesures de prévention et de quelles façons?

5) Advenant le cas d'une autre pandémie comparable dans l'avenir, quelles seraient vos recommandations quant à l'utilisation des mesures de prévention, pour que l'impact sur la communication soit réduit ou éliminé? Y aurait-t-il des moyens ou des stratégies auxquels vous pensez et qui pourraient être utiles pour favoriser la communication en contexte de pandémie?

[Translated version]

Context: You have previously completed an online survey that focused on the effects of using COVID-19 preventive measures on communication. You have agreed to meet with us to discuss your experiences during the pandemic in more depth. This interview aims to gather your insights on this subject. The meeting is expected to last approximately 45 minutes. We can take breaks along the way if you want to. Do you have any questions before we begin?

1) First, could you talk to me about your general experience during the pandemic regarding the preventive measures and their effect on communication?

a. How did it go?
b. How did you find it?
c. What are your initial thoughts?
d. What were the most challenging situations you encountered?

Appendix (p. 2 of 2)

Original and Translated Interview Guides

2) More specifically, what was your experience with communication (e.g., difficult situations or context) for each of the following preventive measures:

a. Face masks
b. Face shields
c. Fixed plastic partitions
d. Physical distancing
e. Remote communication technologies

3) For each of the preventive measures mentioned in the previous question, do you see any advantages or disadvantages for communication that you would like to discuss? Were these measures helpful or detrimental to communication?

4) What changes in your communication difficulties have you noticed between the beginning of the pandemic and now?

a. How has the evolution of sanitary measures affected your communication over time (e.g., fixed plastic partitions, arrival of masks)?
b. Have the people you talk to adapted since the beginning of the pandemic?
c. Have you adapted to the preventive measures, in what ways?

5) In the event of another comparable pandemic in the future, what recommendations would you have regarding the use of preventive measures to minimize or eliminate the impacts on communication? Are there any methods or strategies that you think of and could be useful in promoting communication during a pandemic context?