Phonak
Field Study News

Advanced Remote Control – providing end users with more control

This study conducted at the NIHR, Nottingham Biomedical Research Centre, UK, investigated the benefit of the Advanced Remote Control from Phonak. The Advanced Remote Control is part of the myPhonak app and offers clients the ability to customize their hearing aid setting in a specific listening situation. Results showed 68.5% of participants reported that the Advanced Remote Control met their needs "extremely/very well" and was most beneficial for TV listening or conversations in noise.

Ananya Herbert, Nicola Hildebrand, Marius Beuchert, Melanie Ferguson / August 2020

Key highlights

- Clear benefits of the app were identified which included significant improvements in social participation, quality of listening via hearing aids and hearing aid benefit and satisfaction.
- The most liked features in the Advanced Remote Control were the ability to adjust volume and the noise reduction modifier.

Considerations for practice

- The key themes in the study indicated that participants felt empowered as they were able to participate more in conversations with the app, this in turn increased their confidence and led to fewer environmental limitations. They also felt reduced stigma due to modern perceptions of technology.

Introduction

A trend that has emerged in the last decade shows that people are becoming more health conscious and want to be more involved in their healthcare decisions (Jokstad et al., 2018). As a result, services that focus on "healthy aging" have become one of the fastest growing sectors in healthcare.

Healthcare is now benefiting from technology, not only to improve the quality of care provided but also the way it is delivered by healthcare professionals. The term eHealth has been coined to represent the use of information and communication technologies for healthcare. eHealth has in the last few years grown due to the digital evolution of the healthcare industry and increased uptake in digital technology (Paglialonga et al., 2018).

A subsection of eHealth is mHealth which refers to the practice of medicine and public health supported by mobile devices. People of all ages are embracing digital technology, especially smartphones. It is estimated that there are 2.71 billion smartphone users worldwide which is approximately a third of the world's population. Interestingly, there is a strong growth in smartphone ownership among the 55+ age group in 2019 compared to 2015 (Pew Research Center, 2019).

Technologies such as smartphone-connected hearing aids have created more of a client-centered delivery model of hearing healthcare. Smartphone-connected hearing aids allow clients to adjust how their hearing aids sound in real-time using an app, therefore clients can feel empowered as they can better meet their daily listening needs and preferences. This enables users to feel more independent and to be more involved in their hearing healthcare, which can improve hearing and communication outcomes (Maidment & Ferguson, 2018; Maidment et al., 2019).

This study conducted in 2019 looked at the performance of a new function within the myPhonak app, the Advanced Remote Control. The app connects to Phonak hearing aids and allows clients to choose their hearing aid setting and customize their hearing experience in a specific listening situation. These changes are then saved on the app and can be accessed anytime.

The Advanced Remote Control has three preset listening scenes called 'scenarios,' which are based on programs from Phonak Target. These are Restaurant (based on speech-in-noise program), Music (based on acoustic music program) and TV (based on calm-situation program). Within the scenarios and programs, different sound modifiers (i.e. hearing aid settings or features) can be adjusted in real-time, such as the bass and treble weighting, the strength of the noise canceller, and the beamformer. Additionally, within each scenario there are two sound modifier presets, which allows the client to quickly toggle between predefined settings.

The objectives of this study:

1. To assess the benefits and use of the 'scenarios' and sound modifier presets of the Advanced Remote Control.
2. To explore and identify the users' preferences and usability for the functionality of the Advanced Remote Control.
3. To explore whether the direct input and choice that the patients have over the programming for their hearing aids influence their view of the hearing aid fitting process.

Methodology

Participants

A total of 41 (29 male, 12 female) out of the 42 recruited participants completed the study. All participants were from Nottingham Audiology Services, Nottingham University Hospitals NHS Trust. The average age was 68.8 years, with the youngest participant being 39 years old and the oldest participant being 82 years old. Thirty participants were experienced hearing aid users and 11 participants were new users. All participants had a sensorineural bilateral hearing loss in the range of mild to moderate for low frequencies and mild to moderately severe for the high frequencies. All participants owned an Apple iPhone 5 or newer and used their phone for functions more than just sending and receiving calls / text messages.

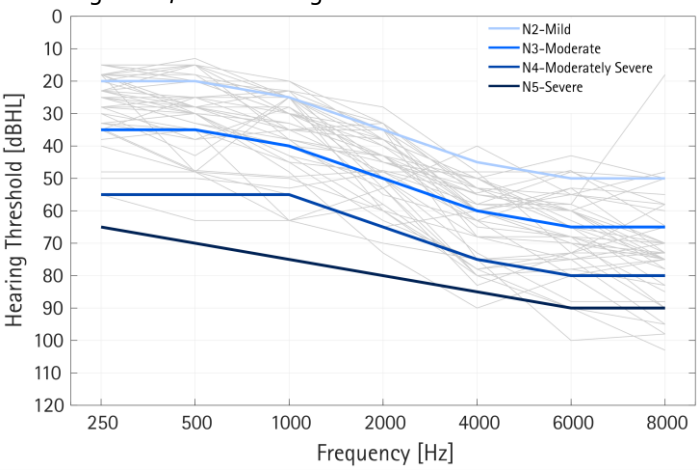

Figure 1. Four standard hearing losses N2–N5

Equipment

Phonak Audeo B90-Direct receiver-in-the-canal hearing aids with xP receivers and audiologically appropriate acoustic coupling (cShells, closed or open domes were used).

For the purpose of the study, the Advanced Remote Control was created as a separate app. This app connects to the

hearing aid via Bluetooth®, and enables hearing aid users to adjust their hearing aids via their smartphones.

Procedures

The study was a single-center, prospective, observational design which used mixed methods and involved two phases. The first phase lasting seven weeks looked at the usability and benefits of the Advanced Remote Control. This phase consisted of three face-to-face study visits as well as home-based tasks. The second phase involved focus groups and explored the usability and personal experiences of the participants.

Phase one:

Appointment one

This involved completing various quantitative assessments. The participants were fitted with the study hearing aids using the 'Adaptive Phonak Digital' fitting formulae and AudiogramDirect was performed. The Advanced Remote Control app was downloaded onto the participants phone and in-depth demonstration was provided by the research audiologist. Participants were asked to familiarize themselves with the app and the hearing aids prior to the next appointment.

Appointment two

Fine-tuning of the hearing aids was performed if required. Participants were asked to complete further quantitative assessments such as the Vanderbilt Fatigue Scale and were instructed on the study tasks they needed to complete at home before the third study visit. The study tasks involved asking the participants about specific use of the app modifiers in certain environments. Participants were also required to complete two online feedback surveys before their third study visit. During appointment two and three, participants were asked to complete the Bamford-Kowal-Bench (BKB) Speech-in-Noise test.

Appointment three

Overall feedback on the app and outcome measures such as questionnaires and speech-in-noise testing were completed.

Phase two:

Two focus groups were held each with four participants from phase one. The transcripts of the focus groups were analyzed.

Results

The wearing time of the hearing aids throughout the study was high (12.85 hours). One of the quantitative assessments the participants had to complete was the Vanderbilt Fatigue Scale. This assessment is a subjective self-report measure that explores listening effort and fatigue and comprises 40 items with a 5-point response scale. For both first-time and existing hearing aid users, scores for overall, cognitive, physical, emotional, and social significantly decreased from appointment 1 to 3.

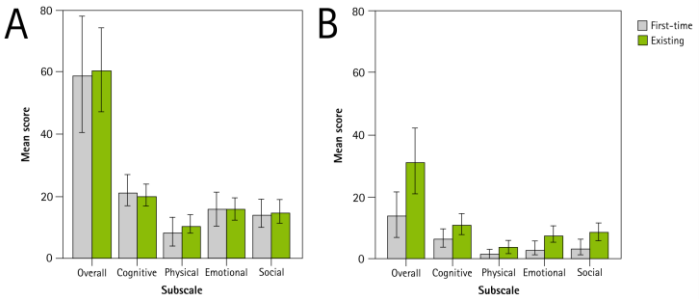

Figure 2. Vanderbilt Fatigue Scale score as (A) appointment 1 before being fitted with hearing aids, (B) appointment 3 with study hearing aids and app

The initial hearing aid preference questionnaire showed that participants ranked highly the ability to optimize their hearing aids themselves using smartphone technology. Participants reported that the app met their needs "extremely/very well" (68.5% of participants) or "somewhat well" (26.3% of participants). In the last two weeks of the trial, 55% of participants reported that they used the app >8 times or multiple times per day. With the BKB Speech-in-Noise test, the scores for each app program tested at both appointments were >95%.

The best reported features were the ability to adjust the quality of sound (42.1%), which was reported to be the most useful feature when having a conversation in the presence of background noise (50%) and when watching TV (31.6%). Participants liked volume (31.6%) and noise reduction (31.6%) modifiers. They reported that they least liked soft/loud (23.7%) and sound focus (26.3%). Some participants reported they would like to have greater automation/personalization (13.2%) and be able to make more situation-specific adjustments (13.2%).

From the focus group, participants stated that they were more likely to use the app when they thought the situation warranted it. Participants found they used the Advanced Remote Control in extreme situations, such as noisy restaurants, pubs, and areas that had an echo. The majority reported that they had sufficient skills to use the app as it was simple to navigate. Participants noted the positive perception of others regarding the app and the potential this had to reduce the stigma surrounding hearing aids. For other participants, the app helped their own acceptance of the hearing aids. Some participants commented on how the app also benefited friends and family due to increased participation in conversations and empowering family to play a role in their hearing healthcare.

Many participants commented on the feeling of empowerment the app gave, providing them with a greater sense of control over their hearing loss which increased their confidence and led to fewer environmental limitations. However, participants also noted that having to choose between multiple settings or recall the name of their customized setting added cognitive burden. The highest number of adjustments using the app were conducted in the first three days. Participants reported a lot of exploration, adjustment and use in the beginning.

The participants liked the noise reduction and volume modifiers the most. The beamformer slider and soft/loud modifier were liked the least. Participants rated the app most useful in noisy environments and whilst watching TV.

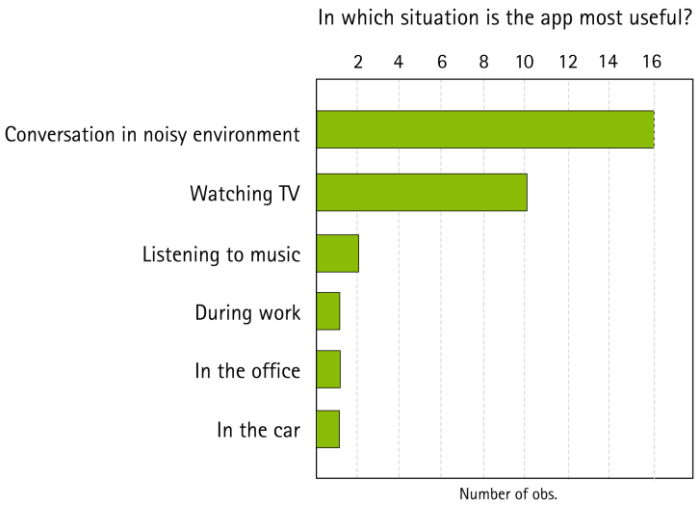

Figure 2. Situations in which the app was rated most useful

Discussion

Clear benefits of the app were identified from the focus group, which included reported improvements in social participation, quality of listening via hearing aids and hearing aid benefit and satisfaction. As there was no control group used in the study, it is possible that the improvements could be due to the participants being fitted with newer hearing aids, the app, or a combination of both.

A positive of using the app was the user adjustability of hearing aid settings which led to increased participation in everyday life for some participants and a perceived increase in speech performance in noisy situations. Noise cancellation was the most liked feature in the app, whereas the beamformer slider was the least useful. A reason for this could be due to many participants having venting in their cShells or open domes. Results showed that participants did not reduce the hearing aid gain and in difficult listening situations they increased the gain towards more clarity. Many participants reported they used the app in complex listening environments. This suggests that when the participants felt the hearing aids were not sufficient for the current listening situation they were in, they were able to adjust it themselves using the app.

Conclusion

Overall, the study identified many benefits of the Advanced Remote Control in terms of social participation, hearing aid use, satisfaction and quality of listening. The greatest benefit for participants was the ability to control and adjust the hearing aids themselves, especially whilst having a conversation in a noisy environment. Additional benefits included reduced stigma and feeling more empowered and confident.

The app empowers clients to make adjustments to their hearing aids without having to see their Hearing Care Professional.

In the study, some participants reported they would like to have more personalization options and be able to make more situational-specific adjustments. Since this study, further improvements have been made to the myPhonak app. In the new myPhonak 4.0 app, the Advanced Remote Control now has a new spatial noise canceller, Dynamic Noise Cancellation, available on the Speech Focus slider for Phonak Audéo Paradise (P90) devices. This feature is activated in noisy situations and allows the end user to improve the SNR by up to 4 dB; thus providing end users with the option to customize their listening experience even more with the new myPhonak 4.0 app.

References

Jokstad, K., Skovdahl, K., Landmark, B. & Haukelien, H. (2018). Community healthcare professionals' experiences of user-involvement in reablement. *Health and Social Care*, 27, 907–916.

Maidment, D.W. & Ferguson, M.A. (2018). An application of the UK Medical Research Council's guidelines for evaluating complex interventions: a usability study assessing smartphone-connected listening devices in

adults with hearing loss. *American Journal of Audiology*, 27, 474–481.
Maidment, D.W., Ali, Y.H.K. & Ferguson, M.A. (2019). Applying the COM-B model to assess the usability of smartphone-connected listening devices in adults with hearing loss. *Journal of the American Academy of Audiology*, Epub ahead of print, doi: 10.3766/jaaa.18061.
Paglialonga, A., Nielsen, A.C., Ingo, E., Barr, C. & Laplante-Levesque, A. (2018). eHealth and the hearing aid adult patient journey: a state-of-the-art review. *Biomedical Engineering Online*, 17.
Pew Research Center, February 2019, "Smartphone Ownership Is Growing Rapidly Around the World, but Not Always Equally". Available at https://www.pewglobal.org/2019/02/05/smartphone-ownership-is-growing-rapidly-around-the-world-but-not-always-equally/. Accessed 02.07.2020.

Authors and investigators

Investigators

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Dr. Melanie Ferguson is the Head of Audiological Science at the National Acoustic Laboratories, Sydney, where she joined in March 2019. She leads the Adult Hearing Loss research program, which focuses primarily on connected health, service delivery models and outcome measures. Prior to that she was Associate Professor in Hearing Sciences and Research Lead for the Mild to Moderate Hearing Loss program at the NIHR Nottingham Biomedical Research Centre, UK. She is actively involved in audiology professional affairs and has had leadership roles in the UK's BSA and BAA.

Dr. Melanie Ferguson would like to thank David Maidment, Rachel Gomez, and Alia Habib who were co-investigators also involved in the study.

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Marius Beuchert received his BSc in Hearing Acoustics from Lübeck University of Applied Science, and his MSc in Audio Communication and Technology from the Technical University of Berlin. He joined Sonova as audiological engineer in the Science and Technology department in 2015. In 2019 he took over the position as Product Owner of the R&D Audiology and Fitting Exploration. His work history includes research on fitting and audiological measurement methods, and function development in the field of eAudiology.

Nicola Hildebrand

Nicola Hildebrand is a trained hearing care professional and studied medical technology and hearing aid acoustics at the University of Applied Sciences, Lübeck. As a validation audiologist, she joined Phonak in 2004. From 2005 to 2019, she developed and researched new innovative fitting and measurement methods as a member of the Science and Technology department at Sonova. In 2019 Nicola Hildebrand took over the leadership position of the Expert of the R&D Software Application Exploration Stream.

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Ananya Herbert

Ananya Herbert received her BSc (Hons) Audiology degree from the University of Leeds, England, and worked as an adult audiologist in the National Health Service (NHS) in the UK. She later went on to complete several pediatric masters modules at the University College London (UCL) before specializing in pediatric audiology and working at Great Ormond Street Hospital (GOSH) before moving to Switzerland to join Phonak as an Audiology Manager. Ananya now works closely with the Phonak eSolutions and eAudiology team.