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Adults With Hearing Loss Demonstrate Resilience During COVID-19 Pandemic: Applications for Postpandemic Services

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ABSTRACT

Background: The COVID-19 pandemic has produced unique challenges for persons with hearing loss. There is a unique concern that adults with hearing loss may be more susceptible to isolation than adults with normal hearing.
Purpose: This study explored the impact of the COVID-19 pandemic on the well-being of older adults with and without hearing loss.
Research Design: This was a longitudinal study with pre-COVID-19 and six mid-COVID-19 interviews, spanning from March 1, 2020, to October 31, 2020.
Study Sample: The study enrolled 12 participants with hearing aids and 12 with cochlear implants aged 55–80 years that were compared to 18 age-matched adults with hearing within normal limits.
Data Collection and Analysis: Surveys were completed to evaluate the impact of time alone and loneliness, social contact, depression, and the impact of masks on hearing. A mixed-effects statistical model was used to analyze each question.
Results: Participants commonly reported stress and anxiety during monthly video calls. Adults with varying degrees of hearing loss reported decreased social interaction and increased stress during the pandemic, similar to the rates observed by participants with healthy hearing. Face coverings were commonly reported to affect the intelligibility of conversational speech. Participants with hearing loss found satisfactory methods for maintaining social connection during the pandemic that they hope will continue once restrictions ease fully.
Conclusions: Participants from the hearing loss groups in this study were frustrated by challenges posed by facial masks and were resilient in their ability to cope with COVID-19 and found the use of technology to be helpful. Audiologists are encouraged to use these successful electronic means of connecting with their patients even after restrictions are fully lifted.

In the early months of 2020, severe acute respiratory syndrome coronavirus 2, also known as SARS-CoV-2 or COVID-19, quickly brought normal activities of daily life to a sudden halt. In the United States, state governors instructed residents not to leave their homes except for mandatory activities such as buying groceries or serving in an essential role (e.g., health care workers). Many older adults limited outings, family visits, and social activities out of concern for transmitting this contagious and sometimes very serious disease. Schools, universities, houses of worship, and other community activities were required to shift to virtual meetings. Public health campaigns encouraged social distancing, hand washing, and face coverings. The pandemic unfolded without any sense of how long it would take to eradicate the disease, and despite rapid scientific advances in development of effective vaccines, residents grew restless and fatigued.

Prior to the pandemic, social isolation leading to loneliness was already a concern for older adults (see

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Courtin & Knapp, 2017; Shukla et al., 2020, for a scoping review.) Loneliness, the sense of loss that at times happens because of a discrepancy between actual and desired levels of social connection, can have negative health consequences (e.g., Peplau & Perlman, 1982; Steptoe et al., 2013). Social isolation may increase an older adult's risk of mental health, cardiovascular, autoimmune, and neurocognitive problems (Gerst-Emerson & Jayawardhana, 2015; Santini et al., 2020). An individual's dissatisfaction with the frequency and closeness of their social contacts may be more directly related to unwanted outcomes than simple measures of isolation. As Pichora-Fuller et al. (2015) describe, a healthy sense of social support emphasizes quality over quantity of relationships providing multiple facets of emotional support, advice, and other assistance.

Many older adults depend on leaving home for social contact through activities like playing cards, volunteering, attending an exercise class, and attending worship services (Armitage & Nellums, 2020; National Institute of Aging, 2017). The unique stress of the pandemic-related social restrictions placed extreme stresses on some in this population, causing some to question the risk assessment of isolation versus exposure to the disease (e.g., Plagg et al., 2020). Not every important social activity can be accomplished well by remote communication methods, and even for those situations that might be amenable to video connection, participants must have consistent Internet access and the knowledge and support to join virtual activities. Connection problems can lead to great disappointment and frustration. In addition to the loss of in-person social interactions, COVID-19 resulted in a range of losses reported by many, including income, a sense of structure and routine, motivation, and even one's self-worth (Williams et al., 2020).

Independent of the pandemic, age-related hearing loss is another common public health concern (Ciorba et al., 2012). Approximately two in three American adults over the age of 70 years live with hearing loss (Lin et al., 2011). Hearing loss has been associated with higher rates of loneliness (Huang et al., 2020; Shukla et al., 2020) and depression (Brewster et al., 2018; Kim et al., 2017). Depression and anxiety rates have been found to be significantly higher for adults with self-reported hearing loss and vision loss, with the highest rates for dual sensory loss (Cosh et al., 2018; Pardhan et al., 2021). Hearing loss can be very frustrating and embarrassing in large group or noisy settings (Shukla et al., 2020).

An additional challenge to effective communication during the pandemic has been the frequent use of facial masks. The public health recommendation to wear a face covering while speaking with people from outside of one's household introduced new challenges for clinical audiologists and patients alike. While effective at reducing the transmission of airborne particles, face coverings obscure lipreading and other visual cues (Cohn et al., 2021), attenuate frequencies above 1 kHz (Corey et al., 2020), and impair speech intelligibility especially in the presence of noise (Brown et al., 2021). This has long been problematic in hospitals and surgical suites, and the COVID-19 pandemic extended this to most public settings. Clear face shields have limitations due to sound attenuation and fogging of the shield such that lipreading cues continue to be difficult to see (Brown et al., 2021). Cohn et al. (2021) demonstrated that clear speech counteracted the effect of attenuation, suggesting that talkers may make clarity adjustments while wearing a mask. It appears that mask-wearing may be a common practice well into the future.

Overall, it is expected that the circumstances of the pandemic present unique and significant challenges to those with hearing loss. This study is part of a larger study at the University of Minnesota (Wu et al., 2021), exploring the impact of the COVID-19 pandemic on older adults with hearing and vision losses. The participants with hearing loss did not have significant vision loss, and the participants with vision loss did not have significant hearing loss. Although not reported in this article, people with vision loss were expected to report challenges related to the sense of touch and maintaining social distancing. People with hearing loss were expected to struggle understanding speech while wearing face coverings.

Method

Ethics Statement

Prior to data collection, this experiment was reviewed and approved by the University of Minnesota Institutional Review Board. Electronic consent was obtained by all participants. Each participant was assigned a code to maintain anonymity.

Participants

Adults over the age of 55 years were invited to participate. Inclusion criteria included primary residence in the Minneapolis–St. Paul metropolitan area, fluency in English, and the absence of significant health comorbidities and cognitive concerns (score of 11 or better on the Montreal Cognitive Assessment [MoCA]; Nasreddine et al., 2005). Due to the inability to meet in person, the MoCA was conducted over phone or video call. The tester checked to make certain that the participant could hear the instructions clearly. Cohabitating partners were not allowed to participate. Participants were assigned to one of the following groups: hearing aid, cochlear implant, visual impairment, and healthy hearing. This article will

Table 1. Demographics of the three groups across sessions and number of participants in each group across the seven sessions.

Group	M_{age} (*SD*)	Session 1 (March 2020)	Session 2 (April 2020)	Session 3 (May 2020)	Session 4 (June 2020)	Session 5 (July–August 2020)	Session 6 (September 2020)	Session 7 (October 2020)
Healthy hearing	67.7 yrs (6.0 yrs)	*n* = 18	*n* = 18	*n* = 18	*n* = 18	*n* = 18	*n* = 17	*n* = 17
Cochlear implant	69.7 yrs (5.7 yrs)	*n* = 12	*n* = 12	*n* = 12	*n* = 12	*n* = 12	*n* = 12	*n* = 12
Hearing aid	73.1 yrs (5.5 yrs)	*n* = 12	*n* = 12	*n* = 12	*n* = 12	*n* = 12	*n* = 12	*n* = 9

Note. Yrs = years.

focus on the adults using hearing aids and cochlear implants, as well the adults who reported normal vision and hearing sensitivity.

Table 1 displays the demographics and number of participants in each group across the seven sessions. Twelve participants using hearing aids were recruited. There were seven women and five men with a mean age of 73.1 years (*SD* = 5.5 years). Twelve participants using cochlear implants were recruited. There were 10 women and two men with a mean age of 69.7 years (*SD* = 5.7 years). Lastly, 18 adults with no vision or hearing concerns (healthy hearing) were recruited. There were 11 women and seven men with a mean age 67.7 years (*SD* = 6.0 years). Some participants had additional health conditions that they reported in addition to sensory loss (see Table 2).

Stimuli and Procedure

The research team developed a qualitative interview through Qualtrics to be conducted every 4–8 weeks by video call or phone call. The Patient Health Questionnaire (PHQ-9) was included in this interview. The questions are in the Appendix. Interviews were never conducted in person. Once it became clear that the pandemic was lasting many months, the decision was made to pause data collection after the eighth session. Participants received a digital gift card as compensation.

Data Analysis

A mixed-effects model was used to evaluate differences between groups (healthy hearing, cochlear implant, and hearing aid) and across the seven sessions (March, April, May, June, end of July to early August, September, and October of 2020; Statistical Package for Social Sciences [SPSS] Version 27.0 [SPSS Inc.]). Several domains of well-being were addressed each session (see Appendix), including time spent alone, sense of loneliness, depression using the PHQ-9, the amount of in-person and electronic social interaction and their satisfaction with this interaction, and the level of worry about the ability to hear someone wearing a face mask. Interactions were adjusted for using Bonferroni pairwise comparisons.

Table 2. Other health conditions.

Health condition	*n* (total *N* = 42)
Diabetes	2
Chronic lung disease	1
Cardiovascular disease	5
Immunocompromised condition	1
Chronic renal disease	1
Other	19
No, I don't have any other health conditions	19

Results

Time Alone and Loneliness

Participants were asked, "In the past week, what is the average number of waking hours per day you spent alone?" On average, adults with cochlear implants spent 7.8 hr (*SE* = 0.5 hr) alone, adults with hearing aids 6.4 hr (*SE* = 0.5 hr), and adults with healthy vision and hearing 7.1 hr (*SE* = 0.4 hr). Results revealed the three groups spent a similar amount of time alone, $F(2, 267) = 1.9$; $p = .15$; see Table 3). There were also no significant differences across sessions, $F(6, 267) = 1.14$; $p = .34$.

Participants were also asked, "How strong is your sense of loneliness?" on a 5-point scale ranging from 1 = *not at all* to 5 = *very strong*. Results, shown in Figure 1, revealed that there was a significant difference in reported loneliness between the groups, $F(2, 267) = 14.7$; $p < .001$. Bonferroni pairwise comparisons revealed that adults with healthy hearing reported being lonelier than adults with hearing aids ($p < .001$) or cochlear implants ($p < .01$). This was true across sessions, with no effect of session number.

Depression

Participants completed the PHQ-9 (Kroenke et al., 2001), and the overall score for depression was compared across groups. Results revealed a significant difference between the three groups, $F(2, 267) = 4.57$; $p = .011$. The

Table 3. Conditions with significant results for main effect and interactions.

Condition	Main effect (*M*; *SE*)	Interactions (mean difference; *SE*)	*F* value	*p* value
Sense_Loneliness	Group		$F(2, 267) = 14.7$	$p < .001$
	HH: 1.46 (0.1)			
	CI: 1.56 (0.1)			
	HA: 2.08 (0.08)			
		HH × CI: 0.63 (0.13)		$p < .001$
		HH × HA: 0.53 (0.13)		$p < .001$
Depression	Group		$F(2, 267) = 4.57$	$p = .011$
	HH: 3.75 (0.32)			
	CI: 2.71 (0.40)			
	HA: 2.27 (0.40)			
		HH × HA: 1.47 (0.52)		$p = .014$
In_Person_Satisfaction	Session		$F(6, 266) = 7.06$	$p < .001$
	Session 1: 4.69 (0.18)			
	Session 2: 3.36 (0.18)			
	Session 3: 3.32 (0.18)			
	Session 4: 3.57 (0.18)			
	Session 5: 3.52 (0.18)			
	Session 6: 3.47 (0.18)			
	Session 7: 3.54 (0.19)			
		Session 1 × Session 2: 1.32 (0.25)		$p < .001$
		Session 1 × Session 3: 1.36 (0.25)		$p < .001$
		Session 1 × Session 4: 1.11 (0.25)		$p < .001$
		Session 1 × Session 5: 1.17 (0.25)		$p < .001$
		Session 1 × Session 6: 1.21 (0.25)		$p < .001$
		Session 1 × Session 7: 1.15 (0.26)		$p < .001$
Electronic_Interaction	Group		$F(2, 267) = 5.09$	$p = .007$
	HH: 23.64 (3.02)			
	CI: 8.50 (3.69)			
	HA: 18.93 (3.76)			
		HH × CI: 15.14 (4.77)		$p = .005$
Electronic_Satisfaction	Session		$F(6, 262) = 2.55$	$p = .02$
	Session 1: 4.39 (0.14)			
	Session 2: 3.71 (0.14)			
	Session 3: 3.93 (0.14)			
	Session 4: 3.97 (0.14)			
	Session 5: 3.79 (0.14)			
	Session 6: 3.88 (0.14)			
	Session 7: 4.09 (0.15)			
		Session 1 × Session 2: 0.68 (0.20)		$p = .014$
		Session 1 × Session 5: 0.61 (0.20)		$p = .049$
Support_Accessibility	Group		$F(2, 258) = 6.97$	$p = .001$
	HH: 4.64 (0.06)			
	CI: 4.37 (0.08)			
	HA: 4.78 (0.08)			
		HH × CI: 0.27 (0.10)		$p = .023$
		CI × HA: 0.41 (0.11)		$p < .001$
	Session		$F(6, 258) = 2.38$	$p = .03$
	Session 1: 4.91 (0.11)			
	Session 2: 4.55 (0.11)			
	Session 3: 4.59 (0.12)			
	Session 4: 4.64 (0.11)			
	Session 5: 4.45 (0.11)			
	Session 6: 4.68 (0.12)			
	Session 7: 4.36 (0.12)			
		Session 1 × Session 7: 0.55 (0.16)		$p = .02$

(*table continues*)

significant difference occurred between the adults with healthy hearing and adults with hearing aids ($p = .014$). The adults with healthy hearing had poorer overall scores on the PHQ-9 questionnaire ($M = 3.75$; $SE = 0.32$) compared to adults with hearing aids ($M = 2.27$; $SE = 0.40$).

Social Interactions

Another question asked, "In the past week, how many different people did you interact with in-person (closer than 6 feet)?" The median number of interactions were six for the adults with healthy hearing, eight for

Table 3. *(Continued).*

Condition	Main effect (*M*; *SE*)	Interactions (mean difference; *SE*)	*F* value	*p* value
Support_Sufficient	Session Session 1: 4.63 (0.16) Session 2: 3.66 (0.16) Session 3: 3.94 (0.17) Session 4: 3.72 (0.16) Session 5: 3.75 (0.16) Session 6: 3.72 (0.16) Session 7: 3.86 (0.17)		$F(6, 257) = 4.46$	$p < .001$
		Session 1 × Session 2: 0.96 (0.22)		$p < .001$
		Session 1 × Session 4: 0.90 (0.23)		$p = .02$
		Session 1 × Session 5: 0.88 (0.22)		$p = .02$
		Session 1 × Session 6: 0.91 (0.23)		$p = .02$
		Session 1 × Session 7: 0.76 (0.23)		$p = .02$
Worry_Masks	Group HH: 2.05 (0.11) CI: 4.48 (0.13) HA: 3.11 (0.14)		$F(2, 227) = 100.38$	$p < .001$
		HH × CI: 2.43 (0.17)		$p < .001$
		HH × HA: 1.06 (0.17)		$p < .001$
		CI × HA: 1.37 (0.19)		$p < .001$

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

those with hearing aids, and 10 for those with cochlear implants (see Table 4 for range and median across session). Results revealed no significant differences between groups, $F(2, 267) = 1.58$; $p = .21$ or sessions, $F(6, 267) = 1.52$; $p = .17$.

Participants were asked, "How satisfied are you with the amount of in-person social interaction you've had in the past 7 days?" on a 5-point scale ranging from 1 = *very dissatisfied* to 5 = *very satisfied*. Results revealed average satisfaction ratings of 3.61 with no significant differences between groups, $F(2, 266) = 2.10$; $p = .13$. There was, however, a significant difference in longitudinal satisfaction with interactions, $F(6, 266) = 7.01$; $p < .001$. Bonferroni pairwise comparisons revealed a significant difference between Session 1 ($M = 4.67$) and every session during the pandemic (Session 2 [$M = 3.31$], Session 3 [$M = 3.26$], Session 4 [$M = 3.56$], Session 5 [$M = 3.5$], Session 6 [$M = 3.45$], Session 7 [$M = 3.53$]; $p < .001$ for all sessions). This, not surprisingly, indicates that participants were more satisfied with in-person interaction pre- versus postpandemic.

Another interview question posed, "In the past week, how many different people did you interact with electronically (voice or video)? E-mail or text are not included." Results shown in Table 5 revealed that adults with healthy hearing reported a median of 14 electronic interactions, while adults with hearing aids reported 10, and adults with cochlear implants reported six. There was an overall difference in the number of electronic social contact between the three groups, $F(2, 267) = 5.09$; $p = .007$. Bonferroni pairwise comparisons revealed those using cochlear implants had less electronic social contact than the adults with healthy hearing ($p = .005$).

Figure 1. Mean and ± 1 *SD* for sense of loneliness by group. A 1 indicates *not at all* and 5 indicates *very strong*.

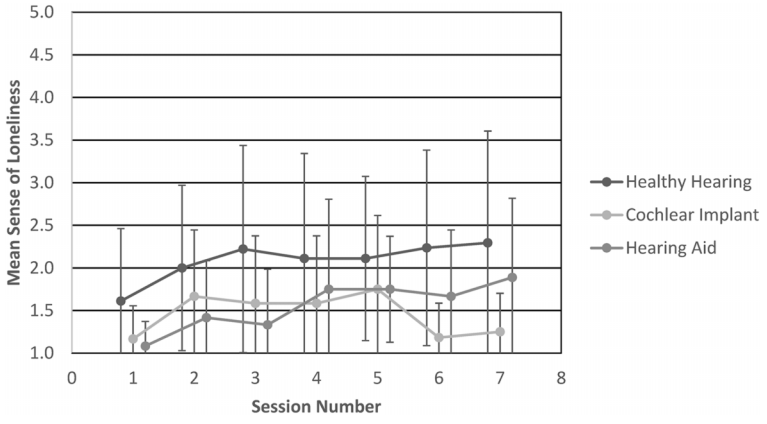


Table 4. Amount of in-person social interactions over the past week in each of the seven sessions.

Session	Range	*Mdn*	IQR
Baseline (March 2020)	2–40000	20	51
Session 2 (April 2020)	0–50	3.5	5
Session 3 (May 2020)	0–20	5.5	7
Session 4 (June 2020)	0–75	10	9
Sessions 5 (July–August 2020)	0–60	6	11
Session 6 (September 2020)	1–3000	7	15
Session 7 (October 2020)	0–400	7.5	11

Note. Some participants volunteered and interacted a large amount of people in busy public venues.

Participants were then asked, "How satisfied are you with the amount of electronic social interaction you've had in the past 7 days?" on a 5-point scale ranging from 1 = *very dissatisfied* to 5 = *very satisfied*. Despite the difference in the number of interactions, the groups were equally satisfied (mean satisfaction rating of 3.97) with their electronic social interaction, $F(2, 262) = 1.40$; $p = .25$. Poorer sound quality of the phone and video calls was reported by adults with hearing aids, but this did not appear to affect their satisfaction with using electronic technology. There was a significant difference in satisfaction with electronic communication across sessions, $F(6, 262) = 2.55$; $p = .02$, where there was a significant difference between Session 1, the prepandemic, and Session 2 when the pandemic started ($p = .014$) and a marginal difference between prepandemic Session 1 and Session 5 (around July of 2020; $p = .049$). This suggested a trend toward decreased satisfaction as the pandemic continued for months.

Participants were also asked about support and interest group accessibility and their satisfaction with this accessibility. Specifically, participants were asked, "How accessible are remote methods for accessing support groups?" on a 5-point scale ranging from 1 = *very inaccessible* to 5 = *very accessible*. Results revealed average ratings of 4.56 with a significant difference between groups, $F(2, 258) = 6.97$; $p = .001$, and session, $F(6, 258) = 2.38$; $p = .03$. Pairwise comparisons revealed that those with hearing aids ($p < .001$) and healthy hearing ($p = .023$) thought support groups were more accessible than those with cochlear implants. Pairwise comparisons for session revealed a significant difference between Session 1 (prepandemic) and Session 7 (October 2020; $p = .02$). This indicates that participants felt access to support and interest groups was poorer as the pandemic persisted. Participants were asked, "Overall, are those methods of communication sufficient for your needs?" for support groups on a 5-point scale ranging from 1 = *very insufficient* to 5 = *very sufficient*. Results indicated a rating of 3.95 suggesting some degree of sufficiency. There were no significant differences in answers between the groups, $F(2, 257) = 2.49$; $p = .085$, but there was a significant difference for session, $F(6, 257) = 4.46$; $p < .001$. Bonferroni pairwise comparison results revealed that there was a significant difference between Session 1 (prepandemic) and all sessions (Session 2, $p < .001$; Sessions 4–7, $p = .02$) except for Session 3 (May 2020; $p = .06$). This indicates that participants did not feel methods of communication were sufficient to meet their needs for support and interest groups during the majority of the pandemic.

Table 5. Amount of electronic social interactions over the past week in each of the seven sessions.

Session	Range	*Mdn*	IQR
Baseline (March 2020)	0–75	5	8
Session 2 (April 2020)	0–100	10	20
Session 3 (May 2020)	0–135	12	14
Session 4 (June 2020)	1–80	11	16
Session 5 (July–August 2020)	0–500	14.5	22
Session 6 (September 2020)	0–40	12	16
Session 7 (October 2020)	0–100	15	22

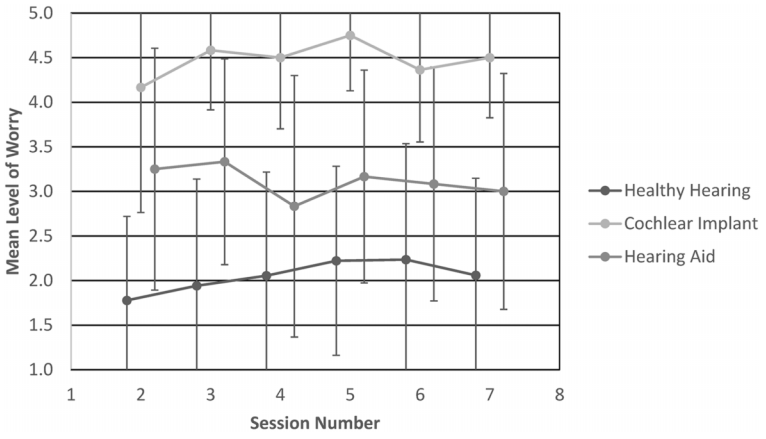
Worry About Ability to Hear With Masks

Participants were asked on a 5-point scale, "I worry that it can be difficult to understand someone talking to me when they are wearing a face mask," with 1 = *not at all typical of me* (indicating low levels of worry) to 5 = *very typical of me* (indicating high levels of worry). Consistent with hearing sensitivity, results shown in Figure 2 revealed average ratings of 2.05 (healthy hearing), 3.12 (hearing aid), and 4.49 (cochlear implant). A significant difference was reported between the groups, $F(2, 227) = 100.38$; $p < .001$. Pairwise comparisons revealed that adults with cochlear implants were more concerned about hearing someone with a face mask than adults with hearing aids ($p < .001$), and they were more concerned than adults with healthy hearing ($p < .001$).

Discussion

This project has explored the impact of the COVID-19 pandemic on the population with hearing loss. This experience has taught many lessons in many sectors of society, and the field of clinical audiology is no exception. One lesson is that face coverings, while necessary to reduce the transmission of contagious illnesses, have a strong detrimental effect on speech communication. Not only do they attenuate speech signals, but they remove speechreading cues helpful for intelligibility, emotion, and nuance. Additionally, the increased social distance that was encouraged further exacerbated these challenges. In cases where a participant asked for a face covering to be

Figure 2. Mean and ± 1 *SD* level of worry about hearing speech with masks by group. A 1 indicates *not at all typical of me* (low worry) and a 5 indicates *very typical of me* (high worry).



removed, misunderstandings were reported. These participants expressed that they wanted to see the person's mouth, not abandon all use of face coverings. Mask wearing may persist even after infection levels recede, and this communication barrier for individuals with hearing loss is an important consideration.

Communicating through facemasks can have both negative and positive effects. Adults with hearing loss, particularly those using cochlear implants, expressed that they felt very challenged to carry on a conversation, yet the masks also lessened the embarrassment felt by asking someone to repeat themselves because many more people with normal hearing also struggled to hear. To compensate for the attenuation of face coverings, programming parameters and remote microphone technology have been suggested (e.g., Lafargue & Stern, 2021). Our data suggest that these should be considered for all patients with hearing loss, as mask wearing may be common for years to come.

Another lesson of the pandemic is that telehealth and telework options can be used effectively when both sides have access to and confidence with using the technology. There are several advantages to conversations over video: A face covering is not needed, volume can be adjusted, each person has a microphone, screen sharing can facilitate communication, and live captioning is sometimes available. Our participants increased their use of electronic social tools as a means of staying connected and reporting their experiences to us. They reported good levels of satisfaction with those electronic means of communication. As audiologists, this is an important consideration when counseling patients, especially as telecommunications may continue (Coco, 2020; Manchaiah et al., 2021).

Some participants told us that they felt less stress to socialize while in lockdown. To them, the cancellation of large group parties and meetings reduced their need to have effortful conversations, thereby reducing associated anxiety and frustration. In fact, there were concerns about returning to a noisier, more social world. One consultant on the project commented that in their experience with a cochlear implant, they felt isolated prior to the pandemic because of their hearing loss. When everyone was instructed to stay home, that "leveled the playing field" and they felt like they did not need to fear missing out on the fun activities that other people were doing. Another reported that as they are returning to large group settings now that restrictions have eased, they are experiencing the stresses of noisy group interactions again. They encouraged us to consider high-quality, one-on-one electronic meetings when possible, to continue the opportunities for quiet, stress-free conversation.

Limitations of this study include small sample sizes due to recruitment challenges during lockdown. Due to the necessity of remote test administration, complete audiologic and treatment information could not be obtained, and audibility challenges cannot be ruled out when interpreting results of the MoCA screening (Phillips et al., 2020). Other communication barriers needed to be navigated due to the participants' hearing losses, absence of visual cues while on the phone, Internet connectivity concerns, and familiarity with the Zoom platform.

Conclusions and Implications

While acknowledging the limitation of small sample sizes, this study identified several significant implications of the COVID-19 pandemic. Adults using hearing aids and cochlear implants expressed similar levels of concern about contracting the virus. Those with cochlear implants spent less time alone and used electronic communication more frequently than those with hearing aids. When in face-to-face interactions with face coverings, recipients of

cochlear implants reported significantly greater frustration, which is expected given the severity of hearing loss. This pandemic period has revealed new insights into the everyday struggles that audiology patients are facing.

Despite these challenges, many learned that remote communication can be very successful in many situations. Some persons with hearing loss commented that they are reluctant to return to in-person meetings where the acoustics may be poorer than using their remote in-home communication systems. Audiologists and others who work with persons who have hearing loss will be wise to consider hybrid services, where some might be offered via remote communication methods.

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Appendix (p. 1 of 2)

Interview Questions

Demographic Questions

1. Which area are you currently living in? (Metro area; rural area; participant chose not to answer; other)
2. Who are you currently living with? (I'm living with my family or partner; I'm living in an assistive living center with other community members; I'm living alone; I'm currently hospitalized; participant chose not to answer; other)
3. Do you know anyone who has contracted the coronavirus (since the last interview)? (Yes, my family member(s) has contracted the virus; yes, my friend(s) has contracted the virus; yes, I have contracted the virus; no, I do not know anyone who has contracted the virus; participant chose not to answer)
4. What is your current employment status? (I'm a full-time worker, and I'm currently working from home; I'm a full-time worker, and I'm still going to my workplace; I'm a part-time worker, and I'm currently working from home; I'm a part-time worker, and I'm still going to my workplace; I'm unemployed; I'm retired; participant chose not to answer; or other)

Daily Social Contacts

5. In the past week, how many different people did you interact with in-person (closer than 6 ft)? [Participants were asked to give an estimate.]
6. How satisfied are you with the amount of in-person social interaction you've had in the past 7 days? (Very dissatisfied, dissatisfied, neutral, satisfied, very satisfied, or N/A)
7. In the past week, how many different people did you interact with electronically (voice or video)? E-mail or text are not included. [Participants were asked to give an estimate.]
8. How satisfied are you with the amount of electronic social interaction you've had in the past 7 days? (Very dissatisfied, dissatisfied, neutral, satisfied, very satisfied, N/A)

Time Alone

9. In the past week, what is the average number of waking hours per day you spent alone? [Participants were asked to give an estimate.]
10. How strong is your sense of loneliness? (Not at all, mild, moderate, strong, very strong, or N/A)

Access to Information About the Pandemic

11. What sources of information do you rely on for information about the pandemic? (Television; radio or podcast; newspaper; web news, including different news app or online media news; Social media such as Facebook, Twitter, etc.; other people [family members or friends]; or other)
12. Overall, how accessible are those sources? (Very inaccessible, inaccessible, neutral, accessible, very accessible, or N/A)

Access to Medical Information

13. What methods do you have for communicating with a health professional (if needed)? (In-person appointment, telehealth, emergency room, or other)
14. Overall, how accessible are those sources? (Very inaccessible, inaccessible, neutral, accessible, very accessible, or N/A)

Access to Shopping and Essential Needs

15. What methods do you use to obtain food, medicine, and other essential needs? (In-store shopping; online shopping and delivery; curbside pick-up or in-store pick-up; help by others, such as family members, friends, neighbors or community members; or other)
16. Overall, how accessible are those sources? (Very Inaccessible, Inaccessible, Neutral, Accessible, Very Accessible, N/A)

Access to Social and Support Groups

17. What methods do you have available to contact support groups, support services, or interest groups? (In-person meetings; phone calls; online video chat; e-mail or messages, including text, iMessages, Facebook Messenger, WhatsApp, etc.; social media; Other)
18. Overall, how accessible are those sources? (Very inaccessible, inaccessible, neutral, accessible, very accessible, or N/A)
19. Overall, are those methods of communication sufficient for your needs? (Very insufficient, insufficient, neutral, sufficient, very sufficient, or N/A)

Appendix (p. 2 of 2)

Interview Questions

Mobility and Transportation

20. What methods do you have to get to desired locations? (Driving; riding with my family members or friends; public transportation, such as bus, subway, light rail, or flight; taxi or share ride services, such as Uber and Lyft; paratransit services; walking; biking; or other)
21. Overall, how confident are you in the safety of those options? (1 = *not confident at all*, 5 = *very confident*)
22. Overall, how much has the virus affected your travel? (1 = *no impact at all*, 5 = *huge impact)*

Stress Level

23. I worry that I will contract the virus. (1 = *not at all typical of me*, 5 = *very typical of me*)
24. I worry that I won't be able to get my essential needs. (1 = *not at all typical of me*, 5 = *very typical of me*)
25. I worry that it's hard for me to keep social distance. (1 = *not at all typical of me*, 5 = *very typical of me*)
26. I worry that it's hard for me not to touch things. (1 = *not at all typical of me*, 5 = *very typical of me*)
27. I worry that it can be difficult for me to understand someone talking to me when they are wearing a face mask. (1 = *not at all typical of me*, 5 = *very typical of me*)

Patient Health Questionnaire (PHQ-9)