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Expectations About Hearing Aids and Their Relationship to Fitting Outcome

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Abstract

Clinicians are often concerned that unrealistic prefitting expectations can have a negative impact on fitting success for new hearing aid wearers. To investigate this concern and to explore the potential value of measuring expectations, we developed the Expected Consequences of Hearing aid Ownership (ECHO) questionnaire as a companion to the Satisfaction with Amplification in Daily Life questionnaire. Four experiments were conducted to (1) determine realistic expectations for hearing aids, (2) evaluate expectations of new users, (3) measure reliability of prefitting expectations, and (4) assess relationships between prefitting expectations and postfitting satisfaction. Novice hearing aid users were found to have stable prefitting expectations about hearing aids, and these expectations were unrealistically high for the typical individual. There were many different expectation patterns across subjects. Of the four subscales of the ECHO, only one was predictive of the corresponding satisfaction data. Potential clinical applications are described.

Key Words: Hearing aids, outcome measure, satisfaction

Abbreviations: ECHO = Expected Consequences of Hearing aid Ownership, SADL = Satisfaction with Amplification in Daily Life, 3FAHL = better-ear three-frequency (500–2000 Hz) pure-tone average hearing loss

In earlier times, the effectiveness of an intervention such as hearing aid fitting was often decided by the practitioner on the basis of technical measurements such as insertion gain or speech recognition scores. More recently, there has been widespread recognition that these types of data do not necessarily reflect the extent to which the intervention has been successful from the patient's point of view (e.g., Gatehouse, 1994; Humes et al, 1996). Although the technical data are essential for documenting the objective features of the fitting (verification), only the patient can determine how well the hearing aid has solved his or her hearing-related problems in everyday life and the extent to which his or her requirements for value, convenience, service, etc. have been met (validation).

With recognition of the centrality of the patient's opinion has come the mandate to employ scientifically defensible methods of quantifying subjective fitting outcome. Accordingly, several inventories have been developed or modified for this purpose. Most of the instruments developed to date are intended to measure subjective hearing aid benefit. These include the Hearing Aid Performance Inventory (Walden et al, 1984), the Hearing Handicap Inventory for the Elderly (Newman and Weinstein, 1988), the Abbreviated Profile of Hearing Aid Benefit (Cox and Alexander, 1995), and the Glasgow Hearing Aid Benefit Profile (Gatehouse, 1999), among others.

Hearing aid benefit is broadly defined as improvement in some domain that has been negatively impacted by the hearing loss. Benefit is clearly one of the important dimensions contributing to the overall success of a hearing aid fitting for a given individual. However, research with hearing aid users has established that there are actually at least six or seven dimensions, including issues such as service, comfort, and stigma management, that are also highly salient to the overall success of the fitting (e.g., Hawes et al, 1985; Kochkin, 1992). It can be argued that quantification of fitting outcome from the patient's point of view might best be accomplished using a variable that is more

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comprehensive than benefit. The term "satisfaction" seems appropriate to describe a global outcome variable that encompasses the full spectrum of issues that are important to the patient. Accordingly, we recently developed the Satisfaction with Amplification in Daily Life (SADL) Scale (Cox and Alexander, 1999) to provide a more global measurement of self-assessed hearing aid fitting outcome.

What Determines Satisfaction?

Collection and use of subjective fitting outcome data are still relatively novel for many practitioners and researchers. It is natural and appropriate that questions about validity should be asked. Ideally, an individual's hearing aid satisfaction would result from an interaction of only two variables: the actual hearing aid fitted and the technical skill and rehabilitative expertise of the dispenser. In fact, both anecdotal and scientific data support the supposition that other variables are also involved. For example, research has shown that certain personality traits are associated with self-reported fitting outcomes (e.g., Gatehouse, 1994; Cox et al, 1999a). Similarly, the lifestyle demands of the patient could be a factor because individuals who have an active social or professional life might be more (or less) satisfied with a hearing aid than those who tend to stay at home most of the time. Another variable that has often been suspected to influence satisfaction is the initial predisposition held by the patient toward hearing aids. An exploration of initial predispositions is the subject of this article.

Research exploring patients' predisposition toward hearing aids has referred to both "attitudes" and "expectations." Although it is theoretically possible to distinguish between the two terms (an expectation is a probabilistic statement, whereas an attitude is a state of mind), it is often difficult to make a clear distinction between them for a particular questionnaire item. In this article, we use the term "expectations" to refer to the patient's predisposition toward hearing aids. Past research involving both expectations and attitudes is relevant to this topic.

Role of Attitudes and Expectations

Self-report scales measuring attitudes or expectations about hearing aids have been devised for use in several research applications (e.g., Franks and Beckman, 1985; Surr and Hawkins, 1988; Seyfried, 1990; Kricos et al, 1991; Hallam and Brooks, 1996; Kochkin, 1998; Schum, 1999). Research questions have explored the attitudes associated with use and nonuse of hearing aids, the overall level of expectations, and the effects of prefitting counseling on expectations. Kricos et al (1991) reported that overall prefitting expectations about hearing aid performance were rather high among nonusers of hearing aids. By comparing corresponding expectation and benefit scores, Schum (1999) was able to verify that most new hearing aid users expect more benefit from their hearing aids than they ultimately receive. Many practitioners have expressed concern that overly high expectations might result in disappointed and dissatisfied patients, even when substantial reductions in disability and handicap are obtained from the hearing aids. In the prevailing consumer-driven rehabilitation environment, patient satisfaction with hearing aids is a primary outcome measure of fitting success. It is, therefore, of considerable importance for dispensers to understand the association, if any, between prefitting expectations and the long-term outcome of the fitting. Hearing aid practitioners need to know whether a patient's prefitting expectations about hearing aids are associated with the satisfaction he/she will ultimately experience. If so, what is the direction of the relationship? It can be argued that higher expectations are likely to be held by optimistic individuals who are also likely to experience greater benefit and satisfaction. Alternatively, it can be argued that high expectations lay the groundwork for disappointment if actual performance is found to be less than anticipated. These two scenarios call for very different action plans on the part of the clinician.

Although both researchers and clinicians have speculated about possible relationships between prefitting expectations and long-term benefit from or satisfaction with hearing aids, only a few studies have actually explored this issue. Some investigators have reported a lack of relationship between prefitting expectations about hearing aids and self-assessed benefit from hearing aid use (Bentler et al, 1993; Gatehouse, 1994). On the other hand, Schum (1999) reported that prefitting expectations about benefit in noise were significantly related to actual self-assessed benefit in noise. In Schum's study, patients who expected more help in noisy situations tended to report receiving more help in these settings.

Franks and Beckman (1985) demonstrated that attitudes toward hearing aids and hearing

aid use are related to acceptance of hearing aids by amplification candidates. However, it was not clear whether these attitudes were already formed before amplification was tried or whether pessimistic attitudes resulted from negative experiences with amplification. The work of Garstecki and Erler (1998) also indicates that negative attitudes toward hearing aid use are associated with rejection of a recommendation to try amplification. Gatehouse (1994) and Brooks and Hallam (1998) reported that a generally positive prefitting attitude toward hearing aid use was clearly associated with greater reported satisfaction. Also, Gatehouse (1994) found that higher expectations of help from the hearing aid were weakly associated with greater reported satisfaction.

New Measure of Expectations

Overall, the existing research indicates that individuals who hold more positive attitudes toward hearing aids are more likely to try them and more likely to be satisfied. However, there is no consistent finding concerning the relationship between expectations about performance and ultimate satisfaction or benefit. One impediment to addressing this issue in a systematic manner is the difficulty in obtaining related expectation and outcome data. In this article, we describe the development and application of a clinical measure of prefitting expectations that yields scores that can be directly compared with postfitting satisfaction scores.

The research addressed the following questions:

1. What are "realistic" expectations for hearing aid wearers?
2. Do novice hearing aid wearers generally hold realistic expectations?
3. Do novice hearing aid wearers enter their rehabilitation program with stable beliefs about what to expect?
4. Are their expectations systematically related to satisfaction after the hearing aid is fitted?

The new questionnaire is called the Expected Consequences of Hearing aid Ownership (ECHO) scale. The ECHO was developed as a companion for the SADL questionnaire. Thus, the items and subscales of the ECHO were modeled on those found to be useful in the SADL. A full description of the rationale, development, content, and characteristics of the SADL can be found in Cox and Alexander (1999). Briefly, it is a 15-item scale that yields a global satisfaction score and a profile of four subscale scores. The four subscales are constituted as follows:

Positive Effect

This subscale comprises six items addressing the domain of improved performance and function. Two items concern acoustic benefit, one is about sound quality, and three address psychological dividends accompanying hearing aid use. Based on our data and others', this domain appears to be the largest single contributor to variance in overall satisfaction data.

Service and Cost

Three items were chosen for the subscale: two about service and one on cost. In applications of the SADL, subjects who have not personally borne the expense of their hearing aids omit the cost item and the subscale score is computed on the two remaining items only.

Negative Features

Each of the three items in this subscale addresses a different aspect of hearing aid use. All three were often identified by hearing aid wearers as relatively unsatisfactory. This subscale provides an estimate of the status of matters that can often detract from an otherwise highly satisfactory fitting.

Personal Image

The fourth subscale addresses the domain of self-image and hearing aid stigma. The image/stigma content area has been implicated repeatedly over time in anecdotal and research forums as highly influential in the decision to try amplification and in ultimate hearing aid satisfaction. The subscale comprises three items.

Each item of the SADL is a question. The patient responds using a 7-point category scale ranging from "not at all" (one point) to "tremendously" (7 points). The global score is calculated as the mean of the 15 items. Subscale scores are calculated as the mean of all subscale items.

Each item for the ECHO was constructed by slightly rewording an item of the SADL. For the ECHO item, the SADL question was transformed into a statement of expectation. Thus, the SADL item "How natural is the sound from your hearing aid?" became the ECHO item "My hear-

ing aid will have a natural sound." Patients respond to the ECHO items by indicating the extent of their agreement with the statement. They use the same 7-point category scale as used in the SADL. Scoring of the ECHO is also parallel to that for the SADL. A global expectation score is generated as the mean of the 15-item responses. Four expectation subscale scores (Positive Effect, Service and Cost, Negative Features, and Personal Image) are computed from the mean of the responses to the items for each subscale. A subscale score is considered valid only when at least two-thirds of the items are completed; otherwise, it is treated as missing. If the patient does not expect to pay for the hearing aid, the item about cost is omitted from the Service and Cost subscale and from the global score.

The items, responses, and instructions for the ECHO are reproduced in the Appendix.

EXPERIMENT I: DETERMINING REALISTIC EXPECTATIONS

It is quite common to encounter concerns from clinicians about unrealistically high expectations held by naive patients. Hearing aid orientation programs often include a discussion of the potential need to adjust expectations in a downward direction. Generally, the decision about whether a particular patient's expectations are unrealistic is based on anecdotal evidence and the dispenser's judgment. It would be useful to have a scientific basis for determining the appropriateness of expectations. We reasoned that only experienced hearing aid wearers could provide valid data on the extent to which each of the statements in the ECHO scale is consistent with reality. Consequently, this experiment used hearing aid wearers to obtain "reality norms" for the ECHO.

Method

The ECHO questionnaire was sent to 174 hearing aid owners who had agreed to participate in this type of research. The instructions were modified to request that subjects provide the "correct" response to each item, based on their actual experience with hearing aids.

Subjects

Useable responses were received from 139 individuals. Figure 1 depicts their distribution on several demographic variables. When asked to self-assess their hearing difficulty (without a hearing aid), most reported a moderate or severe degree of difficulty (note that these are not necessarily the same as the corresponding audiogram categories). Subjects received their hearing aids from one of three different dispensing sites: a Veterans Affairs Medical Center (VAMC), a university-affiliated clinic, and a private practice. Most were aged between 60 and 89 years. Twenty-five percent were female. Most had worn hearing aids for more than 1 year and were in the habit of using amplification at least 4 hours each day.

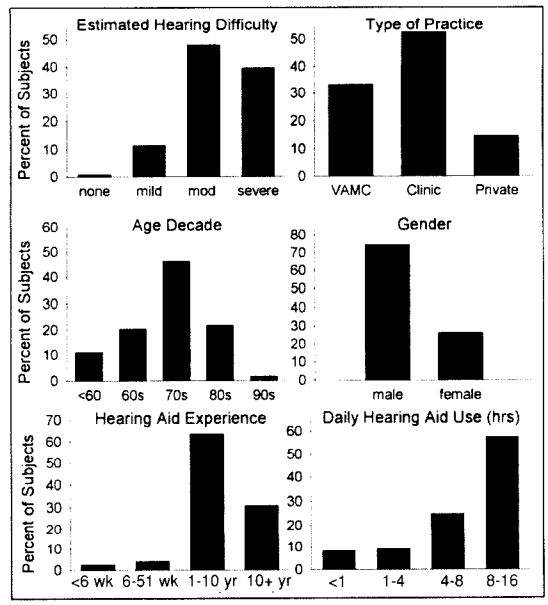

Figure 1 Demographic characteristics of subjects in Experiment I.

Results and Discussion

Normative Data

The response to each item is scored from 1 to 7. Eleven of the ECHO items are written in such a way that a response of "tremendously" is indicative of a favorable expectation. For these, "tremendously" = 7. The four remaining items are written so that a favorable expectation is indicated by a response of "not at all." For these four, "not at all" = 7. Consequently, for all subscales, a higher score is indicative of a more favorable inclination toward the hearing aid. In the Negative Features subscale, a higher score can be interpreted as reflecting a relative lack of knowledge or concern about potentially problematic issues. Because the VAMC subjects did not pay for their hearing aids, the "reason-

able cost" item was not used in computing their scores (as described above).

Data from all subjects were combined to generate "reality norms" for the ECHO. The results are provided in Table 1. The table gives the means and standard deviations of global and subscale scores. In addition, the 20th and 80th percentiles are given for each score. This percentile range was chosen to define the range of typical responses for descriptive purposes when the responses for an individual are compared to the norms.

Relationship to Demographic Variables

As Figure 1 reveals, the group was heterogeneous across several demographic variables. This was intentional because it was hoped that the norms could be representative of a wide spectrum of hearing aid wearers. Nevertheless, it seemed possible that some of these variables might be associated with the subjects' attitudes toward hearing aids. For example, perhaps individuals with a generally low opinion about hearing aids would tend to use them less on a daily basis. Or perhaps younger hearing aid wearers tend to have more positive (or negative) opinions about them. To assess these potential relationships, the ECHO subscale scores were explored statistically to determine if there were significant effects associated with any of the demographic variables. Five of the six variables illustrated in Figure 1 were examined. Hearing aid experience was not examined because there were too few subjects in the two lowest categories (representing less than 1 year of experience).

No significant effects were detected for any variable. Specifically, the estimated realistic performance of hearing aids was not systematically related to subject's self-assessed hearing difficulty, decade of age, daily hours of use, original dispensing site (VA or non-VA), or gender. It should be noted that data about the specifics of the hearing aid fittings (style, unilateral/bilateral, processing strategy) were not available, so potential effects in this domain could not be assessed. Based on the available data, the results suggest that, overall, individuals who have experience with hearing aids have similar opinions about their strengths and weaknesses. It is reasonable to conclude that the data in Table 1 represent the typical opinions of experienced hearing aid wearers about the true attributes of hearing aids on the issues raised in the ECHO inventory.

EXPERIMENT II: EXPECTATIONS OF NOVICE USERS

The most obvious application for the ECHO is to explore the predisposition toward hearing aids of individuals who are approaching their first hearing aid fitting. Dispensers often wonder whether expectations about hearing aid performance are excessively optimistic in some patients who lack direct experience with amplification. It is possible to evaluate this matter by comparing ECHO data from novice hearing aid users with the reality norms obtained in Experiment I. In this experiment, we asked whether new hearing aid users, as a group, are overly sanguine about their impending encounter with amplification.

Method

Data were collected by audiologists at seven different clinical sites. There were four VA hospitals, two university-based clinics, and one private practice. Each audiologist was asked to enrol up to 10 consecutive patients who met the following criteria: inexperienced hearing aid user (defined as no hearing aid use within the past year), expressed desire to try amplification, at least 60 years old, ability to read and write sufficiently to complete the survey, and willingness to participate in the study. The ECHO was administered as soon as feasible after the clinical decision to proceed to a hearing aid fitting. The protocol called for clinicians to provide as little pre-ECHO counseling as seemed compatible with good

Table 1 Reality Norms for the ECHO Global and Subscale Scores

	Global	*Positive Effect*	*Service and Cost*	*Negative Features*	*Personal Image*
Mean	4.8	5.0	5.1	3.5	5.6
SD	0.7	1.1	1.0	1.3	1.0
20th percentile	4.4	4.2	4.0	2.3	5.0
80th percentile	5.5	5.8	6.0	4.7	6.7

clinical service. Thus, minimal counseling about hearing aids preceded the questionnaire's administration.

Subjects

Sixty-seven individuals participated in this experiment. Due to an oversight, four individuals younger than 60 were invited to participate. Their data were included. Subject ages ranged from 46 to 87 with a mean of 69 years. There were 62 men and 5 women. Forty-seven of the subjects originated at the VA sites; these were all men.

The typical subject's audiogram indicated a mild-to-moderate, sloping, sensorineural, symmetric hearing impairment. Mean better-ear three-frequency (500–2000 Hz) pure-tone average hearing loss (3FAHL) was 31 dB. All subjects had bilateral hearing loss, but 32 percent had a 3FAHL better than 25 dB, indicating hearing loss mostly concentrated in the higher frequencies. Thirteen percent of the audiograms displayed average interaural asymmetry in excess of 10 dB.

Each subject was asked to provide a self-assessment of his/her hearing difficulty by choosing from the options none, mild, moderate, severe. Figure 2 depicts self-assessed hearing difficulty for each subject as a function of the better-ear 3FAHL. Most of these new hearing aid seekers reported their hearing problems to be moderate, regardless of their 3FAHL: there was no relationship between hearing impairment measured using the audiogram and self-assessed hearing problems. This is interesting because, in a random sample of hearing-impaired persons, there is a modest correlation between audiogram thresholds and self-assessed hearing problems using these categories (Cox et al, 1999b). The unusual homogeneity of self-reported problems in this group of subjects is consistent with several studies showing that an important predictor of help-seeking behavior in hearing-impaired individuals is the belief that their hearing problem has progressed to a point where they need help (e.g., van den Brink et al, 1996; Kochkin, 1998).

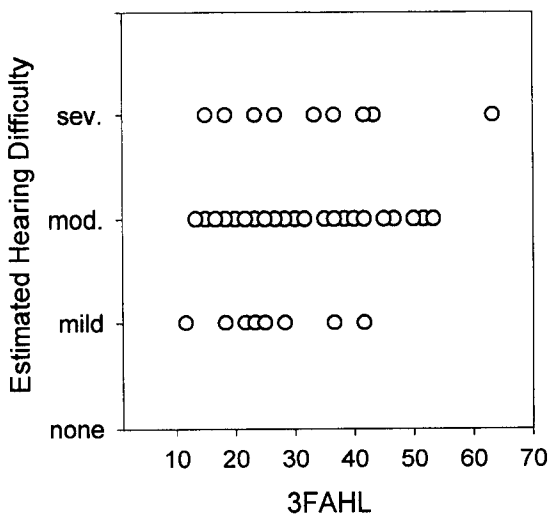

Figure 2 Self-assessed hearing difficulty compared with three-frequency pure-tone average threshold for subjects in Experiment II.

Results and Discussion

Initially, it seemed important to determine whether these subjects, who were inexperienced with hearing aid use, were actually able to provide opinions about the topics in the questionnaire. This was addressed by counting the number of times that each item failed to elicit a response. The count revealed that 14 of the 15 items attracted a response from at least 95 percent of the subjects. The 15th item concerned hearing aid cost and was omitted by 16 percent of the non-VA subjects (i.e., those who expected to pay for their hearing aids). Thus, the greatest uncertainty among the new hearing aid users was whether the cost of the hearing aid would be reasonable.

To evaluate the expectations of novice hearing aid users, the ECHO global and subscale scores were computed for the group. Figure 3 depicts those scores in comparison with the corresponding scores from the experienced users (the reality norms). Recall that for each subscale, a higher score indicates higher expectations about some aspect of the hearing aid. Figure 3 reveals that overall (the global score), the expectations of novice hearing aid users were higher than the reality norms. When we examine the four subscales, we see that for three of them novice expectations are higher than reality, whereas, for the Personal Image subscale, the novice expectations are lower than those of experienced users. A multivariate analysis of variance of the subscale data indicated that the mean difference between novice and experienced users was significant for every subscale ($p < .02$). In other words, these results suggest that the typical new hearing aid user does not have realistic expectations about hearing aids in any of the four domains assessed by the ECHO.

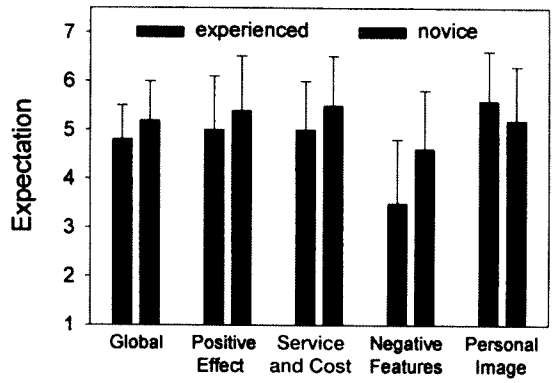

Figure 3 ECHO global and subscale scores for novice hearing aid wearers compared with the realistic scores provided by experienced wearers. Bars show 1 SD.

Even though our analyses of data from the experienced hearing aid wearers (reported in Experiment I) indicated that subject demographics were not systematically related to the ECHO "reality" scores, we did not want to overlook the possibility that some of the differences in expectations between the novice and experienced hearing aid users might originate in differences between the groups. A larger proportion of the experienced subjects reported severe hearing problems and more of them were older. In addition, there were more women and non-VA subjects in the experienced group.

To determine whether the intergroup differences contributed to the expectation differences between experienced and novice hearing aid users, 47 experienced/novice pairs of subjects were selected from the original groups. Each pair was matched on the demographic variables with particular attention paid to age and self-assessed hearing problem. ECHO scores were determined and compared for the newly formed matched groups. The pattern of means was essentially identical to that seen in Figure 3 for the unmatched groups, confirming that the expectation differences between experienced and novice hearing aid wearers were not related to the demographic differences.

Taken as a whole, the results of this experiment indicate that typical new hearing aid users expect more improvements in performance and function and better service and value than they will probably receive (subjectively) from their hearing aids. In addition, they are lacking full awareness of the potentially negative aspects of hearing aid use (such as feedback problems). Finally, as a group, they have more concerns about hearing aid stigma issues than do experienced users of hearing aids.

EXPERIMENT III: STABILITY OF PREFITTING EXPECTATIONS

Experiment II established that prospective hearing aid users were generally able to respond to the items of the ECHO, suggesting that they did have preconceived opinions about what hearing aids could be expected to do. We were interested in assessing the stability of these opinions over the period between the decision to purchase a hearing aid and the actual fitting of the instrument. There are at least two possibilities that might contribute to unreliable results. First, perhaps the subject simply fabricated his or her responses on the spot when asked to complete the ECHO. In that case, we would expect that responses probably would not be very stable on subsequent ECHO questionnaires. Second, during this time, all of the clinicians followed their usual clinical procedures to provide the prospective hearing aid wearer with additional information about hearing aids. Further input from friends or educational sources would also be common. Perhaps this information from both professional and nonprofessional sources generally modifies expectations in either an upward or downward direction.

Method

Subjects from Experiment II were asked to complete the ECHO again when they returned for the hearing aid fitting. The questionnaire was printed to look different from the first occasion and the subjects were informed that it was still under development. Subjects were not told that they were completing exactly the same questionnaire again.

Subjects

Fifty-seven subjects participated in this experiment. The 10 subjects from the original 67 in Experiment II who did not participate in this phase were omitted due to organizational difficulties or because they did not return for the hearing aid fitting within the time frame of the study. As far as can be determined from the demographic data available, they were not systematically different from the subjects who did participate.

Results and Discussion

The minimum allowed test–retest interval was 4 days. For most subjects, the interval was considerably longer, extending up to 12 weeks with a mean of 29 days.

Figure 4 depicts the mean ECHO scores for both administrations of the questionnaire. Both the means and the standard deviations were very similar on the two test occasions. Analysis of variance confirmed the absence of statistically significant mean differences. However, it is possible to obtain this outcome even when the test and retest results from individual subjects are not very similar. The most direct method of assessing stability for individual subjects is to determine the test–retest differences for each subject. This was done for the four subscales. Analyses revealed that the mean test–retest difference was essentially the same for each of the four subscales, so the data were combined for further evaluation. Figure 5 shows the distribution of individual test–retest differences for subscale scores. Forty-seven percent of the test–retest differences were smaller than ±0.5, and 80 percent were less than ±1.5. However, a very small percentage of subjects produced large test–retest differences of 3 or 4 points.

Test–retest differences as reported in Figure 5 illustrate the absolute consistency of responses over test occasions. Another method for assessing the consistency of test data is to compute the correlation between test and retest scores. Correlation coefficients depict the consistency of the relative order of subject's responses over test occasions. If subjects who score highest (or lowest) on the first occasion also score highest (or lowest) on the second occasion, the test–retest correlation will be high. Test–retest correlations

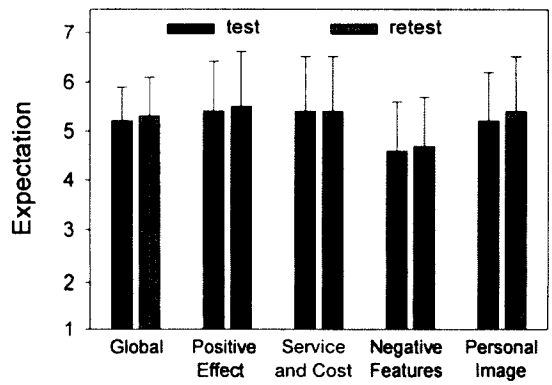

Figure 4 ECHO global and subscale scores for two prefitting administrations of the questionnaire. Bars show 1 SD.

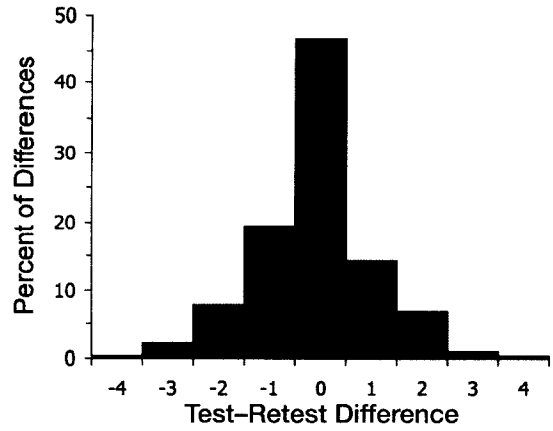

Figure 5 Distribution of test–retest differences for ECHO subscale scores for all subjects and all subscales.

for the four subscales were Positive Effect = 0.59, Service and Cost = 0.27, Negative Features = 0.34, and Personal Image = 0.46. The strength of these correlations ranges from weak to moderate, indicating that, despite the rather small absolute differences from test to retest, the relative order of subjects was not rigidly preserved. The stronger correlation for the Positive Effect subscale probably partly reflects the greater number of items in this subscale. However, it might also suggest that expectations in the Positive Effect subscale are somewhat more firm than those in the other subscale domains.

Taken together, the results depicted in Figures 4 and 5 and the test–retest correlations indicate that prospective hearing aid users do have preconceived ideas about what can be expected of hearing aids. These opinions do not change in a systematic way during the days or weeks preceding the fitting. However, scores for the ECHO subscales do vary in an apparently random way, although variations seldom exceed 1.5 points of the response range.

EXPERIMENT IV: RELATIONSHIP OF EXPECTATIONS TO FITTING OUTCOME

Dispensers often face a dilemma in deciding how to guide a patient about what to expect from hearing aids. If expectations are too high, there is a danger that the patient will be disappointed and, therefore, dissatisfied. On the other hand, excessively low expectations might discourage the patient and inhibit motivation. It is also possible that, once a hearing aid is tried, prefitting expectations become somewhat irrelevant, and the device's actual performance

is the major determinant of fitting outcome. In this experiment, we explored the relationship between prefitting expectations measured using the ECHO and postfitting satisfaction measured using the SADL. Simply stated, the question was whether high expectations are associated with high satisfaction, with low satisfaction, or are unrelated to ultimate satisfaction.

Method

The goal was to obtain satisfaction data for the subjects who participated in Experiment II and who subsequently tried hearing aids, as planned. Two of the clinical sites that participated in Experiments II and III were not able to take part in Experiment IV and several subjects from the other sites had moved away or become incapacitated. Thus, the total number of potential subjects for this phase was 43. These individuals were contacted and asked to complete the SADL with reference to the hearing aid they had obtained following the earlier studies. Responses were received from 31 subjects. The time interval between ECHO and SADL completions ranged from 12 to 14 months.

Subjects

There were 29 men and 2 women. Ages ranged from 46 to 87 with a mean of 69 years. The mean better-ear 3FAHL was 30.3 dB. Five subjects self-assessed their hearing problem without a hearing aid as "mild"; the rest rated their unaided problems as moderate or worse. Fourteen of the subjects reported using their hearing aids more than 8 hours per day. Eight subjects reported hearing aid use of less than 4 hours per day.

We had no way of knowing the amplification success of the 12 subjects who did not elect to return the SADL questionnaire. Were these subjects different in some way from those who did provide satisfaction data? A comparison of the two groups did not uncover any obvious differences in perceived hearing difficulty, age, or gender. As a further precaution, we compared the prefitting expectations of the nonresponders with those of the responders. The mean ECHO results for each group are shown in Figure 6. Inspection of the subscale means suggests that those who returned the SADL might have expected more in the Positive Effect domain and less in the Negative Features domain than those who did not return the SADL. Analysis revealed that the interaction between subscales

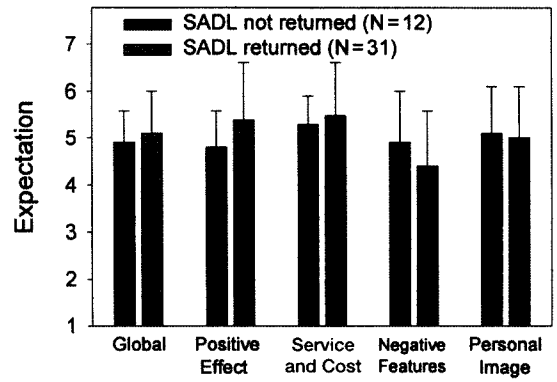

Figure 6 Prefitting expectations of subjects who provided postfitting satisfaction data and subjects who did not provide satisfaction data. Bars show 1 SD.

and response group did not quite meet the standard for statistical significance ($p = .06$), but the power of the analysis was relatively low because of the small number of subjects in the nonresponse group. Based on these results, we cannot be completely confident that the satisfaction data were obtained from a random sample of the available 43 subjects. This matter is discussed in more detail below.

Results and Discussion

Figure 7 illustrates the relationship between ECHO score and corresponding SADL score for the Positive Effect subscale. Each symbol depicts

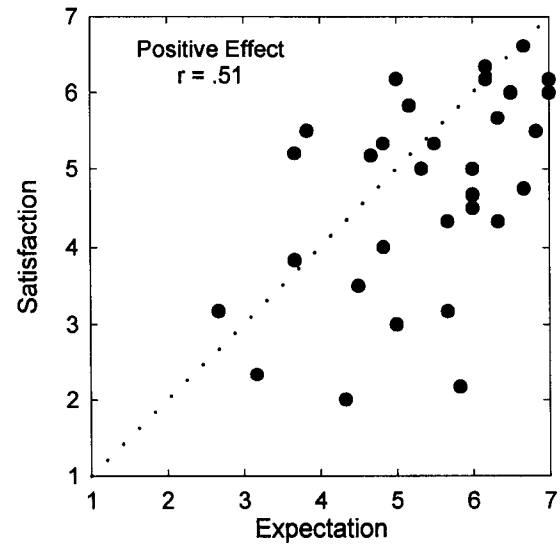

Figure 7 Relationship between prefitting expectation and postfitting satisfaction scores for the Positive Effect subscale. Each symbol represents one subject.

one subject's result. If expectation and satisfaction scores were identical for a subject, the symbol lies on the diagonal line. Symbols above the diagonal indicate that the subject was more satisfied than he or she expected to be. A symbol below the diagonal depicts a subject who was less satisfied than expected.

These data have two interesting features: (1) most of the symbols are below the diagonal, indicating that the majority of subjects were not as satisfied with the advantages of hearing aid use as they expected to be; (2) nevertheless, there is a significant ($p < .01$, two-tailed), moderate, positive correlation between expectation and satisfaction score, indicating that subjects who expected more from the hearing aid tended to be more satisfied with the advantages they did reap from the fitting.

Figure 8 illustrates the expectation and satisfaction results from the Service and Cost subscale. The negligible correlation coefficient indicates that subject's prefitting expectations in this domain were not at all predictive of their final opinions. This result was due to some extent to a ceiling effect in both the ECHO and SADL scores. However, most subjects were eventually more satisfied than they had expected to be—as indicated by the greater number of symbols above the diagonal. Two subjects (arrows) are especially noteworthy because they began the fitting with high expectations but ultimately recorded low satisfaction in this domain.

Figure 9 shows the expectation and satisfaction results from the Negative Features subscale. It would be plausible to postulate that the relationship between expectation and satisfaction would be negative on this subscale, that is, that subjects with higher expectations would have lower satisfaction. There is no support for that idea in these data. The small correlation coefficient reveals that there was a negligible relationship between prefitting expectations and final opinions for the group as a whole in this domain. However, this result was strongly affected by two subjects (arrows) whose expectation and satisfaction results were very disparate. Without these subjects, the correlation coefficient is .43, suggesting a significant, moderate, positive relationship between expectation and satisfaction data. The relatively symmetric distribution about the diagonal indicates that there was no obvious tendency for subjects to be more or less satisfied than they expected with the potentially negative aspects of hearing aid use. This is a bit surprising in view of the finding in Experiment II that the novice hearing aid wearers, on the whole, had an unrealistically optimistic view of the negative features domain. On the other hand, Figure 6 reveals that the expectations of the subgroup of novice users who participated in this experiment were more realistic than those who did not respond to our request for satisfaction data.

Figure 10 depicts the expectation-satisfaction relationship for the Personal Image subscale. The nonsignificant correlation coefficient of –.24 indicates that there was no

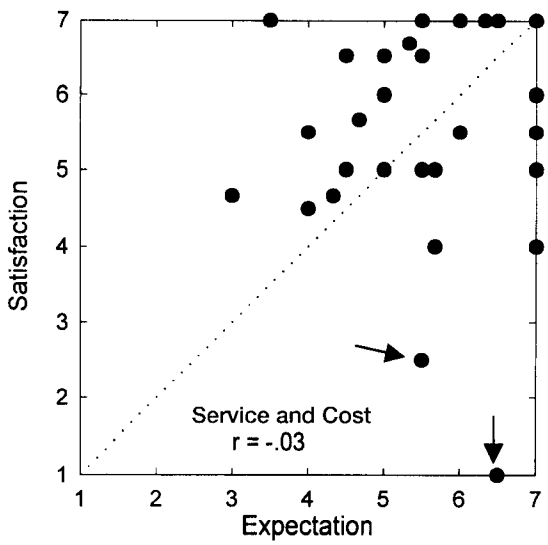

Figure 8 Relationship between prefitting expectation and postfitting satisfaction scores for the Service and Cost subscale. Each symbol represents one subject.

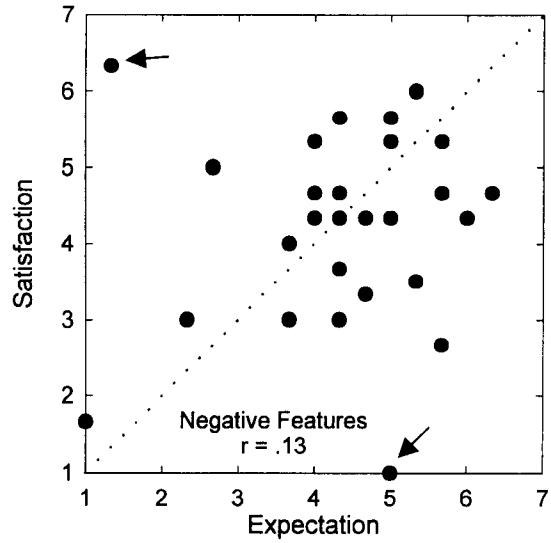

Figure 9 Relationship between prefitting expectation and postfitting satisfaction scores for the Negative Features subscale. Each symbol represents one subject.

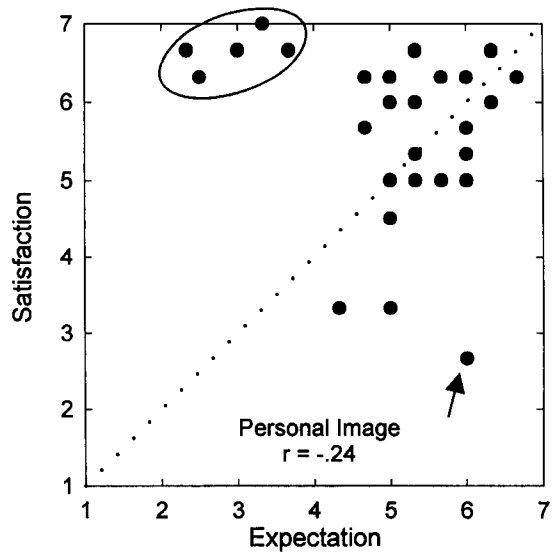

Figure 10 Relationship between prefitting expectation and postfitting satisfaction scores for the Personal Image subscale. Each symbol represents one subject.

systematic relationship between prefitting expectations and postfitting satisfaction in this content domain. Nevertheless, most subjects had fairly high prefitting expectations, and these were generally associated with fairly high postfitting satisfaction. One subject (arrow) had high expectations but ultimately registered rather low satisfaction. Another small subgroup (circled) started out with low expectations but was eventually highly satisfied.

In summary, this experiment found only one aspect of prefitting expectations to be clearly related to ultimate fitting satisfaction: individuals who expected the hearing aid to yield more psychological and psychoacoustic improvements in functioning tended to report greater improvements after the fitting. Recall that the Positive Effect subscale in both the ECHO and the SADL is composed of six items, whereas all of the other subscales comprise three items. It seemed possible that the greater item count in the Positive Effect subscale was instrumental in producing this unique significant relationship between expectations and satisfaction. To explore this possibility, the six Positive Effect items were arbitrarily assigned to two new three-item subscales, and the relationship between expectation and satisfaction scores was recomputed for each of the smaller subscales. Both of the small subscales also yielded a significant ($p < .01$, two-tailed) relationship between expectation and satisfaction (correlations were .46 and .51). Thus, the distinctive result observed for the Positive Effect subscale cannot be attributed to the larger number of items contributing to the score.

Data for the three other subscales did not produce an obvious relationship between expectations and outcome. In the Service and Cost and Personal Image subscales, the data generally fell in the upper right quadrant both pre- and postfitting. Apparently, most individuals will not present for a hearing aid fitting unless they anticipate both that the dispenser and the device will be reasonably effective and that the cosmetic outcome will be acceptable. Previous work contrasting the attitudes of hearing aid seekers and nonseekers has supported this observation (e.g., Kochkin, 1993; Garstecki and Erler, 1998). Despite this overall trend, it is interesting to note that five subjects began the process with rather low expectation scores for Personal Image but concluded with very high satisfaction. Further study of these subjects and outliers from the other subscales (i.e., individuals whose expectation and satisfaction scores were highly disparate) could produce useful insights into the conditions necessary for successful hearing aid fitting.

A cautionary note should be sounded regarding the interpretation of these data. This experiment should be viewed as an initial exploration of the relationship between expectations and outcome. The number of subjects was small, and there is some question about the randomness of the sample. The data shown in Figure 6 suggest that the 31 subjects who provided satisfaction data might have been different in their initial expectations from the 12 individuals who did not comply with our request for satisfaction information. In addition, it is possible that the technical properties of the fitted devices might partly determine the relationship between expectation and satisfaction. These concerns must be addressed in future research.

GENERAL DISCUSSION

This work explored the expectations of new hearing aid wearers as reflected in their responses to the ECHO questionnaire. We should not lose sight of the fact that these individuals are only a small proportion of the hearing-impaired public who might benefit from amplification. Studies have consistently shown that only individuals with certain attitudes toward their hearing loss and toward the psychosocial impact of using a hearing aid are likely to actually seek help (e.g., Garstecki and Erler, 1996; van den Brink et al, 1996; Brooks and Hallam,

1998). Of those who do elect to try hearing aids, satisfaction level is often low (Kochkin, 1993) and the return rate is fairly high (Kirkwood, 1999). This research is seeking to determine whether knowledge of prefitting expectations can help to identify individuals for whom the prognosis for success is poor. If so, can this knowledge be applied in a constructive manner to improve the likelihood of fitting success?

The results of Experiment II confirmed the suspicions of many dispensers that the typical novice hearing aid wearer does not have a realistic view of the instrument's strengths and weaknesses. What should be done about this? The usual recommendation is to provide prefitting counseling intended to mold expectations in a direction more likely to be consistent with experience. Unfortunately, the likely success of one-size-fits-all counseling seems to be low. Both Seyfried (1990) and Norman et al (1994) reported that general informational counseling about realistic benefits of amplification was not effective in changing attitudes/expectations of new hearing aid wearers. On the other hand, the results of Brooks (1989) show that when counseling is targeted toward specific expressed attitudes of the individual, it can increase postfitting use of amplification. The ECHO questionnaire seems well suited to identification of specific issues that should be targeted in prefitting counseling.

Of the four domains assessed in the ECHO, it seems clearly appropriate to recommend informational counseling for patients whose score on the Negative Features subscale reveals substantial ignorance of the potentially unpleasant aspects of hearing aid use. In addition, data for the Service and Cost and Personal Image subscales suggest that most novice users yield an expectation score of 4 or greater in these domains. Thus, a score of less than 4 might identify a potential wearer who is somehow at risk for an unsuccessful fitting. Perhaps an individual who feels pressured to try amplification but is not really motivated to succeed will provide these kinds of scores. Again, counseling attending to these issues might be helpful.

The Positive Effects subscale of the ECHO quantifies expectations about the psychoacoustic and psychological benefits of hearing aid use. Our results agree with those of Schum (1999) in showing that (1) a typical novice hearing aid wearer expects more than is ultimately realized in this domain and (2) there was, nevertheless, a moderate positive relationship between prefitting expectations and postfitting outcome, in that patients who expected more generally reported more positive effects. Given this relationship, it could be argued that we should attempt to raise expectations about benefit as much as possible. This would be wrong for several reasons. First, it should not be assumed that higher expectations *cause* a better outcome. It is more likely that expectations and outcome are both influenced by a third variable, possibly a personality attribute such as extroversion or optimism. Previous research (Cox et al, 1999a) has shown that extroverted individuals tend to report more hearing aid benefit in all types of settings. The relationship between personality attributes and prefitting expectations is a promising area for future investigation. Second, there is clear historical evidence that raising expectations by unrealistic advertising has had a negative impact on patient satisfaction. Third, the small number of subjects in this research and the challenge of obtaining an appropriate sample means that any interpretations of this relationship must be tentative and circumspect.

In the meantime, it is reasonable to speculate that unusually favorable opinions about the anticipated benefits of amplification might predispose the patient to disappointment. It is equally possible that an exceptionally negative viewpoint might cause an otherwise promising hearing aid candidate to avoid or postpone a rehabilitation program. The reality norms could be used to help determine whether a patient falls into either of these categories, and appropriate counseling might be effective in improving the likelihood of a successful fitting.

Clinical Applications

Measuring prefitting expectations about hearing aids is only useful if patients are different from each other. The data obtained in Experiment II strongly supported the notion that expectations do differ across patients. To illustrate this, we determined the various profile patterns used by subjects and how often each was used. To classify the scores in each subscale for each subject, the range of possible scores was divided arbitrarily into three equal intervals. A score of 3.0 or less was labeled low (L), from >3.0 to 5.0 was labeled medium (M), and more than 5.0 was labeled high (H). Using this scheme, there was a total of 25 different patterns encountered in the results for Experiment II. The most common pattern (HHMH) was used by only 20 percent of the subjects, and 16 pro-

files were used by only one subject. These results clearly demonstrate that there are substantial individual differences across patients in prefitting expectations.

The results of Experiment I provide a basis for evaluating the prefitting expectations of individuals who are embarking on a hearing aid quest. The "reality norms" from Table 1 can be used to help determine whether a prospective hearing aid wearer has realistic expectations and beliefs about hearing aids. An example of this is seen in Figure 11. The gray bars in this figure depict the typical range of reality scores (20th to 80th percentiles shown in Table 1) for the ECHO global score and each ECHO subscale. The open circle in each bar shows the mean score. The triangle and filled circle symbols depict the ECHO results for two subjects, both of whom have overall expectations within or near the typical range. These true examples provide a good illustration of the potential value of examining the ECHO profile in addition to the overall expectation score for a particular subject.

Subject 155 had realistic expectations in the Positive Effect domain but scored low on Service and Cost and high on Negative Features and Personal Image. Although we do not yet have research evidence to definitely establish the implications of these results, the pattern shown by subject 155 seems disturbing for two reasons. First, the very high expectations in the Negative Features domain indicate that he is substantially unaware of the unpleasant or disappointing aspects that are a frequent part of hearing aid use. This is not unusual for a novice hearing aid wearer, but it would be prudent to address this issue well before the fitting. Second, the low score in the Service and Cost subscale suggests that this patient is pessimistic about either the value of the hearing aid or the abilities of the dispenser, or both. Figure 8 reveals that this is an unusual position for an individual who is actively pursuing a hearing aid fitting. This response raises a question about the patient's motivation to succeed with the fitting. The patient's reservations should be fully explored and discussed before a fitting is undertaken.

Subject 190 in Figure 11 presents a very different picture from that of subject 155, despite the fact that both have similar global expectation scores. This individual has high expectations in the Positive Effect domain, realistic expectations in Service and Cost, and low expectations for Negative Features and Personal Image. The very low score for Negative Features probably

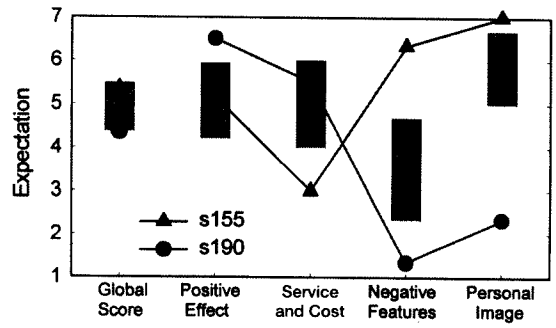

Figure 11 ECHO results for two individuals are shown using filled circles and filled triangles. The gray bars depict the typical range of realistic expectations. The open circles give the mean realistic scores.

indicates that this patient has previously heard about or experienced a disagreeable feature of hearing aid use. Her current reservations should be explored. Solutions might be available for her concerns, and discussion of these could build a more positive approach to the fitting. The very low score on Personal Image is also a potential red flag. Figure 10 shows that this is unusual in someone who presents for a hearing aid fitting. Several studies have confirmed that a belief that hearing aids are too conspicuous or make one appear incompetent is a serious impediment to a successful outcome (van den Brink et al, 1996; Garstecki and Erler, 1998). Thus, although subject 190 has an optimistic approach to the benefits that could be gained from hearing aids, there are indications in the ECHO profile that the success of the fitting could be in jeopardy for other reasons.

Figure 11 demonstrates the use of the reality norms obtained in Experiment I to evaluate the expectations of a potential hearing aid wearer. The reality norms could also be a useful counseling tool for family and friends of hearing aid wearers. These individuals often have inaccurate perceptions about the potential benefits and problems associated with hearing aid use. It might be useful to ask significant others to explore their own understanding of the strengths and weaknesses of hearing aids by completing the ECHO themselves. Comparison of the results with the reality norms could form the basis for a general discussion of the potential advantages and impediments associated with hearing aid use.

The results of these experiments indicate that measurement of prefitting expectations is useful in its own right. Considerable insight can be obtained by displaying the results and

comparing them with norm data. More research is needed before we can determine with confidence whether prefitting expectations are predictive of ultimate outcome or whether they are amenable to manipulation using counseling.

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APPENDIX

ECHO Questionnaire

INSTRUCTIONS
Listed below are statements about hearing aids. Please circle the letter that indicates the extent to which you agree with each statement. Use the list of words on the right to determine your answer.

A Not at all
B A little
C Somewhat
D Medium
E Considerably
F Greatly
G Tremendously

1. My hearing aids will help me understand the people I speak with most frequently ..... A B C D E F G
2. I will be frustrated when my hearing aids pick up sounds that keep me from hearing what I want to hear ..... A B C D E F G
3. Getting hearing aids is in my best interest ..... A B C D E F G
4. People will notice my hearing loss more when I wear my hearing aids ..... A B C D E F G
5. My hearing aids will reduce the number of times I have to ask people to repeat ..... A B C D E F G
6. My hearing aids will be worth the trouble ..... A B C D E F G
7. Sometimes I will be bothered by an inability to turn my hearing aids up loud enough without getting feedback (whistling) ..... A B C D E F G
8. I will be content with the appearance of my hearing aids..... A B C D E F G
9. Using hearing aids will improve my self-confidence ..... A B C D E F G
10. My hearing aids will have a natural sound ..... A B C D E F G
11. My hearing aids will be helpful on most telephones without amplifiers or loudspeakers ..... A B C D E F G
12. The person who provides me with my hearing aids will be competent..... A B C D E F G
13. Wearing my hearing aids will make me seem less capable..... A B C D E F G
14. The cost of my hearing aids will be reasonable ..... A B C D E F G
15. My hearing aids will be dependable (need few repairs)..... A B C D E F G