

Real-World Benefits of Hearing Aids Beyond Better Speech Understanding

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Good patient-centered hearing care involves making shared decisions and setting shared outcome goals with patients and ideally their family members, who are their frequent communication partners. In audiological rehabilitation, these goals are most commonly framed in terms of improved speech understanding. However, for some patients, the benefits from rehabilitation may be different. Adults with mild hearing impairment, for example, may find as much or more benefits from amplification in terms of reduced listening effort or feeling less hampered by their hearing impairment.

To explore some of the real-world benefits that hearing aids may provide for adults with mild hearing impairment, we used an approach called ecological momentary assessment that allowed us to measure the participants' hearing performance in their usual listening situations, *in situ* while they were in those situations (*Trends Hear.* 2018 Jan-Dec; 22: 2331216518783608). Ecological momentary assessment has been shown to provide valid and reliable real-world data that can enhance laboratory testing and retrospective self-reports (*Ear Hear.* 2012 Jul-Aug;33(4):497; *J Am Acad Audiol.* 2015 Nov-Dec; 26(10):872).

ECOLOGICAL MOMENTARY ASSESSMENT

In the study, 10 participants were asked to use an ecological momentary application (app) on a smartphone to describe their listening events. Over the four-week data collection period, the participants didn't wear hearing aids for the first and last weeks, and wore bilateral, open-dome mini-behind-the-ear (BTE) hearing aids programmed to meet their insertion gain targets for the middle two weeks.



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Instructed to complete at least three surveys per day, the participants gave information about their listening activity (e.g., conversation with three people or fewer, listening to media such as TV or radio) and acoustic environment (e.g., size of the room, level of background noise). They were also asked to rate their hearing performance in four dimensions: percentage of speech understanding, listening effort, communication being negatively hampered by hearing difficulties, and enjoyment of the listening event. This allowed us to explore their baseline hearing performance without amplification and whether there was a measurable difference in their hearing performance during the two-week trial with hearing aids.

In total, we collected over 800 real-world listening event surveys. All participants had no previous hearing aid experience and varied attitudes toward hearing aids (Table 1). When asked how they would rate their general attitude toward hearing aids on a scale of -5 (very negative) to +5 (very positive), three participants rated negatively (-3 to -1), three rated as neutral (0), and four rated as positive (1 to 2). Interestingly, at the end of the study, nine out of 10 participants reported having a generally positive attitude toward hearing aids and one reported a consistently slightly positive rating.

HEARING AID BENEFITS

As a group, the participants with mild hearing impairment reported a small degree of benefit from the use of hearing aids in improved speech understanding, reduced listening effort,



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Table 1. Participant Characteristics

Participant	Age (years)	Sex	Four frequency average hearing loss averaged across .5, 1, 2 and 4 kHz, in dB HL	Self-reported health status (excellent, very good, good, fair or poor)	Self-reported vision (excellent, very good, good, fair or poor)	Length of hearing difficulties (years)	Attitude to hearing aids (-5 to +5)
1	71	Female	R: 20.0 L: 21.3	Good	Fair	2	0
2	73	Male	R: 25.0 L: 26.3	Excellent	Excellent	10	2
3	75	Female	R: 25.0 L: 33.8	Very good	Very good	9	-3
4	65	Male	R: 33.8 L: 33.8	Very good	Very good	17	-1
5	65	Male	R: 21.3 L: 27.5	Very good	Excellent	8	1
6	81	Female	R: 31.3 L: 28.8	Very good	Very good	15	1
7	71	Female	R: 37.5 L: 40.0	Fair	Fair	7	0
8	57	Male	R: 35.0 L: 31.3	Excellent	Excellent	20	2
9	72	Male	R: 26.3 L: 30.0	Good	Good	6	0
10	67	Male	R: 20.0 L: 23.8	Very good	Very good	4	-2

being less hampered by hearing difficulties, and increased listening enjoyment (Fig. 1). For the purpose of this study, effect size (degree of benefit) was calculated using benchmarks established in a previous systematic review that explored amplification outcomes for adults with mild hearing impairment (*J Am Acad Audiol.* 2016 Apr;27(4):293).

Rather than taking hearing aid benefit as a singular domain, this study explored the individual participant results to show hearing aid benefit in the four hearing performance dimensions. Participant 7, for example, showed medium benefit in improved speech understanding, but great benefit from the hearing aids in reduced listening effort, communication less hampered by hearing difficulties, and increased listening enjoyment. Participant 5 showed small effect size from the hearing aids for improved speech understanding but medium and large benefit in reduced listening effort and communication being less hampered by their hearing impairment.

Although the ecological momentary assessment app used in this study was devised for research purposes, results such as these can be highly relevant to clinical practice. For example,

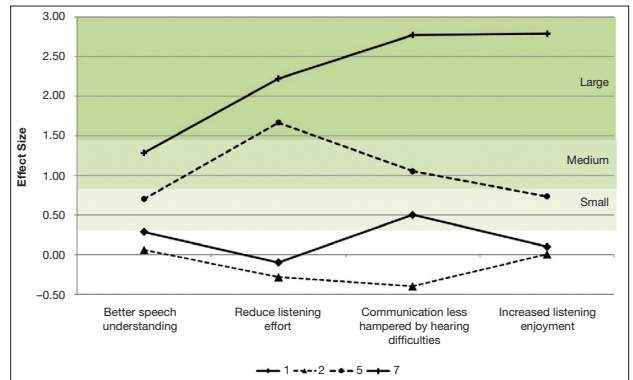


Figure 1. Mean group effect size from hearing aid use for participants 1, 2, 5, and 7, across the four hearing performance dimensions. The regions showing small, medium, or large effect sizes or hearing aid benefit are based on benchmarks calculated for adults with mild hearing impairment (*J Am Acad Audiol*, 2016). An effect size below 0 suggests that the hearing aids did not provide any benefit and may have been detrimental to the hearing performance dimension for that participant.

participant 1 showed no benefit from the hearing aids in improved speech understanding but did show benefit in communication being less hampered by hearing difficulties. If the hearing professional had set rehabilitation goals related purely to improving speech understanding with hearing aids, the benefit that participant 1 had shown in other dimensions may not have been elucidated. These findings could also be relevant in terms of exploring hearing aid candidacy as well as the need for hearing aid fine-tuning or counselling. Participant 1 may find that increasing the strength of hearing aid noise cancellation features increases benefit in reduced listening effort. Participant 2 may require further fine-tuning of his hearing aids or may not even be a candidate for hearing aids as he only experienced negative real-world differences with the device.

These findings help remind hearing professionals that the benefits of hearing aids may go beyond improved speech understanding and that clinical goal setting could incorporate further aspects of hearing performance. [1]