



# Clinical outcomes of Hearing Australia in-person and remote services

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## Executive Summary

This study aimed to assess and understand, using a retrospective mixed-methods design:

1. whether clients receiving hearing services delivered remotely obtained similar or different clinical outcomes to clients receiving hearing services delivered in-person, and
2. the experiences that clients had of remotely delivered services and their decision to access or refuse those services.

One hundred and two Hearing Australia clients seen for hearing aid fitting were recruited and their clinical outcomes post-fitting were collected via telephone interview. Of these, 45 were seen entirely in-person and 48 received a remote follow-up by telephone or video. Nine clients who were seen for a remote appointment that was not a follow-up appointment were excluded from this analysis.

There were no significant differences in any clinical outcome between those who received a remote follow-up appointment and those who received their entire appointment journey in-person.

Outcomes were self-reported hearing aid use, benefit, satisfaction, residual disability, and social isolation.

Clients seen remotely had a significantly weaker preference for in-person services than those seen in-person, although two thirds of them still preferred in-person services over remote services.

A subset of participants (n= 11) was also contacted for a follow-up interview about their experiences with in-person and remote services.

Participants described their experiences with Hearing Australia positively, whether they were seen in-person or remotely. Participants who preferred to be seen in-person stressed the importance of interpersonal relationships and communication that they felt would be strengthened by attending the hearing centre in-person.

This report also discusses a theoretical model that may be useful in designing, implementing, and reviewing technology-based hearing services in the future to improve acceptance by clients.

## Aims and objectives

The COVID-19 pandemic led to significant changes in the delivery of hearing services within Hearing Australia, with a significant number of services traditionally delivered in-person transitioning to telephone or other telepresence technologies. As this represented a significant departure from standard practices within rehabilitative audiology, it was unclear whether clients would obtain the same benefit from remotely delivered services as they might expect from in-person services.

This study aimed to assess and understand, using a retrospective mixed-methods design:

1. whether clients receiving hearing services delivered remotely obtained different clinical outcomes to clients receiving hearing services delivered in-person
2. the experiences that clients had of remotely delivered services and their decision to access or refuse those services.

## Method

### Quantitative survey

A list of Hearing Australia clients who recently completed a follow-up (2F) appointment was generated by Hearing Australia Business Analysts. Only clients who had consented to be contacted for research and marketing purposes (as recorded in AHCIS) and whose primary language was English were included.

Three lists were generated:

1. Clients seen for a 2F in West Victoria/Tasmania between 30/3/20 and 20/5/20 (n = 60)
2. Clients seen for a 2F in West Victoria/Tasmania between 21/5/20 and 12/6/20 (n = 46)
3. Clients seen for a 2F Australia-wide between 13/6/20 and 16/7/20 (n = 594)

In total, these lists contained the details of 700 clients.

Hearing Australia teleaudiology clinicians contacted each client on the list and asked them whether they would be happy to take part in a survey. Those who agreed to participate were then taken through an outcomes survey that comprised a number of outcome questionnaires over the phone.

The staff member delivering the questionnaire recorded the client's AHCIS Number, which portions of their rehabilitation were conducted contactlessly (if any), and recorded hearing aid use in hours per day. Initially it was intended to record hours of use using data logging, but after issues were identified with the recorded results (such as unexplainable differences in wearing time between the ears) usage was obtained using client self-report. The survey included two selected questions from

the International Outcome Inventory for Hearing Aids (IOI-HA; Quality of Life and Impact on Others, measured on a 5 point scale 1-5; Cox & Alexander, 2002), part 2 of the four predefined situations of the Glasgow hearing Aid Benefit Profile (GHABP) that asked about hearing aid Use, Benefit, Residual Disability and Satisfaction measured as a percentage (Gatehouse, 1999), the Social Isolation Measure (Heffernan et al., 2019), and whether they would prefer for their next appointment to be conducted remotely or in-person, on a five-point Likert scale (Strongly prefer in-person, Prefer in-person, No preference, Prefer remote, Strongly prefer remote).

At the end of the survey, clients in the third portion of the data collection were asked whether they consented to being contacted by a NAL researcher for a qualitative interview.

AHCIS numbers collected were used to extract client age, hearing thresholds, eligibility type, hearing devices fitted, postcode, and hearing centre from the Hearing Australia client records system.

Due to significant skew in the results, quantile regression was used to compare outcomes between the groups.

Due to the large number of comparisons undertaken, all P values have been corrected using a False Discovery Rate control method to minimise type II (false positive) errors (Benjamini & Hochberg, 1995). An alpha of .05 was used to indicate significance.

### Qualitative interviews

A selection of participants (n =33) in the quantitative survey provided their consent to participate in further research to discuss their experiences with in-person and remote hearing services. These clients were then contacted by a member of the research team to organise an in-person interview. A total of eleven interviews were conducted.

All interviews were allocated 20 minutes, and these were conducted via telephone calls over a two-week period in August 2020. A semi-structured interview guide was developed to enable the research team to capture client experiences and impressions of their recent in-person or remote Hearing Australia experience to help the research team better understand the barriers and facilitators to implementing these services.

Each interview was audio-recorded to ensure an accurate record of all dialogue. Recordings were then de-identified and professionally transcribed through an online transcription service, Rev.com. The ensuing transcripts were analysed using thematic analysis (Braun & Clarke, 2006) using NVivo software (version Pro 12).

## Results

### Quantitative survey

102 participants completed the survey in total.

As part of the survey, the portions of the fitting journey (defined as Case History, Rehabilitation Planning Discussion, Fitting, Management Training, and Follow-Up) that were delivered remotely were identified. The Assessment appointment was not included in this question as it currently cannot be delivered remotely. Of the 102 participants:

- 45 had no portion of their hearing aid journey delivered remotely;
- 1 received their entire journey via remote service;
- The remainder had a mixed in-person/remote journey:
  - 42 received a follow-up appointment by telephone as the only remotely delivered service;
  - 2 received a follow-up appointment by video as the only remotely delivered service;
  - 3 received several services remotely including a follow-up appointment by telephone;
  - 9 received one or more services of the journey remotely, but these services did not include the follow-up appointment

As follow-up (2F) services were delivered primarily remotely, we compared those participants who had received a remote follow-up 2F service by either telephone or video ( $n = 48$ ) with those who had received an entirely in-person hearing journey ( $n = 45$ ). Those participants who received part of their journey remotely but attended an in-person follow-up service ( $n = 9$ ) have been excluded from the following analysis.

There was no significant difference in age between the two groups (see Table 1). For those participants for whom a Hearing Services Program claim code was available ( $n = 83$ ), there was no significant difference between the groups in the proportion of binaural fittings ( $\chi^2 = 0.477$ ,  $p > .99$ ), refittings ( $\chi^2 = 0.442$ ,  $p > .99$ ), or a fitting for which a follow-up was claimed ( $\chi^2 < 0.001$ ,  $p > .99$ ).

There was no significant difference on any of the clinical measures between the groups, including after correcting for age or better ear three frequency average hearing loss (500Hz, 1kHz, 2kHz, see Table 1). Note that quantile regression was used due to significant skew.

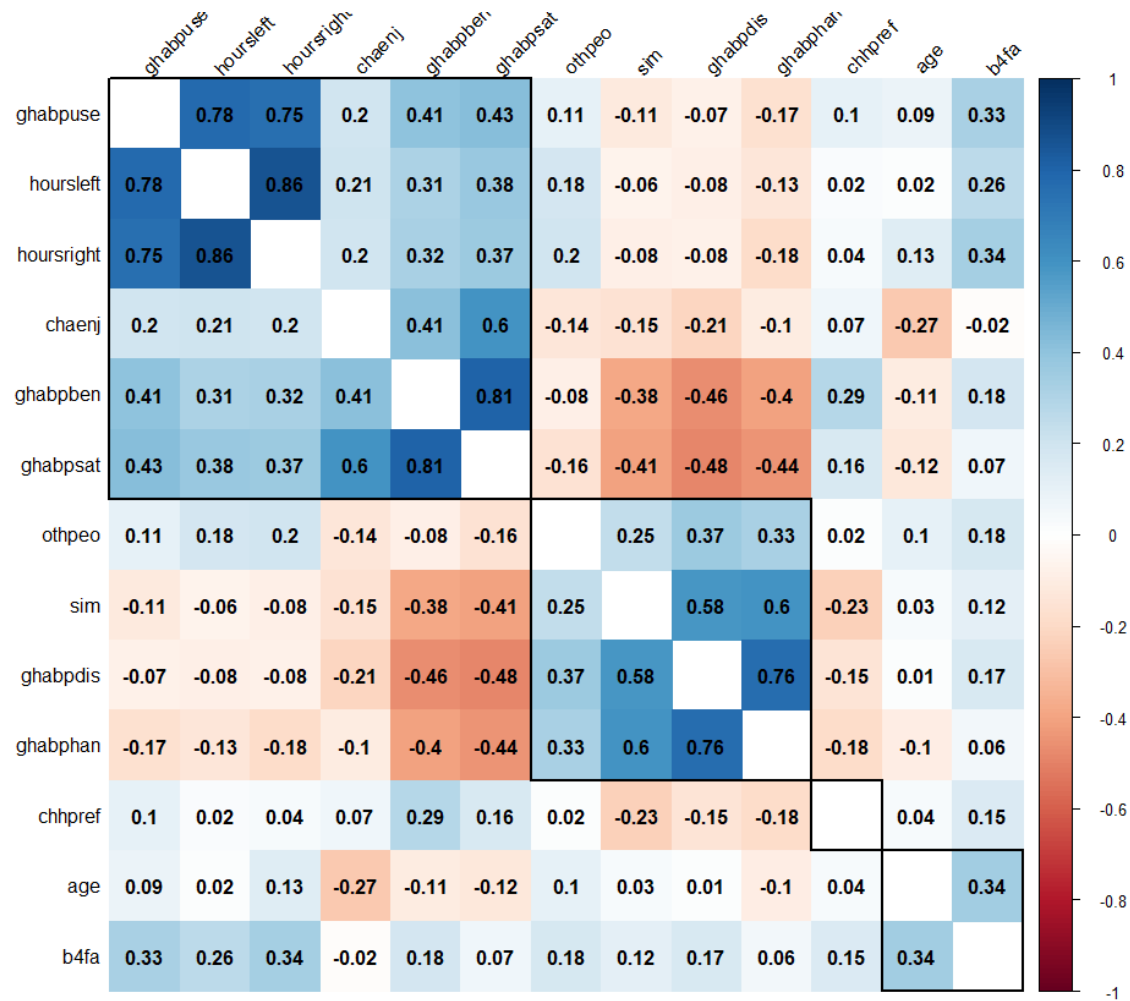
**Table 1**

Details of participants involved in the study

	<b>In-person (n = 45)</b>	<b>Remote (n = 48)</b>	<b>Difference t</b>	<b>Age corrected t</b>	<b>Hearing loss corrected t</b>
<b>Age (years, Med)</b>	75	80.5	1.72, p = .39	-	-
<b>Better ear 3FAHL (500Hz, 1kHz, 2kHz; dB, Med)</b>	35	38	0.68, p > .99	-	-
<b>Claim code available (n)</b>	40	43	-	-	-
<b>Binaural Fitting (n, %)</b>	38, 95%	38, 88%	-	-	-
<b>Refitting (n, %)</b>	30, 75%	32, 74%	-	-	-
<b>Follow-up claimed (n, %)</b>	40, 100%	41, 95%	-	-	-
<b>Hours of use (Left, Med)</b>	12	8	-2.54, p = .07	-2.58, p = .07	-2.78, p=.07
<b>Hours of use (Right, Med)</b>	11	8	-1.65, p =.40	-2.58, p = .07	-2.49, p = .07
<b>Social Isolation Measure (M, SD)</b>	19.4 (13)	14.2 (12.9)	-1.50, p = .49	-1.44, p = .51	-1.23, p = .64
<b>IOI-HA Effect on Other People (Med)</b>	1	1	<0.01, p > .99	0.36, p > .99	<0.01, p > .99
<b>IOI-HA Change in Enjoyment of Life (Med)</b>	4	5	<0.01, p > .99	<0.01, p > .99	<0.01, p > .99
<b>GHABP Residual Disability (Med)</b>	25%	25%	<0.01, p > .99	-0.25, p > .99	<0.01, p > .99
<b>GHABP Residual Handicap (Med)</b>	0%	0%	<0.01, p > .99	<0.01, p > .99	<0.01, p > .99
<b>GHABP Benefit (Med)</b>	56%	63%	1.03, p = .81	1.40, p = .51	0.12, p > .99
<b>GHABP Satisfaction (Med)</b>	63%	67%	0.78, p > .99	0.54, p > .99	0.71, p > .99
<b>GHABP Use (Med)</b>	100%	100%	<0.01, p > .99	<0.01, p > .99	<0.01, p > .99
<b>Note. Med= median, IOI-HA = International Inventory for Hearing Aids, GHABP= Glasgow Hearing Aid Benefit Profile.</b>					

**Figure 1**

Correlation matrix – higher numbers/stronger colours indicate higher correlation between variables. Clusters of variables strongly inter-correlated are indicated by squares.

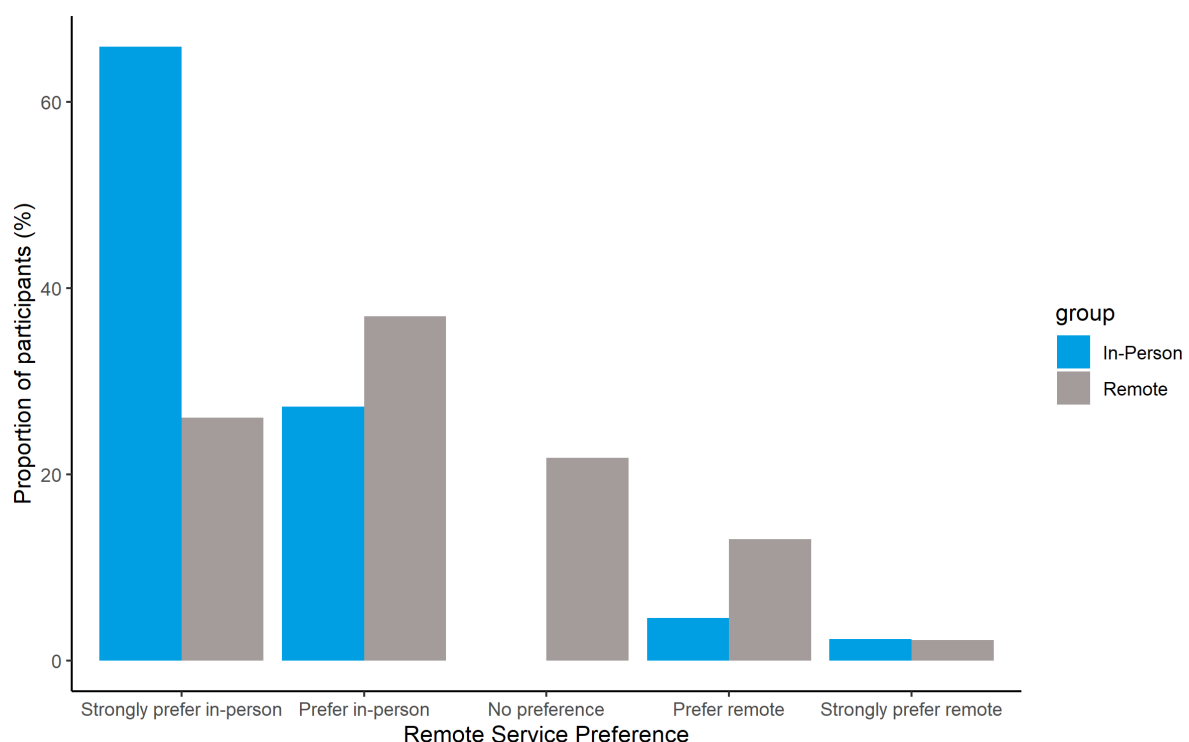


Inspection of the correlation matrix (shown in Figure 1) showed a high correlation between results on the Social Isolation Measure and the Disability and Handicap scales of the Glasgow Hearing Aid Benefit Profile. There was also a strong correlation between reported hours of wear on the left ear and on the right ear, suggesting that most people in the dataset were wearing hearing devices bilaterally, reflecting the high proportion of people who received a binaural fitting.

There was a significant difference between the groups on preference for remotely delivered health services, with those who received a remotely delivered health services being more likely to have no preference or a preference for remote services, and less likely to strongly prefer in-person services ( $t = 4.11, p = .002$ ). However, most participants in both groups preferred in-person services over remote services, as shown in Figure 2.

**Figure 2**

Preferences for remote and in-person services



There was no significant correlation between preference for remote hearing services and age ( $r_s = .039, p > .99$ ) or hearing loss ( $r_s = .15, p = .50$ ).

### Qualitative Interviews

A total of 11 participants were interviewed, of whom 9 preferred in-person hearing services and 2 preferred remote hearing services. To explore the reasons for their preferences, these have been discussed separately below.



### Clients preferring in-person hearing services

There were nine participants in this group. Participants in this cohort had been clients of the Hearing Services Program for between 4 months and 12 years. All except for one participant had received hearing services from another provider before they were a Hearing Australia client. Their most recent experience with Hearing Australia ranged from three weeks to 6 months since the time of the interview, and the type of services provided at these appointments extended from new hearing aid fittings, repairs and hearing device adjustments.

### Overall impression of in-person services

When participants were asked to provide their feedback on their overall impression of in-person services, all responses were overwhelmingly positive. Front of house staff were described as friendly, courteous and pleasant, and clinicians as professional and efficient:

*“They're all very nice and very efficient” (F2F10)*

*“So there's plenty of courtesy there, which is... usual, these days, to see that in a business. But, I think you've got a bunch of people there that are professional about their job and they love their job and trying to fulfil(sic) the help of, especially older people like myself, make me feel comfortable that everything is okay.” (F2F05)*

*“it was a pleasant experience” (F2F01)*

*“Oh, pretty good. They're pretty good, yeah. They're a good bunch, yeah.” (F2F06)*

### Reasons for preference for in-person services

There were a variety of reasons why participants preferred in-person hearing services over remote services, but the primary theme was the personal nature of in-person appointments: being able to see the faces of those who are enabling and providing the services. Participants also appreciated being able to meet other people:

*“Because I prefer to see and speak with somebody.” (F2F03)*

*“Well, first of all, I like to see the person I'm talking to” (F2F06)*

*“Well, it's easier to talk to the girls because they're very good.” (F2F08)*

*“So I just like to go in and see people”. (F2F10)*

This preference remained even when access to the hearing centre was a barrier:

*“Access is difficult. I have to get somebody to drive me. I'm not longer able to drive, and I'm stroke affected and my legs don't work properly...But I do prefer to see the consultant, professional, whatever you call it.” (F2F03)*

Some participants heavily relied on nonverbal communication cues that they felt would be less available during remote appointments. As a result, they chose in-person appointments as they felt that remote appointments would not be as effective.

*“Hearing over the phone is not always very good, let's say. I tend to lip read as I'm speaking with people.” (F2F03)*

In-person appointments were also described as more useful for timely and effective discussion of concerns and resolution of issues, particularly where devices needed to be adjusted:

*“Face to face with being able to discuss things more so than sort of answer questions when you get them.” (F2F09)*

*“Well, I think I can explain it better, and the audiologist is there to make the checks. Check on things that might've gone astray, and face-to-face, I think is always better than over the phone. I might miss something, it's much preferable for me.” (F2F07)*

*“Well, it's one-on-one with your testing and all that sort of thing. And you're right there if need to alter anything on their machines and so that's the way to go.” (F2F10)*

Participants also identified familiarity with the process of in-person appointments and lack of internet access as reasons to prefer them:

*“I don't have the facility for this other garbage they're carrying on with now.” (F2F06)*

*“Well, I don't use any internet.” (F2F08)*

*“Well, I just thought it was like going to the doctor. You just go.” (F2F01).*

*“Guess I'm a traditionalist.” (F2F06)*

One participant expressed a concern about the security of remote appointments:

*“[O]n the phone, people can say anything at all and you can't verify that they're who they say they are.” (F2F03)*

#### *Reasons for preference against remote services*

It was anticipated that the increased risk of infection during the pandemic would lead to many clients preferring to access hearing services remotely. However, these participants continued to prefer and attend in-person visits to hearing centres.

It is unclear how, or how often, hearing centre staff communicated the availability of remote hearing services, although where this was discussed, participants were clear that they made the decision themselves, rather than having it be made for them:

*“They did mention [remote services], yeah, but [audiologist] knows where I stand on that so he didn't push the issue.” (F2F06)*

*“No, I think the receptionist might've mentioned [remote services] when I rang to make an appointment, but I don't go for it.” (F2F07).*

When offered remote services, participants felt that safety measures present within hearing centres (particularly physical distancing and infection control practices) suitably reduced the risk of infection:

*“It's fairly spacious.” (F2F01)*

*“So I practice all the hygiene rules and I'm not worried about going any place medically... that I have to. I have to see my doctor once a week, but they're very careful about social distancing and things like that.” (F2F03)*

When asked whether they had any concerns attending in-person appointments during the pandemic, one participant maintained their preference for in-person visits with reference to their faith:

*“No. I'm a religious person and I feel that if God intends me to get coronavirus, I'll get it. And if He doesn't intend me to get it, I won't.” (F2F03)*

A few participants (although not all) said that they would consider remote hearing services if offered, although they highlighted limitations to the types of services that can be done remotely:

*“I think so. Because that was only a simple thing, wasn't it? It's not like a test or anything.” (F2F01)*

*"Of course. I mean, at the moment where I am in [location] and, the coronavirus, it's a very large situation, but, if I could stay home and have to go in... You know, I'm 70 years old, so I doesn't take any risks, at risk if I can eliminate it. Of course, I would prefer to eliminate it if I can... if they rang me up and said, "Can we do it over the telephone or video," or whatever they want to do, I wouldn't have any objections to that." (F2F05)*

*"Oh, I think that will be all right too, really." (F2F04)*

*"Well, I don't think there was any occasion that I could have done over the phone. I mean, if I have to get batteries or have another hearing test, I would have to go there anyway." (F2F08)*

#### *Clients preferring remote hearing services*

The two participants who consented to being interviewed had been clients of the Hearing Services Program for four months and approximately 5 years respectively, and neither participant had experience with any other hearing service provider under the Hearing Services Program. Their most recent remote hearing service involved follow up phone calls from clinicians.

#### *Overall impression of remote hearing services*

Remote services were positively regarded, driven by the quality of staff interactions and satisfaction with hearing devices fitted. Participants described their remote service experiences as "awesome," "wonderful," "pleasant," and "helpful":

*"I spoke to a woman called [staff member] and she was charming. She was very well spoken. She treated me with the utmost respect and I have nothing negative to say." (RM02)*

*"The lady was very helpful." (RM11)*

#### *Reasons for preference for remote services*

For client RM02, their preference to receive remote hearing services over in-person appointments related to their positive experiences with remote services in the past, their own suitability, and the pandemic. When discussing positive past experiences, they said:

*"If Hearing Australia insisted that I come in, of course I would come in but if they were to give me the option, I would... And with past experiences, I would probably take the phone appointment...if given the choice it would be right home." (RM02)*

They felt that remote service delivery was particularly suited to them as they had a long history of hearing aid experience, and therefore required less support from centre staff:

*"I think because I'm at that stage now where I'm so used to wearing hearing aids and it becomes second nature to me, but a phone call would suit me fine."*

(RM02)

This client also felt that the pandemic was not a strong barrier to attending in-person:

*"given the preference. At that particular time COVID(sic)...I could have gone in or done it by phone. I chose to, want to do it by phone." (RM02).*

Finally, when discussing options for remote hearing services, RM02 described the unfamiliarity of video calling as a barrier to using it for remote hearing services:

*"I haven't got Skype set up or anything like that. It's not part of what I actually do technically. I wouldn't consider it, no. I would have to say no at this juncture."*

(RM02)

## Discussion

The results of this study show no difference in clinical outcome between those clients seen for their follow-up appointment post-fitting in-person and those seen remotely primarily by telephone. This suggests that the delivery of remote follow-up appointments may be continued without risk to clinical outcomes.

While it is true that a majority of participants in this study preferred in-person to remote appointments, approximately a third of participants who received a remote follow-up either had no preference either way or a preference for remote services. This suggests that remote services are likely to be valuable to a reasonable proportion of Hearing Services Program clients across Australia. In light of the increasing rates of mobile phone usage and technological competence of older Australians (Corbett et al., 2019), it is possible that the technological concerns credited by several participants as reasons for their preference for in-person services may diminish over time, and this proportion may increase. As a result, demand for these services may be expected to increase over time.

While it was expected that younger clients would be more likely to prefer and access remote hearing services, those clients seen remotely tended to be slightly older on average than those seen in-person, and there was no association between age and participants preferences for hearing services.

This may suggest that, at least during the COVID-19 period, any decrease in comfort with remote services with age may have been balanced out by the increased risk to health that COVID-19 poses with advancing age. This also suggests that age should not be a barrier to offering remote services. Much is made of the digital divide on modern technology due to age (Barnard et al., 2013), and this is also seen in connected hearing healthcare research where digital literacy is commonly raised (Maidment et al., 2019, 2020; Ng et al., 2017). However, these commonly held beliefs that older adults are not capable or have lower ability to use technology contrasts reports of success and benefits in studies of the use of remote technologies (Ferguson et al., in press; Gomez et al., accepted; Maidment et al., 2019; Ng et al., 2017; Ratanjee-Vanmali et al., 2020a, 2020b). As the evidence suggests there are overwhelming benefits for remote technologies in older adults, it is important that staff be mindful of this by actively seeking opportunities to involve older adults who might benefit from these technologies, and confront these beliefs.

As the present study was retrospective and cross-sectional, it is not possible to know whether the difference in preference for remote hearing services observed between the groups was a precursor to or a result of their being seen for a remote service. Studies in this area conducted by NAL have suggested that experience of remote services can cause improved attitudes towards them among clinicians, although it is unclear whether this is the case for clients as well (Chong-White & Button, 2019). Further prospective investigation of preference for remote services before and after a person experiencing their first remote service would help to identify whether this is the case in this population.

In general, attitudes towards both remote and in-person services were positive, with participants in qualitative interviews describing the clinical services and interactions as professional and meeting their needs. Both participants who preferred a remote service and those who preferred an in-person service described in-person services as the “usual” choice, needing a reason to make use of a remote appointment. Clear articulation of the value of remote appointments – particularly the flexibility that it affords clients, the reduced infection risk, and the ability to trial changes in a familiar environment – may assist clients to feel more comfortable with remote hearing service appointments.

The considerations that participants used to justify accepting or rejecting remote appointments may be understood through the extension to the Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Alaiad and Zhou (2017). This model extends the four constructs of the UTAUT (Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Condition) with four additional constructs (Human Detachment Concerns, Privacy Concerns, Life Quality Expectancy, and Cost Concerns) that are particularly of relevance for health technologies. For example, the

observation by one participant that in-person appointments are an opportunity to meet and interact with others is an example of a Human Detachment Concern, and the unfamiliarity that many participants described with video technology as a significant increase in Effort Expectancy. The use of a model such as this may support the development of materials and structures to support client use of remote hearing services.

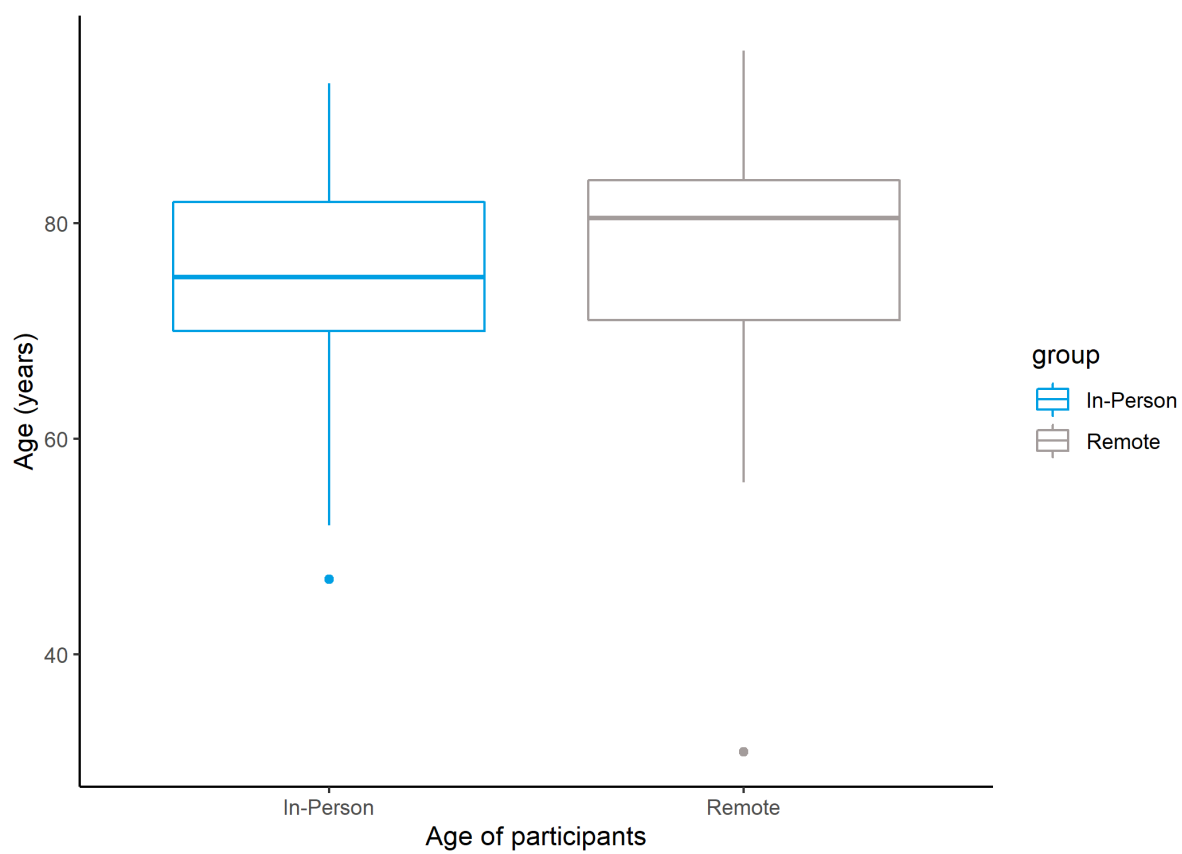
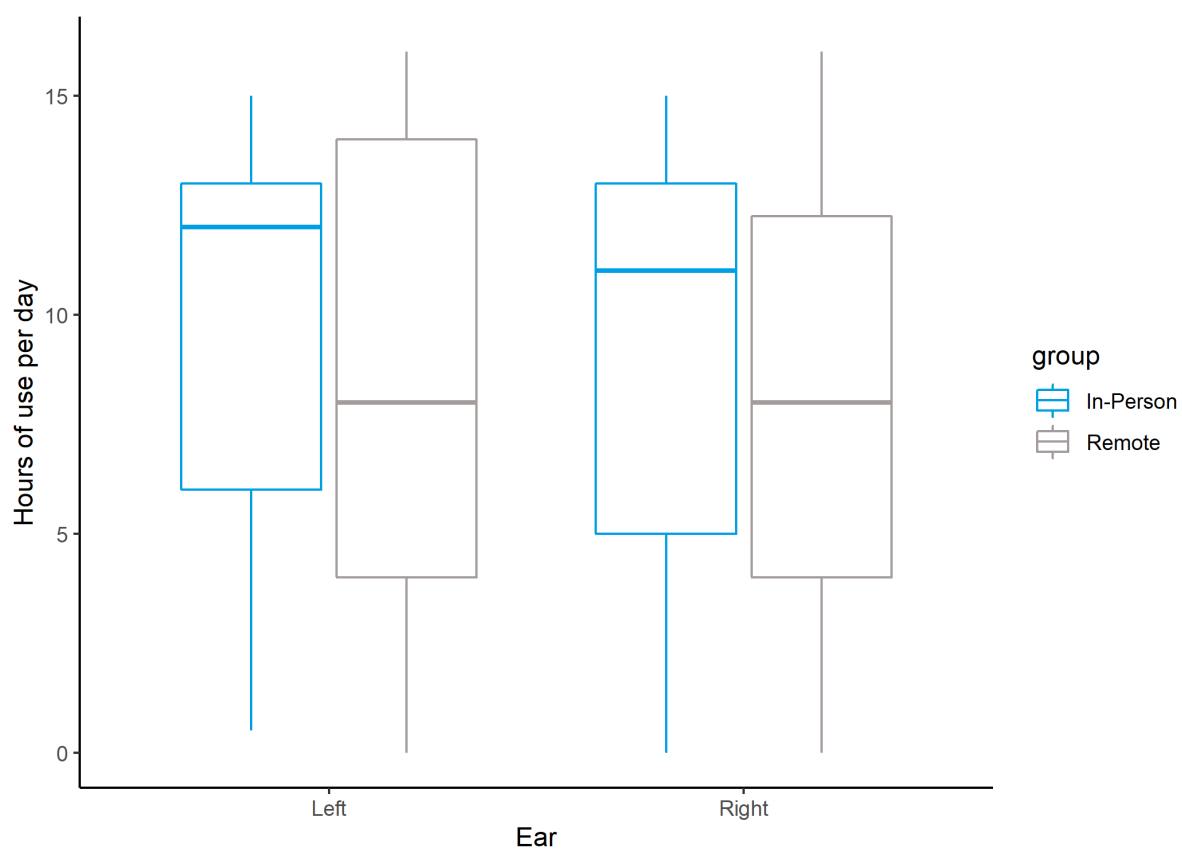
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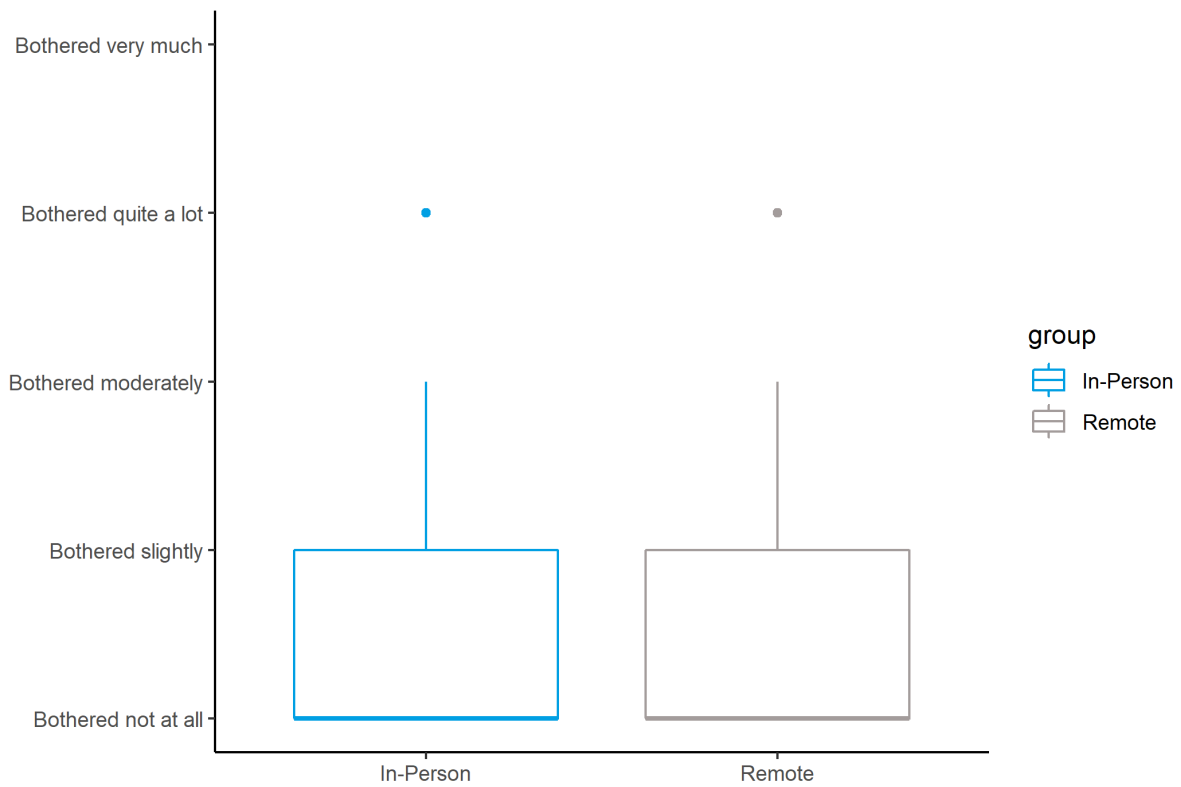
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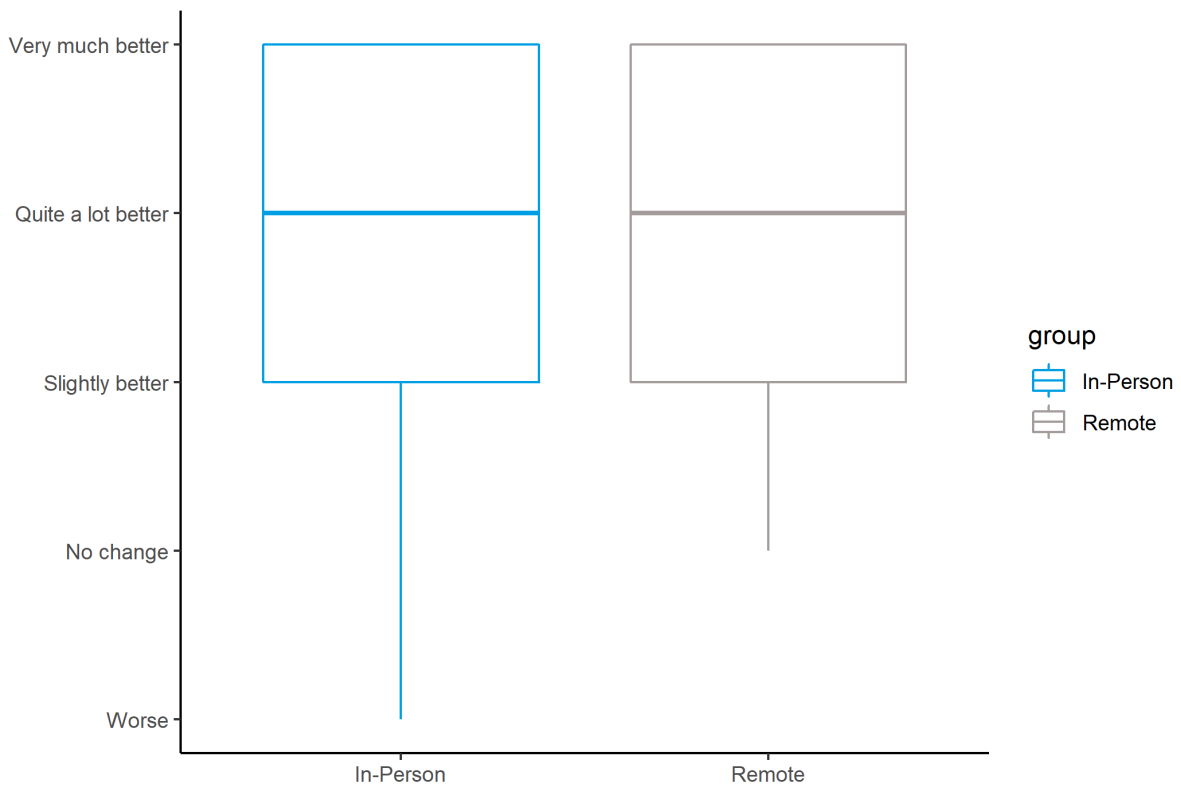


## Appendix – supporting graphs





Over the past two weeks, with your present hearing aid(s),  
how much do you think other people were bothered by your hearing difficulties?



Considering everything, how much has/have your present  
hearing aid(s) changed your enjoyment of life?

