Measuring Hearing Aid Outcomes Using the Satisfaction with Amplification in Daily Life (SADL) Questionnaire: Australian Data

Margaret Uriarte*
Lauren Denzin*
Amy Dunstan*
Jillian Sellars*
Louise Hickson*

Abstract

The aims of this study were to investigate hearing aid satisfaction for a group of older Australians fitted with government-funded hearing aids using the Satisfaction with Amplification in Daily Life (SADL) questionnaire; to compare the Australian data gathered with the provisional normative data reported by Cox and Alexander (1999); and to investigate the relationship between SADL satisfaction and several participant variables, hearing aid variables, and other outcome measures.

The SADL questionnaire and a Client Satisfaction Survey (CSS) were distributed by mail to 1284 adults fitted with government-funded hearing aids three to six months previously. 1014 surveys were returned. The mean age of participants was 75.32 years; 54.4% of participants were male, and 54.8% were fitted binaurally. Participants were fitted primarily with digitally programmable hearing aids of various styles (22.5% BTEs, 34.8% ITEs, 41.8% ITCs, 0.9% nonstandard [NS] devices).

Overall, participants reported a considerable level of satisfaction with their devices. SADL Global and subscale scores were significantly higher for the Australian sample than the U.S. norms described by Cox and Alexander (1999).

Key Words: Hearing aids, older people, outcomes, satisfaction

Abbreviations: BTE = behind-the-ear hearing aid; CSS = Client Satisfaction Survey; HAUQ = Hearing Aid Users Questionnaire; ITC = in-the-canal hearing aid; ITE = in-the-ear hearing aid; NS = nonstandard amplification; OHS = Office of Hearing Services; SADL = Satisfaction with Amplification in Daily Life; SHAPIE = Shortened Hearing Aid Performance Inventory for the Elderly

Sumario

El propósito de este estudio fue investigar la satisfacción generada por el auxiliar auditivo en un grupo de australianos mayores, a quienes se les adaptaron auxiliares pagados por el gobierno, utilizando el cuestionario Satisfacción con la Amplificación en la Vida Diaria (SADL), comparar los datos australianos recolectadas de la información normativa reportada por Cox y Alexander (1999), e investigar la relación entre el SADL, la satisfacción y algunas variables de los participantes, variables de los auxiliares auditivos y otras medidas de resultado.

El cuestionario SADL y una Encuesta de Satisfacción del Cliente (CSS) fueron distribuidos por correo a 1284 adultos, adaptados con audífonos pagados por...
In the current consumer-driven era of health care, health professionals need to be able to demonstrate, to both the community and resource providers, that the services they provide have a positive impact on their clients’ functional status and quality of life (Beck, 2000; Gagné, 2000; Weinstein, 2000). In audiological rehabilitation settings, outcome measures have emerged as an effective method for determining whether or not specific interventions such as hearing aids are working to achieve positive results for clients (Cox and Alexander, 1999; Kricos and Lesner, 2000). Outcome measures in audiology also serve to identify areas of service or treatment that could be modified or enhanced to better suit client needs; provide clients with objective information regarding the benefits of certain interventions and technologies; promote data-driven decision making; evaluate the performance of new and existing hearing aid technologies; provide hearing aid manufacturers with quantitative information regarding clients’ hearing needs and concerns with hearing aids; and track and compare provider performance over time (Beck, 2000; Humes et al, 2001).

Although objective outcome measures of hearing aid benefit, such as insertion gain and aided versus unaided speech recognition scores, are essential for documenting the improvement in a client’s hearing ability resulting from amplification (i.e., verification), only the clients can determine how well hearing aids have solved their hearing-related problems in everyday life and the extent to which their criteria for quality of service, convenience, and value-for-money have been met (i.e., validation) (Huch, 1999; Bentler and Kramer, 2000; Cox and Alexander, 2000; Kricos and Lesner, 2000). Consequently, numerous subjective inventories or self-report measures have been developed for the purpose of quantifying the client’s perspective on the success of their hearing aids (Huch, 1999; Bentler and Kramer, 2000). Many of these self-report measures focus on the benefit the client has received from intervention (Cox and Alexander, 1999; Humes et al, 2001). Benefit typically refers to the improvement in a client’s ability to communicate with others and/or carry out normal everyday activities as well as the reduction in the psychosocial impact caused by hearing loss following amplification and/or aural rehabilitation (Cox and Alexander, 1999; Weinstein, 2000).

The reliance on benefit as an effective index of service quality and value is understandable considering that prospective hearing aid wearers regularly report that...
improved everyday communication is a fundamental goal they wish to achieve through amplification (Dillon et al, 1997; Kochkin, 1992). However, even though a client may demonstrate quantifiable benefit from hearing aids, such as improved ability to hear others speak, this does not ensure that the client is fully satisfied with the overall service received, nor does it guarantee that the client considers the hearing aid purchase to be worthwhile (Cox and Alexander, 1995).

Based on an extensive survey of hearing aid wearers, Kochkin (1992) investigated those factors considered by consumers to be critical for hearing aid satisfaction. It was revealed that improved hearing ability, suitable sound quality, instrument reliability, usefulness in multiple listening environments, postpurchase service, and fit/comfort were the most important factors influencing consumer satisfaction. It can thus be argued that quantification of hearing aid outcomes from the client’s perspective might best be accomplished using a measure that is more comprehensive than benefit (Cox and Alexander, 1999; Weinstein, 2000). The term “satisfaction” has been used to describe a global outcome variable that encompasses the full spectrum of issues that are important to the client (Cox and Alexander, 1999).

Satisfaction is a subjective phenomenon and can be defined as the client’s reaction to salient aspects of the structure, processes, and outcomes of the service received (Kricos and Lesner, 2000; Weinstein, 2000). Quantifying satisfaction is important in rehabilitation in that it not only determines how the client has responded personally to the intervention but also sheds light on improvements that may be needed in areas such as personal interaction between the clinician and client, accessibility and availability of services, continuity of services, client convenience, physical settings, and financial considerations (Cox and Alexander, 1999; Kricos and Lesner, 2000). Additional client-satisfaction studies conducted by Kochkin (2000) showed that a client’s overall satisfaction with hearing aids was strongly linked with the likelihood of repurchasing a particular brand of hearing aid, recommending hearing aids to friends and relatives, recommending a particular clinician or dispenser to others, and general quality-of-life ratings. Thus, high levels of consumer satisfaction are not only beneficial for the client but also for indirectly promoting the public perception of hearing aids and hearing aid dispensers (Kochkin, 2000).

Many of the available measures of client satisfaction rely on a single item question such as “Rate your overall satisfaction with your hearing aid/s” (e.g., Humes et al, 1996; Dillon et al, 1999). However, Cox and Alexander (1999) report that a single global satisfaction score is of limited clinical value. A single score cannot be used by the clinician to specifically determine why a client might be dissatisfied with their hearing aids and offers no insight into areas of rehabilitation that need to be modified or improved.

The Satisfaction with Amplification in Daily Life (SADL), a self-report measure developed by Cox and Alexander (1999), fulfills the need for a clinically viable tool, which assesses the multidimensional nature of satisfaction. The scale consists of 15 questions related to aspects of hearing aid use, and provides a global score indicating overall satisfaction, as well as four subscale scores profiling satisfaction in the areas of “Positive Effect” (improved psychoacoustic and psychological functioning), “Service and Cost” (value for money, confidence in provider), “Negative Features” (undesirable effects of hearing aids including background noise and feedback), and “Personal Image” (appearance and stigma) (Cox and Alexander, 1999; Cox and Alexander, 2001). Respondents are required to indicate their level of satisfaction on a scale of one (not at all) to seven (tremendously) (Cox and Alexander, 1999).

SADL items were determined based on key satisfaction issues raised during interviews with hearing aid users (Cox and Alexander, 1999). Not surprisingly, good construct validity for the SADL has been indicated (Cox and Alexander, 2001; Hosford-Dunn and Halpern, 2000). Furthermore, test-retest reliability was demonstrated by the original authors, who found a high global score test-retest correlation coefficient ($r = 0.81$) (Cox and Alexander, 1999). Hosford-Dunn and Halpern (2001) suggest that with its sound construct and psychometric properties, the SADL may serve as a gold standard for measuring satisfaction.

At present, little Australian data for the SADL has been reported in the literature. In 2001, McLeod et al investigated the differences in SADL scores when administered at two weeks ($N = 45$) and
12–24 months postfitting ($N = 75$) for two groups of Australian adults fitted with government funded hearing aids. The aim was to determine whether early responses were representative of long-term satisfaction. The results of the study indicated that application of the SADL two weeks after fitting may not be appropriate, as Global scores and all subscale scores, with the exception of the Personal Image subscale, were significantly lower at one to two years postfitting (McLeod et al, 2001). In their study, McLeod et al (2001) did not attempt to establish Australian SADL norms. These are important, however, as the SADL was originally designed for use in conjunction with normative data. The idea was that comparison of an individual’s scores with norms allows the clinician to identify those clients reporting lower than average satisfaction levels (Cox and Alexander, 1999). This can then help the clinician to determine what areas need to be addressed in order to improve the client’s overall satisfaction with the hearing aid experience (Hosford-Dunn and Halpern, 2001). Interim norms were provided by Cox and Alexander (1999) for American private-pay and third-party pay patients; however, these may not be applicable for the Australian population. Thus the first aim of this study was to provide SADL data for a group of older Australians provided with government-funded hearing aids.

In the study by McLeod et al (2001), the Australian SADL results were compared to Cox and Alexander’s (1999) provisional norms. They reported that the 12–24 month postfitting group produced similar SADL scores to the original American cohort with the exception that satisfaction in the Negative Features subscale was higher in the Australian group. However, it is difficult to draw definitive conclusions from this study as the Australian and American groups were not compared statistically (McLeod et al, 2001). Therefore, the second aim of the present study was to compare our Australian data with the provisional norms described by Cox and Alexander (1999).

Hosford-Dunn and Halpern (2001) identified some variables that have small effects on SADL results, namely hours of hearing aid use per day, years of prior hearing aid experience, pure-tone average, self-perceived hearing difficulties, style of hearing aid, cost of hearing aid, and type of processing used in the aid. In addition to considering the influence of audiological variables on a client’s performance on the SADL, it is also important to be aware of those nonaudiological variables, such as the person’s age, gender, personality type, race/ethnicity, self-efficacy, social support, attitudes toward hearing aid use, socioeconomic status, and general health, which may potentially affect a client’s level of satisfaction with their hearing aid/s. To date, there have been only two studies that have investigated such relationships using the SADL. First, a study by Hosford-Dunn and Halpern (2001) examined the relationship between various client variables and overall performance on the SADL, and found that older hearing aid wearers tended to report less satisfaction than younger clients. Second, a study by Cox and Alexander (2000) revealed that those clients with relatively high prefitting expectations generally demonstrated higher postfitting satisfaction. Therefore, a further aim of this study was to investigate the effect of participant and hearing aid variables on the SADL results. The specific variables examined were severity of hearing impairment (better ear three frequency average); self-perceived hearing difficulty; age; gender; previous hearing aid experience; type of fitting (monaural/binaural); style of hearing aid; and type of hearing aid funding (fully or partially government subsidized).

In order to observe whether the single item satisfaction measures correlated to the Global scores for the SADL, this study involved a comparison between SADL Global Scores and scores for a single item satisfaction measure (Cox and Alexander, 2001). Results of this comparison indicated a modestly strong relationship between the two measures (Cox and Alexander, 2001). Presently this is the extent of such comparisons between the SADL and other outcome measures in the literature. Hence, the final aim of this study was to examine the relationship between other outcome measures and SADL scores. The specific outcome measures examined include self-reported hearing aid use, satisfaction with hearing aid/s (single item), satisfaction with practitioner (single item), hearing aid benefit, and hearing aid difficulties.
METHOD

Participants

Participants for the present study were sampled from the population of new and return clients, involved in Australia's Commonwealth Hearing Services Program (which requires clients to be on a pension for eligibility), who had been fitted with a government-funded hearing aid three to six months previously at various clinics throughout Australia. Participants were recruited by the Office of Hearing Services (OHS) and asked to complete the Client Satisfaction Survey (CSS) in addition to a SADL questionnaire. All participants were fitted with hearing aids according to the OHS Clinical Standards for Service Providers as well as the protocols and procedures employed by each clinic (Office of Hearing Services, 2002).

The hearing aid fitting process typically involves three appointments: (1) initial assessment (i.e., administering audiological assessments, providing feedback and counseling to the client and family regarding assessment findings, discussing rehabilitation options, determining the client’s listening difficulties and everyday communication needs, assisting clients in choosing a style of hearing aid that suits their type and severity of hearing loss, their physical and visual capabilities, their daily activities, and their personal preferences, explaining to clients and families how the Commonwealth Hearing Services Program operates, and taking ear mould impressions); (2) fitting appointment (i.e., verifying that appropriate amplification has been achieved through the use of coupler measurement, real ear insertion gain, and/or real ear aided response measurements, educating the client in how to manage and care for their hearing aids, and providing the client with an appropriate listening program to meet the goals established in the prior appointment); and (3) follow-up appointment (i.e., determining any further complications the client may be having with the fit, management, or acoustics of his or her hearing aid/s, carrying out speech perception assessments, and completing outcome measures).

An equal proportionate sampling method was used to ensure an even representation of OHS clients throughout Australia. Eight percent of the target population was randomly sampled from each Australian state and territory. A total of 1284 Client Satisfaction Surveys were mailed out to the sample. One thousand and fourteen (1014) surveys were returned, equating to a response rate of 79%. No exclusion criteria were applied; however, some participants were excluded from statistical analysis, as surveys were not always completed in full. Participant demographics were supplied by the OHS. Participants ranged from 29 to 104 years of age (M = 75.32, SD = 9.73). The majority of participants were male (54.4%), primarily fitted with digitally programmable aids and fitted binaurally (54.8%). Specific hearing aid details were not provided to the researchers. The mean better ear three frequency average was 40.21 dB HL (SD = 14.46, range = 0 to 110 dB HL) (OHS record three frequency average not four frequency average). A large proportion (89.7%, N = 910) of participants were using hearing aids fully subsidized by the government, while the remaining 10.3% (N = 104) had been fitted with top-up aids (which are devices that are funded partially by the government with an additional contribution by the hearing aid purchaser). At the time of the survey, 48.1% of respondents had six weeks to 11 months of lifetime hearing aid experience (including all old and current hearing aids); 34.8% of participants had one to ten years hearing aid experience; 15.7% indicated they had over ten years of hearing aid experience; and 1.3% of participants had less than six weeks experience with hearing aids. Table 1 provides

| Table 1. Summary of Styles of Hearing Aid Fitted |
|-----------------|-----|-----|-----|-----|
|                | BTE | ITE | ITC | NS  |
| Left Ear       | 22.2% | 34.3% | 42.9% | 0.6% |
| N = 177        | N = 274 | N = 342 | N = 5 |
| Right Ear      | 22.9% | 35.3% | 40.6% | 1.2% |
| N = 177        | N = 273 | N = 315 | N = 9 |

Note: N = 1572 ears. BTE = behind-the-ear hearing aids; ITE = in-the-ear hearing aids; ITC = in-the-canal hearing aids; NS = nonstandard amplification (e.g., FM system).
details of the different styles of amplification devices fitted. The nature of specific nonstandard (NS) devices (e.g., FM systems) is not known.

Materials

Two questionnaires were mailed to participants for the present study, the SADL (Cox and Alexander, 1999) and the OHS Client Satisfaction Survey (CSS) (see Appendix A), adapted from the Hearing Aid Users Questionnaire (HAUQ) (Dillon et al, 1999). This study was conducted using the original published version of the SADL and not the more recent version with minor revisions to the wording of two of the questions (available from www.ausp.memphis.edu/harl). In addition, Item 14 relating to hearing aid cost was omitted in the present study as no cost was incurred for the majority of hearing aids. This was in accordance with Cox and Alexander’s suggestion that “subjects who have not paid for their hearing aids should omit the cost item and the Service and Cost subscale score should be computed on the two remaining items only” (1999, p. 313).

With regard to the SADL, respondents were asked to rate their responses to each of 14 questions using the seven-point descriptor scale. For positively geared questions (e.g., Item 8: How content are you with the appearance of your hearing aids?), a higher score was indicative of greater satisfaction (Cox and Alexander, 1999). Four items on the SADL were negatively geared (i.e., Items 2, 4, 7, and 13), such that a higher score indicated less satisfaction. For analysis of the negatively geared items, the scoring scale was reversed so that high scores on all questions could be equated with high satisfaction. The score for each subscale was computed by averaging the responses to the relevant items for that subscale. For the subscale score to be considered valid and used in the analysis, at least two thirds of the questions within that subscale had to be completed. Global scores were calculated as the average of all SADL items. However, Global scores were only produced for those respondents for whom there were four valid subscale scores.

The OHS CSS features ten items relating to hearing aid use, and hearing aid difficulties and benefits, which are measures of hearing aid success that are considered independent of, but related to, satisfaction (Hosford-Dunn and Halpern, 2001). Response formats vary and require the participant to give both quantitative and qualitative information for some items (e.g., “If you never wear your hearing aid/s please tell us why”). Incorporated within the OHS CSS are two single-item questions relating to satisfaction with hearing aids and satisfaction with the practitioner. Additionally, the following questions were used as outcome measures in the present study: Question 2 assigned a score to how often hearing aids are used; Question 3 addressed how much help/benefit hearing aids provide in six generalized listening situations (e.g., family, small group conversation); and Question 4 identified difficulties with six potential management problems (e.g., positioning/removal of hearing aids, manipulating controls).

Procedure

OHS routinely collects outcome measures for clients under the Hearing Services Program as an initiative toward improving service and satisfaction with aural rehabilitation. OHS typically uses mail surveys to collect outcome data. This method is supported by Dillon et al (1991b), who suggests that clients tend to underrate their level of difficulties when questioned on the phone or via interview, and that mail surveys may elicit more information. Participants were contacted by OHS via post, approximately three to six months following hearing aid fitting, and asked to complete and return both the SADL and the OHS CSS forms in a postage paid envelope. A reminder notice was also forwarded to participants who had not returned their questionnaires, to encourage a higher response rate. Additionally, a toll-free number was provided for respondents in case of questions regarding the survey. Thus, participants completed the questionnaires independently, without input from their audiologists.

Data Analysis

The data were de-identified by the OHS and entered into a database on an SPSS package (Version 11.0 for Windows) for statistical analysis. This SPSS file was subsequently provided to the researchers. As previously mentioned, negatively
geared/reversed items on the SADL were accounted for. Additionally, the rating scales on question 3, 4, 7, and 8 on the CSS were reversed when compared to the SADL so that both scales went in the same direction (e.g., higher scores were associated with greater satisfaction and greater aid use).

A number of tests were used to analyze the data including descriptive statistics for the Australian SADL data; single sample $t$-test statistical comparisons to examine differences between the Australian sample mean and the U.S. population mean obtained for the global and subscale scores; independent groups $t$-tests to compare the means of two independent samples to determine if those means differed significantly (i.e., gender, top-up/fully subsidized devices, monaurally/binaurally fit); Pearson’s $r$ to observe any correlations between global and subscale SADL scores and a number of variables (i.e., age, better ear average, overall benefit and problems indicated by the OHS CSS, satisfaction with practitioner and satisfaction with hearing aid/s); and one way analysis of variance (ANOVA) tests, were used to assess and determine the significance of the remaining hearing aid variables (i.e., style of hearing aid/s and hearing aid use) for SADL score means. Where rank data was present, ANOVAs were fitted with polynomial contrasts, and Bonferroni post hoc comparison tests were performed where categorical data was evident.

**RESULTS**

The $N$ values for each test varied, according to how many participants received valid SADL scores (criteria previously mentioned).

**Australian SADL Data**

**Global Satisfaction Score**

A summary of the mean SADL Global and subscale scores obtained is reported in Table 2. The overall mean Global score was 5.27 ($SD = 0.81$, range = 2.43 to 7.00), indicating a considerable level of participant satisfaction. The distribution of Global scores, shown in Figure 1, indicates that more than 70% of participants were very satisfied overall.

![Figure 1. Distribution of SADL Global score ($N = 813$).](image)
Positive Effect

The Positive Effect subscale is comprised of Items 1, 3, 5, 6, 9, and 10 of the SADL. The mean level of participant satisfaction for the Positive Effect subscale was 4.98 (SD = 1.21, range = 1.00 to 7.00), consistent with considerable satisfaction. Additionally, participants indicated considerable satisfaction levels for items relating to improvement in understanding familiar conversation (M = 5.09, SD = 1.46); to reducing the number of repetitions requested by the hearing aid user (M = 4.49, SD = 1.77); and to the naturalness of the sound derived from their hearing aids (M = 4.74, SD = 1.36). A medium level of satisfaction (M = 4.35, SD = 2.03) was reported for improved self; while participants were greatly satisfied (M = 5.67, SD = 1.49) when indicating whether obtaining their hearing aids was in their best interest and whether obtaining hearing aids was worth the trouble (M = 5.51, SD = 1.64).

Service and Cost

The Service and Cost subscale is comprised of Items 12 and 14 of the SADL. Participants indicated that they were greatly satisfied (M = 5.70, SD = 1.14) with the services they received when obtaining their hearing aids. Specifically, participants were greatly satisfied (M = 6.28, SD = 1.02) with the competency of the hearing aid provider and indicated a considerable level of satisfaction (M = 5.03, SD = 1.89) with the dependability of their hearing aids.

Negative Features

Negative Features is comprised of Items 2 (reversed item), 7 (reversed item), and 11 of the SADL. Generally, a considerable level of satisfaction (M = 4.74, SD = 1.40) was observed with regard to undesirable aspects of hearing aid use. Participants were considerably satisfied (M = 5.12, SD = 1.82) with extraneous sounds amplified by the hearing aids and greatly satisfied (M = 5.66, SD = 1.76) with their ability to turn hearing aids up loud enough without getting feedback. However, participants were only somewhat satisfied (M = 3.27, SD = 2.00) with the benefit provided by their hearing aids using standard telephones (i.e., with no amplifier).

Personal Image

The Personal Image subscale is comprised of Items 4 (reversed item), 8, and 13 (reversed item) of the SADL. Participants indicated high levels of satisfaction on this subscale (M = 5.86, SD = 0.93). Furthermore, participants were greatly satisfied (M = 5.85, SD = 1.60) that people did not notice their hearing loss more when using their hearing aids. A considerable level of satisfaction (M = 5.14, SD = 1.63) was noted for aesthetic aspects of their hearing aids, and participants indicated that they were tremendously satisfied (M = 6.61, SD = 1.01) that wearing their hearing aids did not make them appear less capable.

Comparison of Australian SADL Data with U.S. Interim Norms

In Figure 2, the mean SADL Global and subscale scores for the Australian sample are presented with the corresponding U.S. interim norms described by Cox and Alexander (1999). The U.S. sample in the original 1999 study was comprised of 257
participants who completed the SADL. This included a large group of Veteran’s Affairs clients as well as a number of private paying clients. Specific numbers in each group were not specified. The SADL scores for the present participant group were compared to the normative Global score and Service and Cost subscale score provided by Cox and Alexander (1999) for their Veterans Affairs participants. These scores were calculated without the “reasonable cost” item as they did not pay for their hearing aids. For the remaining subscales, the present Australian SADL data was compared to the normative data that included both Veterans Affairs and private paying hearing aid users.

A single sample t-test statistical comparison revealed a significant difference between the mean SADL Global score obtained for the Australian group and the U.S. group (Cox and Alexander, 1999) ($t [812] = 12.97, p < .001$). Participants in the Australian group were significantly more satisfied ($M = 5.29$) than individuals included in the U.S. group ($M = 4.9$). A significant difference was also observed for all means of both samples for each subscale SADL score: Positive Effect ($t [960] = 2.01, p < .05$), with the Australian group being significantly more satisfied ($M = 4.98$) than their U.S. counterparts ($M = 4.9$); Service and Cost ($t[834] = 7.65, p < .001$), such that the Australian participants were significantly more satisfied ($M = 5.70$) than U.S. participants ($M = 5.4$); Negative Features ($t [939] = 25.35, p < .001$), with the Australian group significantly more satisfied ($M = 4.74$) than the U.S. participants ($M = 3.6$); and Personal Image ($t [952] = 8.68, p < .001$), Australian participants reporting greater satisfaction ($M = 5.86$) than the U.S. group ($M = 5.6$).

Variable Effects on Australian SADL Results

Participant Variables

An independent groups t-test was used to compare the mean SADL Global scores for male and female participants. No significant difference was found ($t [952] = 8.68, p > .05$). Furthermore, the correlation (Pearson’s $r$) between participant age and mean SADL Global scores was not significant ($r [813] = 0.001, p > .05$). However, a very weak but significant positive correlation was observed between the degree of hearing loss (better ear three frequency average) and SADL Global scores ($r [806] = 0.100, p < .01$), (see Figure 3), such that participants with higher better ear averages (more hearing loss) were more likely to be satisfied with amplification than those participants with minimal better ear averages (i.e., better hearing).

One way analysis of variance (ANOVA) testing, fitted with polynomial contrasts, was used to examine the effect of the remaining participant variables on mean SADL scores (see Table 3). A significant effect of prior experience with hearing aids was observed for Global satisfaction, and Positive Effect and

Table 3. ANOVA (F) Results for Prior Experience and Degree of Difficulty without Hearing Aids

<table>
<thead>
<tr>
<th></th>
<th>Global</th>
<th>Positive Effect</th>
<th>Service and Cost</th>
<th>Negative Features</th>
<th>Personal Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior experience</td>
<td>8.60*</td>
<td>75.37*</td>
<td>3.27**</td>
<td>0.96</td>
<td>0.68</td>
</tr>
<tr>
<td>Degree of difficulty</td>
<td>14.31*</td>
<td>45.43*</td>
<td>6.89*</td>
<td>1.70</td>
<td>0.20</td>
</tr>
</tbody>
</table>

*p < 0.001  **p < 0.05

![Figure 3](https://example.com/figure3.png)  
**Figure 3.** Correlation between better ear average hearing threshold and Global satisfaction ($N = 813$).
Service and Cost subscale scores, such that greater experience with hearing aids was associated with higher satisfaction. Participants were also asked to indicate the degree of hearing difficulty without hearing aids. A significant effect for this variable was demonstrated for SADL Global, Positive Effect, and Service and Cost scores, such that the more difficulty participants reported without their hearing aids, the greater the postfitting satisfaction levels.

**Hearing Aid Variables**

A number of hearing aid variables were investigated to determine the relationship between amplification characteristics and self-reported satisfaction. An independent groups t-test revealed no significant difference between mean SADL Global satisfaction scores for participants who received top-up or fully subsidized hearing aids (t [811] = 1.026, p > .05). Additionally, there was no significant difference between mean Global satisfaction for participants who were fitted monaurally compared to those who were fitted binaurally (t [811] = 1.305, p > .05). ANOVA revealed a significant effect of hearing aid style (BTE, ITE, ITC) on Global satisfaction (F[2,794] = 3.353, p < .05), Personal Image (F[2,549] = 3.850, p < .05), and Positive Effect (F[2,938] = 13.195, p < .001). However, a Bonferroni post hoc multiple comparisons analysis did not suggest that one style of hearing aid was significantly better for overall Global satisfaction (p > .05 for all comparisons). For the Positive Effect subscale, Bonferroni comparisons indicated that satisfaction was significantly greater for BTE and ITE aids compared to ITC aids (p < .001). With regard to the Personal Image subscale, Bonferroni comparisons demonstrated significantly higher satisfaction for ITC aids in comparison with BTE style aids (p < .001). There was no significant effect of hearing aid style for the Service and Cost (F[2,618] = 1.005, p > .05) and Negative Features subscales (F[2,919] = 1.708, p > .05). Nonstandard (NS) amplification devices were excluded from these analyses due to the small sample size (N = 14), and only participants who were either monaurally fit or binaurally fit with the same style of aid in both ears were included.

**Relationship of Other Outcome Variables to SADL Scores**

**Satisfaction with Practitioner**

Responses on the CSS indicated that 95% of participants were either satisfied or very satisfied with the quality of services provided by their practitioner. Pearson’s r was used to determine the presence of a significant association between satisfaction with the service provided by their practitioner (as indicated by single item on the CSS) and the SADL Global and subscale scores. Weak, yet significant, correlations were observed between levels of satisfaction with the hearing aid practitioner and SADL Global scores (r [813] = 0.35, p < .01), Positive Effect (r [953] = 0.3, p < .01), Service and Cost (r [828] = 0.33, p < .01), Negative Features (r [92] = 0.21, p < .01), and Personal Image subscale scores (r [945] = 0.18, p < .01). This positive relationship indicated that participants who reported greater satisfaction with their hearing aid provider also reported greater satisfaction with amplification.

**Satisfaction with Hearing Aids**

Overall, 89% of respondents were either satisfied or very satisfied with the hearing aids provided. Satisfaction with hearing aids (as indicated by a single item on the CSS) was significantly correlated with satisfaction levels in the SADL results. Specifically, significant weak correlations were observed between hearing aid satisfaction and SADL Global (r [802] = 0.54, p < .01), Positive Effect (r [945] = 0.49, p < .01), Service and Cost (r [824] = 0.28, p < .01), Negative Features (r [924] = 0.41, p < .01), and Personal Image scores (r [937] = 0.35, p < .01). This relationship was positive such that the more satisfied respondents were with their hearing aids, the higher the satisfaction reported in all areas of the SADL.

**Hearing Aid Use**

Approximately 91% (N = 919) of participants used their hearing aids on a daily basis, that is, one or more hours per day. Only 3% of participants reported using hearing aids less than one hour per week or not at all (see Figure 4). One-way ANOVA revealed a significant effect of hearing aid use (F[5,799] = 35.00, p < .001) on Global satisfaction such that increased hearing aid use was associated with greater satisfaction. Furthermore, a significant linear trend according to hearing aid use was noted for mean satisfaction in the Personal Image (F[5,927] = 2.40, p < .05), Negative Features (F[5,923] = 5.93, p < .001), Service and Cost (F[5,821] = 6.39, p < .001), and Positive Effect
subscales ($F_{5,945} = 75.37, p < .001$), such that greater satisfaction levels within each of these subscales was associated with greater hearing aid use. See Figure 5 for an illustration of the observed trends. Although a major proportion of the variation in satisfaction levels according to hearing aid use was explained by this linear trend, a small but significant deviation was observed for Global, Negative Features, Service and Cost, and Positive Effect scores ($p < .05$), and hence, a quadratic function was performed. This revealed a significant quadratic relationship for the Positive Effect ($F_{1,945} = 7.52, p < .05$) and Negative Features subscales ($F_{1,923} = 11.38, p = .001$). Neither a quadratic function ($F_{1,821} = 2.47, p > .05$) nor cubic function ($F_{1,821} = 1.93, p < .001$) was significant for the Service and Cost subscale in accounting for this deviation from the linear trend.

**Hearing Aid Benefit**

Over 75% of participants found that hearing aids helped a moderate amount or a lot in certain situations (see Figure 6). Overall hearing aid benefit was determined from Question 3 on the CSS (see Appendix A), which asked the participants to indicate the level of assistance (on a scale of one to four) provided by their hearing aids in six different situations. Overall benefit for each participant was calculated by averaging the benefit ratings over the number of situations that were personally relevant to each participant. This overall hearing aid benefit experienced by participants was significant and moderately correlated to Global ($r = 0.53, p < .01$) and Positive Effect ($r = 0.52, p < .01$), and significant, but weakly, correlated to Service and Cost ($r = 0.19, p < .01$), Negative Features ($r = 0.39, p < .01$), and Personal Image satisfaction ($r = 0.2, p < .01$). The relationship demonstrated was positive, such that greater reported benefit from amplification was associated with higher levels of satisfaction for the SADL.
Over 90% of participants reported difficulties with hearing aids some or none of the time, with only 4% of the study group experiencing difficulties all the time. Similarly with overall benefits, overall difficulties with hearing aids were calculated from Question 4 on the CSS (see Appendix A). Significant, yet relatively weak, correlations were observed between hearing aid difficulties and SADL scores as follows: Global score ($r = -0.36, p < .01$), Positive Effect ($r = -0.31, p < .01$), Service and Cost ($r = -0.25, p < .01$), Negative Features ($r = -0.24, p < .01$), and Personal Image ($r = -0.23, p < .01$). This negative relationship indicated that high levels of reported hearing aid difficulties were associated with reduced satisfaction levels.

**DISCUSSION**

The first aim of this study was to provide SADL data for a group of older Australian hearing aid users. The results indicated that, overall, there was a considerable level of participant satisfaction with amplification. This is consistent with a number of other studies conducted with older Australian hearing aid users (e.g., Hickson et al, 1999; McLeod et al, 2001). Results for the present study can be compared to the SADL data obtained by McLeod et al (2001), which included similar participants in terms of age and gender representation. Table 4 shows the mean SADL scores obtained for the present study, the two week and 12–24 month postfitting groups from the McLeod et al study, as well as Cox and Alexander’s (1999) provisional norms. Overall, satisfaction levels reported in the present study are generally more comparable with the two-week group. In their study, McLeod et al reported that satisfaction declines over time, because while hearing aid benefit is rapidly noticed by the hearing aid user, negative aspects of hearing aid use take longer to become apparent, and thus the hearing aid user may experience a “honeymoon” effect. The results for the present study seem to support this assertion.

**Table 4. Comparison of SADL Scores across Three Studies**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>5.5</td>
<td>5.27</td>
<td>4.9</td>
<td>4.9</td>
</tr>
<tr>
<td>Positive Effect</td>
<td>5.1</td>
<td>4.98</td>
<td>4.6</td>
<td>4.9</td>
</tr>
<tr>
<td>Service and Cost</td>
<td>5.9</td>
<td>5.70</td>
<td>5.4</td>
<td>5.4</td>
</tr>
<tr>
<td>Negative Features</td>
<td>5.5</td>
<td>4.74</td>
<td>4.3</td>
<td>3.6</td>
</tr>
<tr>
<td>Personal Image</td>
<td>6.0</td>
<td>5.86</td>
<td>5.8</td>
<td>5.6</td>
</tr>
</tbody>
</table>

Demographic Details:
- Mean Age: 75.7 years, 75.3 years, 76.3 years, Not Reported
- % Males: 46.4%, 54.4%, 43.0%, Not Reported
- % Binaural Fit: 75.1%, 54.8%, 72.0%, Not Reported

**Figure 6. Distribution of hearing aid benefit (N = 1014).**
All SADL scores in the present study, which were collected at three to six months postfitting, were lower than McLeod et al.’s two-week group. Conversely, SADL scores for the present study were higher than McLeod et al.’s (2001) 12–24 month postfitting group, possibly because the present data were collected at an earlier stage postfitting.

The second aim of the study was to compare the Australian SADL data to the provisional norms described by Cox and Alexander (1999). A statistically significant difference was noted between the Global scores and all subscale scores obtained for the two groups, with the Australian group being significantly more satisfied than the U.S. group. The difference in satisfaction cannot be attributed to differences in the cost of the hearing aids, as the majority of participants in both studies had hearing aids that were fully subsidized; to the exclusion of the reasonable cost item, it was omitted in both studies; or to differences in participant age, which was similar between studies.

The level of hearing aid technology supplied to participants in both studies may possibly account for the difference. Participants in the present study had predominantly been fitted with digitally programmable hearing aids, while participants in Cox and Alexander’s (1999) study were fitted primarily with “conventional” aids (presumably analogue), with few programmable aids included in the group (Cox and Alexander, 2001). As programmable technology is related to higher satisfaction levels relative to nonprogrammable technology (Kochkin, 2000), this may explain the higher SADL scores observed in the present study. Additionally, Cox and Alexander (1999) reported administering the SADL with participants at least one year postfitting, while participants in the present study were surveyed only three to six months postfitting. McLeod et al. (2001) reported that satisfaction decreases over time, although it is unsure at this stage at what point this decline occurs and what is the most appropriate point postfitting to administer the SADL. It is possible that satisfaction for the participants in the present study, if measured at a later stage postfitting, may more closely resemble the normative data developed by Cox and Alexander (1999), as was the case when McLeod et al. (2001) compared their 12–24 month postfitting participant group with Cox and Alexander’s (1999) interim norms.

Figure 2 illustrates that the difference between the Negative Features subscale scores for the Australian and U.S. samples is by far greater than the other SADL scores. Other studies have also reported higher satisfaction for Negative Features subscales compared to Cox and Alexander’s (1999) interim norms (Hosford-Dunn and Halpern, 2000; McLeod et al., 2001). The finding for the present study adds further weight to Cox and Alexander’s (2001) belief that upwards adjustment of the normative data for this subscale may be necessary.

However, having stated that the differences between the Australian and the U.S. samples are statistically significant, the mathematical difference is relatively small, which makes it difficult to speculate how this difference would translate clinically. For example, the significant difference in the Positive Effect score for the Australian group (M = 4.98) and their U.S. counterparts (M = 4.90) equates to a mathematical difference of 0.08. Given that the critical test-retest difference for this subscale is 0.90 (Cox and Alexander, 1999), a difference of 0.08 between the two groups, regardless of statistical significance, does not seem compelling in terms of clinical applicability.

The third aim of this study was to examine the effect of a number of participant and hearing aid variables on SADL results. A significant but weak positive correlation (r = .100) was noted between SADL Global scores and degree of hearing loss. This relationship was reported by Hosford-Dunn and Halpern (2001); however, a study by Jerram and Purdy (2001) failed to reveal a significant relationship between degree of hearing loss and satisfaction. The weak nature of the correlation in the present study supports Jerram and Purdy’s findings and indicates that degree of hearing loss is not strongly associated with satisfaction with hearing aids. A positive relationship was found between perceived degree of hearing difficulty without hearing aids and mean SADL Global, Positive Effect, and Service and Cost scores. The finding that greater perceived hearing difficulty initially is associated with higher satisfaction scores postfitting is supported in the literature (Hosford-Dunn and Halpern, 2001; Kochkin, 2000). Similarly, the positive relationship evident between prior hearing aid experience and mean SADL Global, Positive Effect, and Service and Cost scores is consistent with the findings of a previous study by Kochkin (2000). It may be that experienced hearing aid users have more realistic expectations regarding amplification and thus view amplification more favorably. Experienced hearing aid users also reported greater amounts of hearing aid use,
which is positively associated with SADL satisfaction.

No relationship was found between SADL Global scores and either gender or age, a finding that is generally consistent with the literature. Previous studies examining the relationship between gender and satisfaction have reported insignificant results (Hosford-Dunn and Halpern, 2001; Jerram and Purdy, 2001). Previous results regarding age and satisfaction have been more inconsistent. Cox and Alexander’s (1999) preliminary data indicated no difference in SADL scores for subjects under and over 60 years of age, and Jerram and Purdy (2001) likewise found no effect on satisfaction for age. However, both of these studies may have been constrained by methodological factors. For instance, Cox and Alexander (1999) appeared to compare their older subject group over 60 years of age (N = 257) with a small group of younger hearing aid users (N = 50), and Jerram and Purdy (2001) only included a somewhat restricted age range (31–88 years of age). Hosford-Dunn and Halpern (2001) were able to demonstrate a negative effect of age on satisfaction, and attributed the relationship primarily to the deleterious effects of age-related central processing changes on speech understanding (Gordon-Salant and Fitzgibbons, 1999). The present study examined a smaller age range (29–104 years) compared to the study by Hosford-Dunn and Halpern (2001) (6–101 years of age), which may explain why a significant effect for age was not observed in the present study.

The present study revealed a significant effect of hearing aid style on SADL Global, Personal Image, and Positive Effect scores. This effect was in favor of ITC aids for Personal Image, which is consistent with the findings of higher satisfaction for smaller aids noted in previous studies (Baumfield and Dillon, 2001; Kochkin, 2000). The result for Positive Effect was in favor of larger aids (BTEs and ITEs) over ITC style aids. Although on first appraisal this would seem inconsistent with previous studies reporting greater satisfaction for smaller aids (Baumfield and Dillon, 2001; Kochkin, 2000), respondents wearing larger hearing aids have both greater average hearing losses and greater perceived hearing difficulties without hearing aids, which are both factors related to higher satisfaction. It is plausible to suggest that because ITE and BTE hearing aids usually feature more gain within their specifications, these aids deliver better performance to cater for clients with these larger hearing losses. These most probably explain the higher satisfaction for the Positive Effect subscale.

The remaining hearing aid variables investigated in the present study did not show significant effects in relation to SADL scores. No difference was found between SADL satisfaction scores for fully subsidized and top-up (partially subsidized) participants; however, as there were relatively few top-up participants (N = 104) compared to fully subsidized participants (N = 910), this result should be interpreted with caution. This finding, however, was also evident in Cox and Alexander’s (2001) study whereby no significant difference in SADL scores was observed between “co-pay” participants and fully subsidized Veteran’s Affairs participants. Monaural/binaural status did not have a significant effect on mean satisfaction scores. Kochkin (2000) did find higher satisfaction scores on the MarkeTrak survey (Kochkin, 2000) with binaural fitting relative to monaural fitting; however, the difference was very small, and the finding has not been repeated in subsequent studies using other measures of satisfaction (SADL in Hosford-Dunn and Halpern, 2001; single-item measure in Jerram and Purdy, 2001).

The fourth aim of this study was to examine the relationship between the SADL and other outcome measures typically used for evaluating hearing aid fitting success, specifically single-item satisfactions scales, measures of hearing aid use, hearing aid benefit, and hearing aid difficulties. The purpose of investigating the relationship between Australian SADL scores (Global and subscale) and single-item satisfaction scores was to reinforce the validity of the SADL as a true measure of satisfaction and to determine those subscale areas that contribute most to a respondent’s overall satisfaction. A weak correlation was observed between participants’ Global scores on the SADL and their single-item scores for overall hearing aid satisfaction, as measured by Question 8 on the CSS. This shows that as participants’ satisfaction on the single-item scale improved, so too did their satisfaction on the SADL. This reconfirms the validity of the SADL as a genuine measure of satisfaction. However, the relationship between the two measures is not as strong as we might expect (r = 0.54) given that both scores are intended to be indicators of hearing aid satisfaction. Some reduction in correlation strength may be due to random error inherent in both types of measures or the relative insensitivity of the single item (Cox and Alexander, 2001).
Additionally, the SADL questionnaire taps into content areas that may not always be considered by participants when responding to a single-item satisfaction scale. For example, a person may not always consider issues such as how competent the clinician was or how the hearing aids have affected their self-image when asked to rate on a single-item scale how satisfied they are with their hearing aids. Instead, they may focus more on the communication benefits or negative effects produced by their hearing aids. This was evidenced in the current study when looking at the relationship between single-item scores for overall hearing satisfaction and individual subscale scores on the SADL. Although the single-item satisfaction scale correlated with all four SADL subscales, correlations were particularly weak for the Cost and Service subscale and the Personal Image subscale. This indicates that when clients rate their satisfaction level using a single-item scale, they do not consider issues relating to service provision and self-image as much as communication benefits and negative features.

Kochkin’s study (1992) revealed that a reduction in the disability or handicap caused by a hearing loss (i.e., benefit) was, by itself, not sufficient to ensure a client was completely happy with the amplification aspect of their rehabilitation program. It was found that hearing aid users considered improved hearing ability, suitable sound quality, instrument reliability, usefulness in multiple listening environments, postpurchase service, and fit/comfort to be the most important factors influencing consumer satisfaction. This was supported in the current study in that the single-item hearing aid satisfaction scale correlated with all four SADL subscales, not just the Positive Effect subscale, which primarily relates to hearing aid benefit. That is, issues relating to sound quality and hearing aid benefit (i.e., Positive Effect subscale), difficult listening situations (i.e., Negative Features subscale), clinician competency and hearing aid reliability (i.e., Service and Cost subscale), and the appearance of the hearing aid (i.e., Personal Image subscale) all contributed to how satisfied a person was overall with their hearing aids. This further highlights the importance of using outcome measures that look beyond benefit when evaluating the success of a rehabilitation program.

The importance of evaluating how a client feels about the competency of their clinician when measuring hearing aid success was further supported in the current study. A relatively weak positive correlation ($r = 0.35$) was observed between participants’ Global scores on the SADL and single-item satisfaction scores for the quality of service provided by the practitioner (as measured by Question 7 on the CSS). This shows that as participants’ satisfaction with their clinician increased, so too did their satisfaction on the SADL. This supports Kochkin’s (1997) theory that a client’s satisfaction with amplification is a function of three important variables: satisfaction with the physical features of the instrument dispensed; satisfaction with the instrument’s performance in a variety of listening situations; and satisfaction with the services provided by the clinician.

In the literature, degree of hearing aid use is often reported as an outcome measure for assessing hearing aid fitting success (e.g., Dillon et al, 1997; Humes, 1999). In a study by Dillon et al (1991b), satisfaction with hearing aids (as measured by the single-item hearing aid satisfaction scale on the HAUQ) correlated highly with reported hearing aid use. This relationship was also observed in the current study in that greater hearing aid use was associated with increased satisfaction on the SADL. However, Humes (1999) cautions that employing hearing aid use as a measure of hearing aid success can be misleading. Not only do clients tend to overestimate or underestimate their use time, some clients may only require use of their hearing aids in certain listening conditions and may be very happy with how their hearing aids are performing within this limited space of time. Alternatively, some clients, particularly those who rely heavily on their hearing aids for day-to-day functioning, may persevere in using their hearing aids despite being dissatisfied with them. This issue was highlighted in the current study in that, although there was a significant linear relationship between hearing aid use and all four SADL subscales, significant deviations from the linear trend were exhibited for the Positive Effect, Negative Features, and Service and Cost subscales. That is, an increase in hearing aid use was not always associated with a steady increase in satisfaction scores on these subscales. For example, as can be seen in Figure 5, there was a slight decrease in satisfaction with Service and Cost with an increase in hearing aid use from never to less than one hour per day, followed by an increase in satisfaction with further use. This suggests that people who use their hearing aids a little may require more repairs than those who never use their aids and
are thus less satisfied with the dependability of their hearing aids and the competency of the service provider. Additionally, those who use their hearing aids a lot may be more used to hearing aid breakdowns and/or be more familiar with how to care for their aids to ensure that they last longer.

Hearing aid benefit is broadly defined as the reduction in disability or handicap caused by a hearing loss (e.g., improved communication ability, increased participation in social activities) following amplification and/or aural rehabilitation (Cox and Alexander, 1999). In a study by Baumfield and Dillon (2001), a significant correlation was observed between clients’ single-item satisfaction scores on the HAUQ and their scores on a measure of hearing aid benefit (i.e., the Shortened Hearing Aid Performance Inventory for the Elderly [SHAPIE]). This relationship was also demonstrated in the present study in that the more benefit participants received from their hearing aids in certain situations (as measured by Question 3 on the CSS), the higher their overall satisfaction level on the SADL. However, this correlation was only moderate ($r = 0.53$), which suggests that, although benefit is a significant determinant of satisfaction, there are other factors that contribute to overall satisfaction. This once again supports Kochkin’s (1992) findings that satisfaction is more than just benefit.

Although not a traditional outcome measure, the number of hearing aid difficulties reported by a client may also be used by the clinician as measure of hearing aid success (Dillon et al, 1997). Baumfield and Dillon (2001) found a significant correlation between clients’ single-item satisfaction scores on the HAUQ and their degree of hearing aid difficulties. This relationship was also demonstrated in the current study in that the more difficulties participants experienced with their hearing aids, the lower their overall satisfaction level on the SADL. However, this correlation was weak ($r = 0.36$), which suggests that, although the number of hearing aid difficulties experienced by a client is a significant determinant of hearing aid satisfaction, there are other factors that contribute to a client’s overall satisfaction with their hearing aids. Thus, when validating the rehabilitation process in follow-up sessions, the clinician must not only focus on addressing and resolving the client’s hearing aid difficulties, they must also address other issues considered to be important to clients if high levels of satisfaction are to be achieved (Kochkin, 1992).

As expected, degree of hearing aid difficulty (as measured by Question 4 on the CSS) correlated with the Negative Features subscale of the SADL. Less anticipated was the significant correlation observed between degree of hearing aid difficulty and the other three SADL subscales (i.e., Positive Effect, Service and Cost, and Personal Image). This suggests that a client experiencing difficulties with a hearing aid may not only develop negative perceptions about the hearing aid itself but also the competency of the service provider, the dependability of hearing aids, the overall benefit and value of amplification, and their self-confidence and personal image.

**Clinical Applications**

Cox and Alexander (1999) envisioned that the SADL might be used to evaluate satisfaction in a normative sense. If SADL norms were established for certain distinct groups (e.g., different styles of hearing aids, degree of hearing loss), the clinician could compare a particular client’s SADL results to these norms to determine whether or not their level of satisfaction was acceptable given certain personal and/or hearing aid characteristics. The results of the present study offer preliminary evidence that it is necessary to establish separate population norms, based on the specific variables found to have a significant influence on SADL scores, such as style of aid and perceived degree of hearing difficulty. However, if using the SADL in a normative sense, it would be critical for the clinician to administer the SADL within the same time frame postfitting as when the normative group was evaluated, because, as shown in the McLeod et al (2001) study, client satisfaction tends to decline over time. Additionally, given the significant difference between the data obtained for the present study and the U.S. study (Cox and Alexander, 1999), it is recommended that data be collected for other nations that intend to use the SADL in a normative manner, with careful attention to methodological factors.

The SADL could also be implemented at the service level as an outcome measure. The Office of Hearing Services (OHS) could examine average overall satisfaction scores for various clinics, to ensure that all accredited service providers were delivering a satisfactory service to clients. If a particular service provider was not achieving a comparable level of client satisfaction as other centers, the OHS could look at the
procedures and policies of this center as well as the practices of individual clinicians and recommend appropriate changes. From a marketing point of view, this information would be particularly valuable for service providers to be aware of, as those clients who are more satisfied are more likely to recommend the service to others (Kochkin, 2000).

It is the researchers’ view that the SADL is particularly appropriate for use at the service level. It is important to note, however, that Dillon et al (1997) stated that self-report measures that consist of a fixed list of situations that the client must rate in terms of difficulty (or satisfaction), are disadvantaged in that certain situations may be irrelevant to the client. Although the 15 questions contained within the SADL were included based on research by Cox and Alexander (1999) into those areas considered to be most important to clients in terms of overall satisfaction with amplification, the questionnaire may fail to capture all clients who are dissatisfied. It may be the case that a client is dissatisfied with some issue not included on the SADL (e.g., difficulty managing the small controls on the hearing aid; long waiting time for an appointment). A questionnaire in addition to the SADL that offers the client the opportunity to add their own comments through open-ended questions may be advantageous. At a service level, the authors believe that the SADL has an invaluable application as it offers quantifiable results, organized into neat category areas, which would make collation of results at a service level quicker and more efficient.

Limitations of the Study

Some of the limitations of the present study included restricted availability of participant details and amplification characteristics, the participant group used in the study, the procedure used for administering the SADL, and missing data. Participant details that were unavailable to researchers in the present study included type of hearing loss (i.e., conductive, sensorineural, or mixed), four frequency average, symmetry of hearing loss, attitude toward amplification, hearing aid expectations, personal goals for rehabilitation, and other disabilities (e.g., visual impairment). Amplification details that were unavailable included use of additional hearing aid features (e.g., multiple memory program, directional microphones, telecoil, remote control) and the prescriptive procedure used to fit the participants’ hearing aid(s).

Hosford-Dunn and Halpern (2001) recognized that many complex variables such as personality, psychosocial adjustment to hearing loss, and overall health, which are typically weighed in clinical decision making, were omitted from their study. In this study, the authors did not have access to this information. The relationship of many of these listed variables with regard to hearing aid satisfaction has yet to be established (Humes et al, 2001).

The participant group for the present study was limited to people who had received government-funded hearing aids and did not include people who had paid the full cost of their hearing aids. The preliminary SADL norms established by Cox and Alexander (1999) showed a difference between nonpaying and paying clients, with the latter group demonstrating less satisfaction on the Service and Cost subscale of the SADL. Further investigation in this area for the Australian population is warranted.

The CSS and SADL questionnaire was sent to participants via mail. Although all participants were strongly encouraged to complete and return the questionnaire using the enclosed reply paid envelope, a percentage of clients failed to respond, despite everyone being sent a reminder notice. This may introduce a response bias that is frequently indeterminate (Stein and Cutler, 1996). Thus, the normative data obtained in the present study may not be a valid representation of the majority of Australian hearing aid users (under the Commonwealth Hearing Services Program). Of those questionnaires that were returned to the OHS, a proportion was not fully completed. Dillon et al (1991a) highlighted that misinterpretation of questions may occur in surveys that are mailed to and filled in solely by the client. It may have been the case that some of the questions in the CSS and/or SADL were considered irrelevant to certain clients. Dillon et al (1991b) emphasizes that for an outcome measure to be a valid indicator of the rehabilitation success, it must be applicable to the majority of clients.

CONCLUSION

This study has provided SADL data for the older Australian population. Significant differences were identified between Australian and U.S. levels of satisfaction as measured by the SADL, with Australian hearing aid users being more satisfied than their U.S. clients.
across all SADL subscales. Several variables that can influence satisfaction levels were identified. These include perceived degree of hearing difficulty without hearing aids, amount of previous hearing aid experience, and style of hearing aid. Satisfaction scores for the SADL were significantly related to all outcome measures examined, including single-item satisfaction (practitioner and hearing aids), self-reported hearing aid use, hearing aid benefits, and hearing aid difficulties.

REFERENCES


Gagné J. (2000) What is treatment evaluation research? What is its relationship to the goals of audiological rehabilitation? Who are the stakeholders of this type of research? Ear Hear 21(4):605–73S.


Huch J. (1999) In documenting user benefit/satisfaction there are many tools to choose among. Hear J 52(4):60–70.


**Appendix A: Client Satisfaction Survey**

**Instructions:** Some questions require a tick in the answer box. Please tick only one box per question. For some other questions you will be asked to indicate your answer by circling a number. For these questions you will need to circle a number on each row unless otherwise directed. Other questions require a short written answer.

1. **How many hearing aids do you usually wear?**
   (Tick one box only)
   - One Hearing Aid
   - Two Hearing Aids

2. **How often do you use your hearing aid/s?**
   (Tick one box only)
   - More than 8 hours a day
   - Between 5 and 8 hours a day
   - Between 1 and 4 hours a day
   - Less than 1 hour a day
   - Less than 1 hour a week
   - Never

2a. If you never wear your hearing aid/s please tell us why.

3. **How much has your hearing aid helped you with any of the following?**
   (Circle the appropriate number for each statement—if you do not participate in any of the activities please leave the row blank)

<table>
<thead>
<tr>
<th>Activity</th>
<th>A lot</th>
<th>A moderate amount</th>
<th>A little</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family conversation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Small groups</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Meetings/Church</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Social situations</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>TV/Radio</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Telephone</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

4. **How often do you experience problems with any of the following when using your hearing aid?**
   (Circle the appropriate number for each statement)

<table>
<thead>
<tr>
<th>Problem</th>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positioning the hearing aid or removing the hearing aid</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Adjusting the controls of the hearing aid</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>The aid whistling when it is in the ear and set at a comfortable listening level</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>The hearing aid or ear mould causing you discomfort</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>The hearing aid making any sudden loud noises (unbearably loud not just annoying)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Your own voice sounding hollow or echoing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
5. Have you reported these problems to your hearing practitioner?
(Tick one box only)
Yes  
No  2
If No, go to Question 7.

6. What action did your practitioner take after you reported the problem?

The next few questions are about your satisfaction with the service you received and with the hearing aid/s.

7. How satisfied were you with the quality of service provided by your chosen practitioner?
(Tick one box only)
Very satisfied  
Satisfied  
Dissatisfied  
Very dissatisfied  

8. How satisfied are you with your hearing aid/s?
(Tick one box only)
Very satisfied  
Satisfied  
Dissatisfied  
Very dissatisfied  

9. If you are dissatisfied with your hearing aid/s or with the service provided by your chosen practitioner, please explain why.
(Please feel free to attach any additional written material that you feel may help to answer the question)

10. Do you want the Office of Hearing Services to follow up on this matter with your practitioner?
Yes  
No  
Not applicable  
