Research Article

Changes in Psychosocial Measures After a 6-Week Field Trial

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Purpose: The purpose of this study was to assess the extent to which intervention with hearing aids, namely, a 6-week hearing aid field trial, can minimize the psychosocial consequences of hearing loss in adults who have previously not sought treatment for their hearing loss.

Method: Twenty-four adults with mild to moderate bilateral sensorineural hearing loss, who had never worn hearing aids or sought help for their hearing loss, participated in this study. Participants were fitted with receiver-in-canal hearing aids, bilaterally, and wore them for 6 weeks. Participants completed subjective measures of hearing handicap

and attitudes about hearing loss and hearing aids before, during, and after the hearing aid trial. A control group of age-matched participants followed the same experimental protocol, except they were not fitted with hearing aids.

Results: Using hearing aids for 6 weeks significantly reduced participants' perceived stigma of hearing aids, personal distress and inadequacy due to hearing difficulties, and hearing handicap.

Conclusions: A hearing aid trial can have a positive effect on a person's attitudes toward wearing hearing aids and decrease hearing handicap.

Hearing loss is one of the most prevalent chronic conditions in the United States, affecting 20% of people 45–59 years of age, 33% of people 60–69 years of age, and nearly 50% of individuals 75 years of age and older (Lin, Niparko, & Ferucci, 2011).

Hearing loss can be a serious communication disorder that has been shown to be independently associated with accelerated cognitive decline, general cognitive impairment (Lin et al., 2013), a higher incidence of having dementia (Allen et al., 2003; Uhlmann, Larson, Rees, Koepsell & Duckert, 1989), and social and psychosocial problems (Arlinger, 2003; Dalton et al., 2003; Kramer, Kapteyn, Kuik, & Deeg, 2002; National Council on the Aging, 1999).

Hearing loss can impair everyday communication for individuals with hearing impairment. For example, individuals with hearing loss may experience isolation, maladjustment, anxiety, depression, loneliness, and frustration (Arlinger, 2003; Dalton et al., 2003; Kramer et al., 2002;

National Council on the Aging, 1999). In fact, many individuals with hearing loss who have difficulty communicating report a decrease in their quality of life and an increase in disability and handicap (Dalton et al., 2003; Gopinath et al., 2012).

Hearing aid use has been shown to improve some of the negative psychosocial aspects of hearing loss in older adults (Abrams, Hnath-Chisolm, Guerreiro & Ritterman, 1992; Chisolm et al., 2007; Humes & Wilson, 2003; National Council on the Aging, 1999). The National Council on the Aging (1999) found that hearing aids improved peoples' quality of life in terms of greater earning power; greater intimacy; lessening of communication problems; and reduced anger, frustration, and depression. Consistent with this, the American Academy of Audiology Task Force on Adult Hearing Loss (Chisolm et al., 2007), in their systematic review with meta-analysis, also found that hearing aids improved adults' hearing-related quality of life by reducing psychological, social, and emotional effects of sensorineural hearing loss. The benefit of hearing aids on psychosocial functions was also demonstrated in a randomized control study by Mulrow et al. (1990). In particular, they assessed whether hearing aids improved the quality of life of older persons with hearing loss. Significant improvements in social and emotional function, as well as lessening depression, were reported for participants who received hearing aids compared with those who did not receive hearing aids. They concluded that hearing loss is associated with important

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adverse effects on the quality of life of older persons with hearing impairment, effects which are reversible with hearing aids.

Despite the known significant benefits of treatment of hearing loss with amplification, the prevalence rates for adult hearing aid use are low: 20% for all adults with hearing impairment, and 15% for adults 50–59 years of age (Lin, 2012). Because of its gradual onset, hearing loss is often difficult for an individual to perceive, especially when the degree of hearing loss is relatively mild. Although signs for early hearing loss exist, many people are unaware of them or choose not to acknowledge them. Instead, they will place the onus of their communication problems on others. For example, people with hearing impairment will often suggest that other people mumble, do not speak clearly, or speak too softly. On average, it takes individuals about 10 years from the time they become aware of their hearing problems to seek treatment (Davis, Smith, Ferguson, Stephens, & Gianopoulos, 2007).

Even when they seek treatment, many individuals with hearing loss choose not to follow through with the recommendation to obtain hearing aids (Humes, Wilson, & Humes, 2003; Knudsen, Öberg, Nielsen, Naylor, & Kramer, 2010). According to data from The MarkeTrak VIII survey (Kochkin, 2012), the primary reasons individuals do not adopt hearing aids to treat their hearing loss are a lack of experience with hearing aids, financial barriers, negative attitudes toward hearing aids, degree of hearing loss, lack of knowledge, minimization or lack of need, vision/dexterity problems, professional recommendations, social network recommendations, stigma, and trust (Kochkin, 2012). Some of these reasons, namely, negative attitudes toward hearing aids and minimization of hearing loss, have the potential to be changed if an individual were to have a positive experience using hearing aids. Such an experience could occur during a hearing aid trial period (i.e., 30–45 days), but hearing aid trial periods are generally recommended only for patients who have decided to obtain hearing aids. The trial period allows them to determine whether they perceive enough benefit/satisfaction from their hearing aids to keep them. Therefore, if a person has not decided to obtain hearing aids, they do not get to have this experience with hearing aids.

The purpose of the present study was to determine whether using hearing aids for 6 weeks could alter an individual's attitudes towards hearing aids, the amount they minimize their hearing loss, and their level of self-perceived hearing handicap. The individuals who participated in this study had never had a hearing test or sought treatment for their hearing loss. An aged-matched control group was also included in this study to help ensure that any significant changes in the experimental group's psychosocial test scores over time were not from being retested on the measures. It was hypothesized that exposure to hearing aids would decrease an individual's minimization of their hearing loss, improve their attitudes toward amplification, and reduce their level of hearing handicap.

Method

Participants

A group of 24 adults (15 men, nine women) 50–74 years of age ($M = 63$, $SD = 1.5$) participated in this study. Participants were recruited as part of a larger study conducted in our laboratory through advertisements and flyers seeking individuals “who are having some difficulty understanding speech and may or may not have hearing loss.” The experimental participants had at least a mild sensorineural hearing loss, bilaterally (i.e., two out of three thresholds were > 26 dB at 2 kHz, > 30 dB at 3 kHz, and/or > 35 dB at 4 kHz), and no more than a 15-dB difference in hearing thresholds between ears at any audiometric frequency. This hearing loss criterion was selected so that the participants' thresholds would be at least > 0.5 SD from the normal hearing thresholds reported for these ages in the Cruickshanks et al. (1998) study. Mean pure-tone thresholds for the left and right ears are shown in Figure 1. Participants reported having difficulty understanding speech for an average of 6.4 years ($SD = 2$) in quiet listening conditions and 8 years ($SD = 1.6$) in noisy listening conditions. See Table 1 for participant demographics.

A control group of 16 adults (51–70 years of age; $M = 61$, $SD = 6.5$) were included in this study to ensure that any significant changes measured in the experimental group over the 8-week study period were not a result of normal test–retest variability on the subjective experimental measures. The control participants were recruited in the same manner as the experimental participants in this study. If a participant did not meet the hearing threshold criteria for being fitted with hearing aids, they were assigned to the control group (see Figure 1 for mean pure-tone thresholds of the control participants averaged across ears).

Figure 1. Mean pure-tone thresholds (in dB HL) averaged across the right and left ears for experimental and control group participants. Error bars represent ± 1 SD .

Table 1. Participant demographics.

Participant	Age (years)	HFPTA (dB)	Difficulty Hearing (years)		Speech Recognition Quiet (%)		Speech Recognition Noise (%)	
			Quiet	Noise	Unaided	Aided	Unaided	Aided
S1	50	31	0	10	100	100	100	100
S2	52	50	12	12	100	100	100	100
S3	54	32	3	3	92	100	100	100
S4	56	40	10	20	100	100	100	100
S5	56	21	0	4	100	100	100	100
S6	58	33	3	10	100	100	100	100
S7	58	38	10	10	100	100	92	100
S8	59	43	2	2	88	100	92	100
S9	60	27	0	2	100	100	96	100
S10	60	33	5	20	96	100	100	100
S11	60	37	0	2	100	100	100	100
S12	63	38	20	30	100	100	100	100
S13	64	32	0	2	100	100	100	100
S14	64	24	0	2	100	100	100	100
S15	64	27	0	5	100	100	100	100
S16	65	36	0	3	100	100	100	100
S17	69	38	0	13	88	100	92	100
S18	70	68	40	0	58	100	58	100
S19	70	36	20	0	100	100	100	100
S20	71	48	0	2	92	100	100	100
S21	73	39	0	5	100	96	100	100
S22	73	29	10	10	100	100	100	100
S23	73	49	0	2	92	79	88	100
S24	74	41	20	20	100	100	79	100

Note. HFPTA = high-frequency pure-tone average at 1000 Hz, 2000 Hz, and 4000 Hz.

All participants self-reported that they had never had a hearing evaluation or had worn or tried a hearing aid prior to participating in this study. All participants in this study were native speakers of English and passed the Short Portable Mental Health Status Questionnaire (Pfeiffer, 1975), a screening test of cognitive impairment. Participants were paid an hourly wage for their participation. Institutional review board approval was obtained prior to commencement of this study in accordance with the Syracuse University Institutional Review Board committee.

Amplification

Experimental group participants were fitted with ReSound Alera 9 receiver-in-canal hearing aids coupled to open dome ear molds, bilaterally. Hearing aid gain was prescribed using the desired sensation level (Version 5) hearing aid fitting algorithm (Scollie et al., 2005). The desired sensation level algorithm targets were generated using Avanti 3.2 software in NOAH 3 and verified with the audio scan Verifit VF-1 real ear system (Dorchester, Ontario, Canada). The hearing aids were adjusted so that the hearing aid output was verified to be within 5 dB of the prescribed target values at 0.25, 0.5, 1, and 2 kHz, and within 10 dB at 4 kHz and 6 kHz with an input signal of 70 dB sound pressure level. The hearing aids were set to have two programs: (a) omnidirectional, and (b) adaptive directional/noise reduction. The frequency response of the hearing aid and the compression parameters were equated across the two programs. All other programs and the volume control were disabled.

Each participant received a hearing aid orientation session in which hearing aid use and care were explained. The Practical Hearing Aid Skills Test-Revised (PHAST-R; Desjardins & Doherty, 2009; Doherty & Desjardins, 2012), an eight-item questionnaire that measures basic hearing aid use and care skills, was administered to participants at their initial hearing aid fitting session, after 2 weeks of hearing aid use, and at 6 weeks of hearing aid use. This provided an objective measure of the participants' ability to correctly use and care for their hearing aids. The eight tasks on the PHAST-R cover the following skills: (a) hearing aid insertion, (b) hearing aid removal, (c) opening the battery door, (d) changing the hearing aid battery, (e) cleaning the aid, (f) manipulating the volume control, (g) telephone use, and (h) use of the directional microphone or noise program. After each administration of the PHAST-R, participants were reinstructed on tasks they did not perform correctly or did not know how to perform. Data logging in the hearing aids was used to track each participant's hours of hearing aid use. Data log information was recorded by the examiner during experimental test Sessions 3 and 4.

Subjective Test Measures

The Hearing Handicap Questionnaire (HHQ; Gatehouse & Noble, 2004) was used to assess hearing handicap. This survey is based on a 12-item standardized self-assessment inventory of questions related to the social limitations and emotional distress of hearing impairment. Responses are on a 5-point scale (*almost always, often,*

sometimes, rarely, never), with higher scores indicating greater handicap.

The Hearing Aid Attitude Questionnaire (HARQ; Hallam & Brooks, 1996), a 40-question self-assessment inventory, was used to assess an individual's attitudes and emotions toward hearing aids and hearing loss across seven subscales; personal distress/inadequacy (PDI), hearing aid stigma (HAS), hearing loss stigma (HLS), aid not wanted (ANW), minimization of loss (MOL), pressure to be assessed (PTA), and positive expectation (PE). For each item, the respondent must choose one of three options: true, partly true, or not true. The responses are scored 3, 2, and 1, with a higher score indicating the specified attitude more strongly.

The International Outcome Inventory for Hearing Aids (IOI-HA; Cox & Alexander, 2002), a seven-item questionnaire, was used to assess the effectiveness of the hearing aid fitting. The seven questions on the IOI-HA address hearing aid daily use, benefit, residual activity limitations, satisfaction, residual participation restrictions, impact on others, and quality of life. Participants were instructed to choose a value from 1 to 5 for each of the seven outcome items (higher scores indicate a more favorable outcome).

Procedure

All testing was conducted in five test sessions over 8 weeks. Experimental group participants wore the hearing aids for 6 weeks during the study. We selected a 6-week time period for hearing aid use because it is similar in length to a typical clinical hearing aid trial period (i.e., 30–45 days). When participants were not seen in the laboratory (i.e., Weeks 3 and 5), they were contacted via telephone by the examiner to encourage hearing aid use, answer questions, and troubleshoot hearing aid problems. During Session 1 (before hearing aid fitting), all testing was performed unaided, and hearing thresholds were obtained at the standard audiometric test frequencies 0.25–8.0 kHz for air and at 0.5–4.0 kHz for bone with a GSI-61 audiometer using standard audiometric test procedures (American National Standards Institute [ANSI], 2004). Speech recognition testing in quiet and background noise (i.e., speech-shaped noise [SSN] at +8-dB signal-to-noise ratio [SNR]) was measured using the Revised Speech Perception in Noise Test (R-SPIN; Bilger, Nuetzel, Rabinowitz, & Rzeczkowski, 1984). A list of 50 sentences from the R-SPIN was presented at 70-dB sound pressure level through a GSI speaker at 0 degrees azimuth in quiet and in +8-dB SSN. Participants were required to verbally repeat the last word in each sentence and to write it on an answer sheet. The test was scored as the percentage of correctly repeated final key words. Last, the HHQ and the HARQ were administered in a randomized order. One week later, participants returned to the laboratory for Session 2. During Session 2, participants were fitted with the hearing aids, and the PHAST-R was administered. Two weeks after their initial hearing aid fitting, participants returned to the laboratory to participate in Session 3. During Session 3,

hearing aid orientation information was reviewed. The PHAST-R (Doherty & Desjardins, 2012) was administered, and participants were reinstructed on tasks they did not perform correctly or did not know how to perform. In addition, participants' aided speech recognition in quiet and in an SSN at +8-dB SNR was measured using two lists of 50 sentences from the R-SPIN, following the standard R-SPIN test instructions. The hearing aids were set to the noise reduction program for all speech testing in noise. After wearing the hearing aids for 6 weeks, participants returned to the laboratory for Session 4. In Session 4, participants were administered the HHQ, the HARQ, and the IOI-HA in a randomized order. In addition, participants were administered the PHAST-R. At the end of Session 4, participants returned the hearing aids. Two weeks after they returned the hearing aids, participants came back to the laboratory to participate in the final test session, Session 5, during which the HARQ was administered. We chose to have participants be tested 2 weeks after they returned their hearing aids to give them time to experience what it was like to no longer wear hearing aids.

The age-matched control group followed the same testing procedure as the experimental group, except they were not fitted with amplification. Control participants completed Session 1 as described for the experimental participants. Six weeks after they completed session 1, they returned to the laboratory for a second test session (i.e., Control Session 2). During Control Session 2, the control participants were administered the HHQ and HARQ in a randomized order. Two weeks later, the control group returned to the laboratory to complete Control Session 3, during which the HARQ was administered. See Table 2 for the study protocol for the experimental and control participants.

Results

Hearing Aid Trial

The participants' hours of hearing aid use and ability to use and care for their hearing aids were closely monitored over the 6-week hearing aid trial. Hearing aid data log information was downloaded by the examiner during Sessions 3 and 4 for each experimental participant. Before the hearing data log information was downloaded, participants were asked to self-report their hearing aid use and reasons for nonuse. Hearing aid use ranged from 1.2 to 20 hr per day at 4 weeks of hearing aid use and 1.4 to 20 hr per day after 6 weeks of hearing aid use. On average, participants used their hearing aids 12 hr per day ($SD = 5.6$ hr) during the 6-week hearing aid trial. Two of the participants averaged less than 5 hr of use per day over the 6 weeks. Both of these participants reported that they did not use the hearing aids daily because they did not think their hearing loss was severe enough to warrant daily hearing aid use. See Table 3 for individual hours of hearing aid use.

The PHAST-R was administered to participants three times over the 6 weeks to ensure participants were

Table 2. Description of the 8-week experimental protocol for the experimental and control group participants.

Session	Experimental measures
Session 1 (pre-hearing aid fitting), control-session 1	Audiometric testing Hearing Handicap Questionnaire (HHQ)
Session 2 (hearing aid fitting)	Hearing Aid Attitude Questionnaire (HARQ) Unaided reading span test in quiet & +8-dB signal-to-noise ratio Hearing aid fitting and orientation
Session 3 (after 2 weeks of hearing aid use)	Practical Hearing Aid Skills Test-Revised (PHAST-R) PHAST-R Hearing aid data-log information retrieved
Session 4 (after 6 weeks of hearing aid use), control-session 2 ^a	Aided speech recognition testing in quiet & +8-dB signal-to-noise ratio HHQ HARQ PHAST-R International Outcome Inventory for Hearing Aids (IOI-HA) Participant returned hearing aid
Session 5 (2 weeks after hearing aid return), control-session 3	Hearing aid data log information retrieved HARQ

^aDuring control-session 2, control group participants completed only the HHQ and HARQ.

able to correctly use their hearing aids. The mean score on the PHAST-R was 78% ($SD = 8.4$) immediately after the initial hearing aid orientation, 91% ($SD = 6$) after 2 weeks of hearing aid use, and 94% ($SD = 6$) after 6 weeks of hearing aid use. All participants were able to insert and remove their hearing aids correctly. Participants had the most difficulty cleaning their hearing aids. See Table 3 for participants PHAST-R scores.

Speech recognition scores on the R-SPIN were obtained unaided and aided in quiet and in background noise for each participant. Unaided speech recognition scores on the R-SPIN were 96% ($SD = 9$) in quiet and 95% ($SD = 9$) in the +8-dB SNR SSN. Aided speech recognition scores on the R-SPIN were 99% ($SD = 4$) in quiet and 100% ($SD = 0$) in +8-dB SNR SSN. On the basis of a paired samples t test, there was no significant difference ($t = 1.44$, $p = .16$) in

Table 3. Participants' average hours of hearing aid use per day over the 6-week hearing aid trial, Hearing Handicap Questionnaire (HHQ) scores, and individual scores on the PHAST-R.

Participant	Hearing aid use (hr/day)	HHQ unaided	HHQ aided	PHAST-R		
				Session 2 (hearing aid fitting)	Session 3 (2 weeks of use)	Session 4 (6 weeks of use)
S1	12	26	21	89	100	100
S2	12	49	46	73	98	95
S3	8.5	27	24	60	93	93
S4	20	33	27	75	93	100
S5	8	27	12	81	90	100
S6	18	41	31	83	98	95
S7	6.6	16	13	76	96	100
S8	12	33	33	65	92	85
S9	11	33	22	70	86	98
S10	18	33	27	88	89	100
S11	5	23	21	71	81	88
S12	19	39	17	76	88	86
S13	19	37.5	12	89	81	98
S14	12	25	20	74	82	89
S15	11.6	35	28	83	89	93
S16	21	30	24	79	93	93
S17	5.5	39	36	87	94	95
S18	20	41	26	81	90	90
S19	15	29	18	77	96	98
S20	4.7	24	14	73	86	77
S21	1.5	13	13	70	77	81
S22	8.5	32	21	83	83	93
S23	8	30	29	82	88	85
S24	11	26	20	83	92	82

participants' speech recognition scores in quiet in the unaided and aided listening conditions. There was a statistically significant ($t = 2.19$, $p = .04$) difference in speech recognition in noise scores from the unaided to aided listening conditions. However, a change in scores from 95% to 100% would not be considered clinically significant, as both scores represent excellent speech recognition (see Table 1 for participants' individual speech recognition scores).

IOI-HA

Table 4 shows the IOI-HA scores for each participant. Mean scores on the IOI-HA after 6 weeks of hearing aid use were 4.3 ($SD = 0.8$), 3.5 ($SD = 1.0$), 3.8 ($SD = 0.9$), 3.8 ($SD = 1.3$), 4 ($SD = 1.23$), 4.6 ($SD = 0.5$), and 3.5 ($SD = 1.1$) on the hearing aid use, benefit, residual activity limitations, satisfaction, residual participation restrictions, imposition on others, and quality of life measures, respectively. Participants' scores were within or above the published norms for each of the seven subscales according to the group data for clients with mild-to-moderate hearing loss, indicating that the trial with hearing aids was successful (Cox, Alexander, & Beyer, 2003).

HHQ

Hearing handicap was measured before participants were fitted with hearing aids (i.e., Session 1) and at 6 weeks of hearing aid use (i.e., Session 4). Figure 2 shows hearing handicap scores for the participants before and after hearing aid fitting (i.e., Sessions 1 and 4) and for the control group during Control Sessions 1 and 2. Mean scores on the HHQ were 31 ($SD = 8.1$) before participants were fitted

with amplification and 23 ($SD = 8.2$) after 6 weeks of using hearing aids. Mean HHQ scores for the control group were 16.9 ($SD = 8$) at Control Session 1 and 16.3 ($SD = 5.4$) at Control Session 2. To compare differences in hearing handicap across testing sessions and between the experimental and control groups, a 2×2 full factorial repeated measures analysis of variance was performed on the within-subject factor test session (Session 1 and Session 2) and the between-subjects factor group (experimental and control). All post hoc comparisons were completed using the Bonferroni adjustment for multiple comparisons.

There were significant main effects of session, $F(1, 36) = 14$; $p = .001$; $\eta_p^2 = .3$, and group, $F(1, 36) = 19.8$; $p < .001$; $\eta_p^2 = .35$, and a significant two-way interaction of Session $\times$ Group, $F(1, 36) = 16.2$; $p < .001$; $\eta_p^2 = .31$. Post hoc analysis indicated that participants in the experimental group had significantly ($p < .05$) higher scores on the HHQ than participants in the control group. Scores on the HHQ were significantly different between Session 1 and Session 2 for the experimental group ($p < .001$). That is, participants' hearing handicap was significantly less after 6 weeks of using hearing aids than before participants were fitted with the hearing aids. However, there was no significant difference in HHQ scores for the control group between Sessions 1 and 2 ($p > .05$), which indicates the change in hearing handicap observed in the experimental group was likely due to wearing the hearing aids.

HARQ

Attitudes toward hearing loss and amplification use were measured across seven subscales (i.e., PDI, HAS,

Table 4. Participants' scores on the IOI-HA.

Participant	Use	Benefit	Residual activity limitations	Satisfaction	Residual participation restrictions	Impact on others	Quality of life
S1	3	3	4	5	4	4	3
S2	5	5	4	5	1	5	5
S3	3	2	4	2	5	4	2
S4	5	5	4	5	3	5	5
S5	5	3	5	5	5	5	5
S6	5	3	3	4	4	5	4
S7	4	2	1	4	5	5	4
S8	5	4	5	5	5	5	4
S9	5	3	4	3	5	5	3
S10	4	4	4	4	4	5	3
S11	3	3	5	3	5	5	3
S12	5	5	4	5	4	5	5
S13	4	5	5	5	1	4	5
S14	3	2	2	1	5	5	2
S15	5	4	3	3	5	5	1
S16	5	2	4	2	4	5	2
S17	5	5	5	5	5	5	4
S18	5	4	3	4	4	5	4
S19	4	3	4	3	3	4	3
S20	4	4	4	4	5	4	4
S21	3	2	4	1	5	4	2
S22	5	4	4	5	4	4	4
S23	4	4	4	3	2	5	4
S24	5	4	4	4	4	4	4

Figure 2. Mean Hearing Handicap Questionnaire (HHQ) scores for the experimental and control group participants obtained during session 1 and session 4. Error bars represent ± 1 SD.

HLS, ANW, MOL, PTA, and PE) using the HARQ. Table 5 shows mean scores and standard deviations of the mean for the experimental and control group participants, respectively, for the three test sessions, which spanned an 8-week period. A repeated measures analysis of variance was performed to measure changes in attitude over time and across experimental and control groups using the within-subject factors attitude (i.e., PDI, HAS, HLS, ANW, MOL, PTA, PE) and session (Session 1, Session 4, Session 5) and the between-subjects factor group. Greenhouse–Geisser corrections for violations of sphericity were applied when indicated. All post hoc testing was conducted using pairwise comparisons with a Bonferroni-adjusted critical alpha level. There was a significant main effect for attitude, $F(6, 216) = 101$; $p < .001$; $\eta_p^2 = .74$, and a significant

three-way interaction of Session $\times$ Attitude $\times$ Group, $F(12, 432) = 3.14$; $p < .001$; $\eta_p^2 = .1$.

Post hoc testing showed that PDI was significantly ($p < .05$) reduced in the experimental group participants after using hearing aids for 6 weeks (Session 4) compared with scores before participants started the hearing aid trial (Session 1). However, there was no significant ($p > .05$) difference in PDI measures between the pre-hearing aid fitting measure (Session 1) and 2 weeks after the hearing aid trial ended (Session 5). Thus, PDI attitudes returned back to pre-hearing aid fitting levels after 2 weeks of not using the hearing aids. There was no significant ($p > .05$) change in PDI across sessions for the control group. This indicates that PDI was likely reduced as a result of using the hearing aids.

HAS was significantly ($p < .05$) less at 6 weeks of hearing aid use, and at 2 weeks after hearing aid use than before the experimental group participants were fitted with the hearing aids. Note, there were no significant differences ($p > .05$) between scores at 6 weeks of hearing aid use and 2 weeks after hearing aid use. Thus, HAS remained lessened even after the hearing aid trial ended. There was no significant ($p > .05$) change in HAS across sessions for the control group. This indicates that HAS was likely reduced as a result of using the hearing aids. There were no other significant within- or across-subject main effects or interactions for the HARQ.

Discussion

The purpose of the present study was to assess the psychosocial benefits of a 6-week trial with hearing aids for adults who have not previously sought treatment for their hearing loss. This is a unique group of individuals to study because although they reported having difficulty understanding speech for an average of 6 years in quiet

Table 5. Mean scores and standard deviations of the mean on the Hearing Attitudes in Rehabilitation Questionnaire (HARQ) for the seven attitude measures for experimental (regular font) and control participants (italic font).

Attitude Measure	Hearing Aid Use		
	Pre-hearing aid fitting	6 weeks of hearing aid use	2 weeks post-use
Personal Distress/Inadequacy (PDI)	15.3 (3.4) <i>11.2 (2.4)</i>	13.8 (3.5)* <i>11.6 (2.8)</i>	14.2 (4.3) <i>12 (4.5)</i>
Hearing Aid Stigma (HAS)	13 (2.7) <i>11.1 (2.2)</i>	10.5 (1.3)* <i>11.3 (1.7)</i>	10.4 (1.5)* <i>11 (2.3)</i>
Hearing Loss Stigma (HLS)	6.3 (1.1) <i>6.3 (1.6)</i>	6 (1.1) <i>6 (1.1)</i>	5.9 (1.2) <i>6 (1.6)</i>
Aid Not Wanted (ANW)	6.8 (2) <i>9.5 (2.1)</i>	7.5 (2.5) <i>9.6 (2.5)</i>	7.5 (2.4) <i>10 (3.2)</i>
Minimization of Loss (MOL)	10 (3) <i>14.4 (2.7)</i>	10.8 (3.3) <i>14.6 (2.9)</i>	11 (3.3) <i>14 (3.1)</i>
Pressure To Be Assessed (PTA)	4.0 (1.4) <i>3.3 (.77)</i>	3.9 (1.2) <i>3.1 (.25)</i>	4.2 (1.5) <i>3.3 (.8)</i>
Positive Expectation (PE)	5.4 (1.6) <i>6.4 (1.3)</i>	6.2 (1.7) <i>6.1 (1)</i>	6.4 (1.5) <i>6.6 (1.65)</i>

*Significant change ($p < .05$) from pre-hearing aid fitting session.

listening conditions and 8 years in background noise, this is less than the average 10-year time frame most individuals wait until they received treatment for their hearing loss. The experimental participants' hearing handicap scores on the HHQ ranged from 13 to 49 ($M = 30.9$, $SD = 7.9$) prior to using hearing aids. These perceived hearing handicap scores are consistent with those reported by Hickson and Scarinci (2007), in which 178 older adults with hearing impairment scored, on average, 27.97 ($SD = 9.36$) on the HHQ prior to intervention. In the present study, participants' hearing handicap was significantly reduced after using hearing aids daily for about 12 hr per day for 6 weeks. This result is consistent with several studies that have shown hearing handicap is significantly reduced as a function of intervention with amplification in adults (Abrams et al., 1992; Dalton et al., 2003; Mulrow, Tuley, & Aguilar, 1992).

Participants' perceived personal distress and/or inadequacies due to hearing impairment as measured by the PDI scale on the HARQ were also significantly reduced after using hearing aids consistently for 6 weeks. The PDI subscale of the HARQ measures an individual's own recognition of difficulties he or she may have in communication that have a significant impact on his or her personal well-being. For example, an individual may recognize that they feel isolated from others, inadequate, and/or depressed due to their failures in communication. Participants who score high on this subscale of the HARQ consider hearing loss as having these adverse effects on them. It has been shown that individuals who experience personal distress and/or inadequacy as a result of their hearing loss are more likely to cope with their feelings by avoiding social situations and keeping quiet during a conversation (Brooks & Bulrner, 1981). Whereas PDI was significantly reduced during the hearing aid trial, once the participants stopped using the hearing aids, their scores on the PDI subscale of the HARQ increased to levels similar to those before they were first fitted with amplification.

Participants in this study also perceived that the stigma of hearing aids was significantly reduced after trying hearing aids for 6 weeks. *Stigma* specifically refers to an attribute about hearing aids that is deeply discrediting to an individual (Dobbs et al., 2008; Sandelowski, Lambe, & Barroso, 2004). Previous studies have reported that HAS contributes to the nonadoption of hearing aids in adults with hearing impairment (Kochkin, 2012; Southall, Gagné, & Jennings, 2010). For example, in the MarkeTrak VIII survey of over 2,000 adults with hearing impairment who had not adopted hearing aids, Kochkin (2012) found that nearly half of the respondents in the survey indicated that stigma contributed to their desire not to wear hearing aids. Wallhagen (2010) examined HAS in older adults and their primary communication partners. They found that perceived stigma affected participants' initial acceptance of hearing loss, their decision to be tested or seek treatment, the type of hearing aid they selected, and when and where they wore hearing aids. Note, we found in the current study that not only was stigma reduced during the hearing aid trial,

but that the reduction in hearing aid stigma was sustained even after participants had stopped using the hearing aids.

Participants in this study did not change their minimization of hearing impairment after trying the hearing aids for 6 weeks. People who minimize their hearing loss, generally, acknowledge that they may have some hearing impairment, but they do not consider it to be a significant problem (Hallam, Ashton, Sherbourne, & Gailey, 2008). This would be indicated by a high score on the MOL subscale of the HARQ. Most participants in this study scored relatively low on this subscale before they were fitted with the hearing aids. Thus, it was not surprising that we did not see significant changes in the minimization of hearing loss after using hearing aids, because participants in the current study were not minimizing their hearing loss prior to intervention.

An aged-matched control group, who were not fitted with hearing aids, was included in this study to ensure that significant changes in the experimental group on the psychosocial measures were not a result of being retested on the experimental test measures over the 8 weeks of testing. The findings in the current study are strengthened by the fact no significant changes on the HHQ or HARQ across test sessions were observed in the control group not fitted with hearing aids. Thus, the significant changes in the experimental groups' psychosocial scores were not a result of being retested over time. Although the control group in this study was matched to the participant group on age, their hearing thresholds were not matched. This is a limitation of the current study and may limit the interpretation of the results.

In the present study, participants had relatively excellent unaided speech recognition scores in quiet and in background noise. Thus, on the basis of this objective clinical test measure, a clinician may not have recommended amplification for some of these individuals. However, after wearing hearing aids for 6 weeks, hearing handicap, hearing aid stigma, and personal distress/inadequacy were significantly reduced. Thus, the results from the current study suggest that even adults who report having trouble understanding speech in quiet and/or in background noise despite having relatively excellent speech recognition scores could potentially benefit from hearing aids.

Conclusions

Trying hearing aids for as little as 6 weeks can change a person's attitudes towards wearing hearing aids and decrease hearing handicap. This suggests the need for future research to specifically assess the impact of a clinical hearing aid trial on a patient's decision to obtain hearing aids.

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