

Changes in Self-Assessment of Hearing Handicap Over the First Year of Hearing Aid Use By Older Adults

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The purpose of the present study was to monitor the reaction to hearing aid use over 3-week, 3-month, and one-year intervals in a sample of 25 older adults. The Hearing Handicap Inventory for the Elderly (HHIE) was used to assess perceived hearing aid benefit (as measured by reduction in handicap) before and after a period of hearing aid use. Results of this study indicated the feasibility of using the HHIE to monitor changing reaction to a hearing aid over time. Mean scores on the HHIE indicated a significant reduction in perceived handicap after 3 weeks of hearing aid use, a significant increase during the interval from 3 weeks to 3 months, and a stabilization from 3 months to one year.

A recent survey by the American Speech-Language-Hearing Association (ASHA) estimated 70% of ASHA-certified audiologists providing clinical services dispense hearing aids and assistive/augmentative devices to hearing-impaired clients (ASHA, 1988). With increasing participation of audiologists in the dispensing process and attention to quality assurance comes the need to document efficacy of hearing aid fittings. Many methods have been used to quantify success of hearing aid fittings, including frequency of hearing aid use, sound field and real ear measurements, frequency with which major changes in the original hearing aid fitting occur, acceptability ratings by clients, and use of self-assessment scales (Byrne & Dillon, 1986; Dillon & Murray, 1987; Hawkins & Schum, 1984; Humes, Hipskind, & Block, 1988; Mason & Popelka, 1986; Newman & Weinstein, 1988; Rines, Stelmachowicz, & Gorga, 1984; Walden, 1982).

Self-assessment scales which quantify the perceived social and emotional impact of hearing impairment as well as communication handicap are seen by some researchers to be sensitive measures of hearing aid benefit (Birk-Nielsen

& Ewertsen, 1974; Demorest & Erdman, 1988; Dempsey, 1986; Malinoff & Weinstein, in press; Newman & Weinstein, 1988; Tannahill, 1979; Walden, Demorest, & Hepler, 1984). Studies that have employed self-report scales have varied in their subject selection criteria, the scales used to measure outcome, and test-retest intervals adopted to measure benefit.

The question of the best test-retest time interval over which to assess hearing aid benefit is still unresolved. Several researchers have documented benefit using a brief time interval ranging from 3 to 6 weeks, while others have used longer intervals of 6 months to one year. Birk-Nielsen & Ewertsen (1974) employed the Social Hearing Handicap Index (SHHI) over a 3- to 6-week time interval to determine the benefit obtained from the hearing aid. While subjects did show benefit over this brief interval, the reliability data on the SHHI jeopardizes the results of the study.

Tannahill (1979), using the Hearing Handicap Scale (HHS), documented hearing aid benefit over a 4-week time interval in a group of 24 adults ranging in age from 56-91 years. The HHS is heavily weighted with social/situational questions so that the study does not enable conclusions about change in emotional response to hearing impairment with hearing aid use.

Dempsey (1986) administered the Hearing Performance Inventory (HPI) to 10 adults prior to and following 6 weeks of hearing aid use in order to measure hearing aid success. He found that scores on the understanding-of-speech-and-intensity sections changed significantly following 6 weeks of hearing aid use whereas the score quantifying the users' reaction to hearing loss did not. Dempsey (1986) reasoned that perhaps rehabilitation is necessary to effect a change in the emotional reaction to hearing aid use.

Malinoff and Weinstein (in press) used the Hearing Handicap Inventory for the Elderly (HHIE) to determine the benefit obtained from hearing aid use by 45 elderly hearing aid users over a 3-week test-retest time interval. These authors found a large reduction in perceived emotional and situational handicap as measured by the HHIE but questioned whether the reduction would be sustained past that period. They reasoned that the initial change in perception may have been an artifact or merely a reflection of early enthusiasm for the hearing aid.

Newman and Weinstein (1988) employed the HHIE prior to and following one year of hearing aid use. Though the authors found the HHIE to be a sensitive measure of hearing aid benefit, they questioned whether the one-year interval was too long.

The purpose of the present study was to monitor the reaction to and assess the benefit of hearing aid use over 3-week, 3-month, and one-year time intervals in a sample of older adults. The objective of the longitudinal testing was to measure changes in behavior and self-perceived handicap during the first year of hearing aid use. The 3-week interval was chosen because (a) it is the time within which a hearing aid is often returned if rejected and (b) it is the time when audiologists make modifications and adjustments to the hearing aid. Demorest and Erdman (1988) advocated a brief time interval (a few days or

weeks) because of the reduced probability that personal and environmental factors would intervene to influence hearing aid use. The additional time intervals were employed in the present study to continue to monitor hearing aid use. The 3-month interval is useful because it is usually within the warranty period and modifications can still be made free of charge. The one-year time interval may be appropriate to see if the client needs additional help such as further counseling, hearing aid modifications, or assistive listening devices to supplement the hearing aid.

METHOD

Subjects

Subjects for this study were 25 persons over the age of 55 referred to an audiology clinic for hearing aid selection, dispensing, and orientation. The mean age of subjects was 70.3 years ($SD = 11.3$) with ages ranging from 55 to 90 years. All had been medically cleared to wear a hearing aid and were first-time hearing aid users. All subjects were living at home, and were healthy and active enough to travel to the center independently.

Materials and Procedures

The Hearing Handicap Inventory for the Elderly (HHIE) by Ventry and Weinstein (1982) was used to assess the perceived hearing handicap pre- and post-fitting. The internal consistency and test-retest reliability of the HHIE are quite high ($r > .85$) (Weinstein, Spitzer, & Ventry, 1986). The inventory is composed of a 13-item emotional scale and a 12-item social/situational scale. The emotional section is sensitive to attitude and emotional response to auditory deficit. The social scale taps the perceived effects of the hearing loss in a variety of situations. Subjects are asked to respond *yes*, *sometimes*, or *no* to each item. Scoring of the HHIE calls for 4 points to be given to *yes*, 2 to *sometimes*, and 0 for *no*. Scores for the entire scale range from 100%, indicating significant handicap, to 0%, suggesting no perceived handicap. A score of 18% or greater is suggestive of some degree of self-perceived handicap according to Weinstein and Ventry (1983).

All subjects underwent a complete audiometric evaluation, including pure-tone, speech, and immittance audiometry. Unaided speech recognition scores were obtained using CID W-22 word lists at 35 or 40 dB above speech thresholds. MCLs and UCLs were obtained for speech. A hearing aid was selected following the audiometric evaluation. All subjects but two were fitted monaurally.

The HHIE was administered face-to-face to each client before the hearing aid dispensing session. At the time of dispensing, the subject received one hour of counseling regarding the operation and use of the hearing aid. Subjects were instructed to return for a hearing aid check after 3 weeks of hearing aid use. At that time, the scale was readministered. Subjects were asked to answer the questions according to how they felt while wearing the hearing aid over the

previous 3 weeks. The HHIE was then readministered 3 months and again one year after the hearing aid was dispensed. The questionnaire was mailed to the subjects in a stamped self-addressed envelope at each of these two intervals. Again, the subject was asked to respond to the HHIE according to the way he/she currently heard while wearing the hearing aid in everyday listening situations.

RESULTS

Results of the audiometric evaluation showed that all subjects had bilateral sensori-neural hearing losses. The 3-frequency pure-tone average (500, 1000, and 2000 Hz) of the fitted ear was 44.3 dB HL ($SD = 12.7$; range = 15-70 dB). Based upon the mean pure-tone average of the fitted ear, 9 of the 25 hearing aid users had a mild hearing loss; 10, a moderate hearing loss; and 6, a severe loss. Speech recognition scores ranged from 28% to 92% ($M = 72.3$; $SD = 23.9$).

Figure 1 summarizes the scores on the HHIE for the 25 clients prior to and during hearing aid use over a one-year period. The mean score on the pre-fit test was 35% ($SD = 18.8$) with scores ranging from 8% to 74%. The mean post-fit score was 5.4% ($SD = 16.1$) after 3 weeks, 19.7% ($SD = 16.1$) after 3 months, and 19.5% ($SD = 15.5$) after one year. Figures 2 and 3 respectively, summarize the mean raw scores on the situational and emotional sections of the HHIE during the same time periods.

Statistical analyses using a *t*-test for correlated samples indicated a significant reduction in perceived handicap following 3 weeks of hearing aid use ($t = 8.91$; $df = 24$; $p < .0001$). Differences were statistically significant for the emotional ($t = 6.63$; $df = 24$; $p < .0001$) and the situational scales of the HHIE ($t = 8.18$; $df = 24$; $p < .0001$) as well. Nineteen clients (76%) had mean scores which differed from the pre-fit scores by more than 18%, which defines the bounds of the 95% confidence interval for a true change attributed to intervention (Weinstein, Spitzer, & Ventry, 1986). Of the 25 clients, 4 had pre-fit scores on the HHIE which were less than 18%, thus permitting little room for improvement. Significant mean differences also emerged between the HHIE pre-fit test scores and those at 3 months post-fitting ($t = 4.65$; $df = 24$; $p < .01$).

As is evident from Figure 1, the mean score rose between 3 weeks and 3 months, suggesting an increase in perceived handicap over that period. This difference was statistically significant for the total score ($t = 3.28$; $df = 24$; $p < .01$), the situational scale score ($t = 3.37$; $df = 24$; $p < .01$), and emotional scale score ($t = 4.49$; $df = 22$; $p < .01$). The difference between the mean HHIE score obtained at 3 months and that obtained at one year after a hearing aid was dispensed did not achieve statistical significance ($t = .12$; $df = 24$; $p > .05$) (Figure 1). The lack of significant change was also true for both the situational ($t = 24$; $df = 24$; $p = .91$) and the emotional scales of the HHIE ($t = -.26$; $df = 24$; $p = .79$).

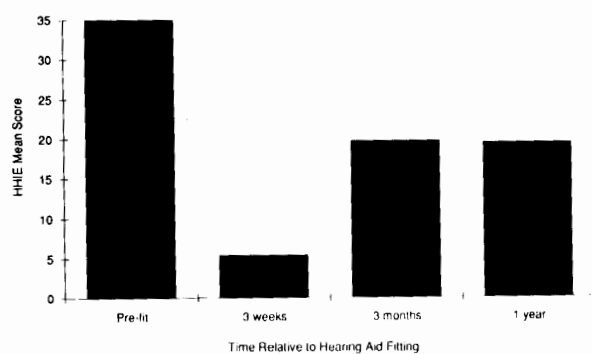


Figure 1. Mean scores on the Hearing Handicap Inventory for the Elderly over one year for 25 subjects. Maximum score = 100. Higher score indicates greater perceived handicap.

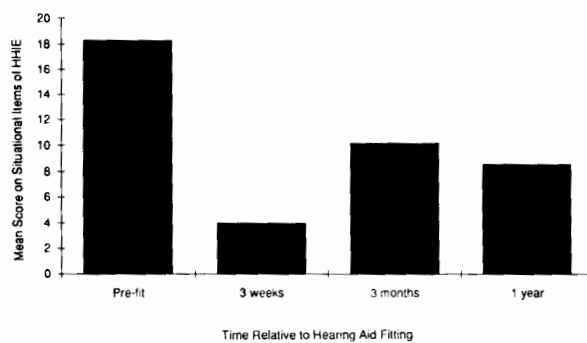


Figure 2. Mean scores on the situational scale of the Hearing Handicap Inventory for the Elderly over one year for 25 subjects.

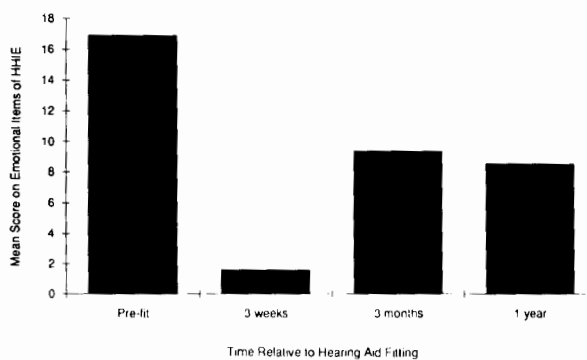


Figure 3. Mean scores on the emotional scale of the Hearing Handicap Inventory for the Elderly over one year for 25 subjects.

DISCUSSION

Results of the present study indicate that the HHIE is sensitive to changing perceptions of handicap associated with hearing aid use. One of the major findings of the study was the large mean reduction in perceived handicap 3 weeks after a hearing aid was dispensed, which appeared to stabilize by 3 months after dispensing. This initially favorable reaction to the hearing aid may be because many people often wait several years before finally purchasing a hearing aid and are pleasantly surprised by the benefits they receive.

Dempsey's data (1986) appear to differ somewhat from the present findings. He noted changes in understanding of speech, but not in the emotional perception of the handicap and suggested the need for further intervention to reduce the emotional handicap. Differences in results between the two studies may be due to the measurement tools employed. Dempsey's subjects completed the HPI, which is not standardized on the elderly, and thus may not be tapping the reactions of the older adults.

The emergence of a significant increase in perceived handicap with continued use of a hearing aid after the initial few weeks is a pattern often seen by hearing aid dispensers. After the initial positive feelings generated from the use of the aid have worn off, clients become more aware of its drawbacks and limitations. As one client explained, once he started wearing an aid he was suddenly more aware of different sounds that he had not heard, and as he heard more he desired more from his hearing aid. Thus, although a hearing aid significantly reduces the handicapping nature of a hearing impairment, scores on the HHIE after 3 months of hearing aid use are probably more realistic than those measured after 3 weeks. Although it may be tempting to suggest a trial period of 3 months, this would be unrealistic and inappropriate, as clients can determine benefit during the first several weeks.

There are many factors which may affect success of a hearing aid fitting and the benefit a client receives from a hearing aid. The following two clients had very different reactions to their hearing aids. LC is an 86-year-old woman who was not very satisfied with her aid after several months of use. Her pre-fit HHIE score was 30%. This score decreased to 0% at the end of 3 weeks of hearing aid use, but increased to 36% after 3 months, reflecting her dissatisfaction. LC had a bilateral sloping hearing loss, but because she felt she could handle only one hearing aid she was fitted monaurally. The monaural fitting, as well as her age, probably contributed to the eventual lack of perceived benefit.

In contrast to the above client, FL is a 65-year-old male with a bilateral sharply sloping sensori-neural hearing loss. He was fitted with binaural amplification, and was quite happy with his aids. His scores on the HHIE were 58% pre-fitting, 2% at 3 weeks, and 16% at 3 months after hearing aid fitting. Both clients' scores stabilized after the 3 month period.

There appears to be a stabilization of perceived benefit obtained from a hearing aid by 3 months of use. Though 3 months post-fitting may ultimately prove to

be a critical time at which to monitor hearing aid use, and may be the best time at which to use the HHIE, additional data are needed at brief intervals (such as 6 and 8 weeks) in order to determine the best intervals at which to monitor perceived benefit. Ultimately, it may prove beneficial to continue monitoring hearing aid use with the HHIE over longer periods than one year. Following stabilization, it would be beneficial for audiologists to help their clients to improve their life style through the use of assistive listening devices and aural rehabilitation as indicated.

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