

Survey of Hearing Aid Use and Satisfaction by Young Adults

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The purpose of this study was to survey young adults' (18 to 35 years of age) hearing aid satisfaction using the *Satisfaction with Amplification in Daily Life* (SADL) to compare them to existing norms based mainly on middle-aged to elderly patients. An Internet questionnaire was administered to potential participants in February, 2011. Responses for those meeting age and hearing aid use criteria were analyzed (power analysis required 20 participants). Of the 162 respondents, 114 met criteria; 97 participants completed the SADL. Although they rated their hearing aid satisfaction significantly poorer than norms on the Service and Cost and Personal Image subscale and Global scores, these young

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adults were generally satisfied with their hearing aids. Based on these findings, separate norms on the SADL may need to be developed for young adults.

Although technology has improved dramatically in recent years, there is little information available about young persons' use of and satisfaction with hearing aids. Of the approximately 34.5 million persons in the United States with hearing loss, nearly 2.5 million are young adults between 18 and 35 years of age (Fabry, 2011; Kochkin, 2001, 2005, 2009; Kochkin et al., 2010). Roughly 25% of the U.S. population uses hearing aids (Fabry, 2011; Kochkin et al., 2010), but only 11% of those between 18 and 35 years of age have adopted hearing instruments, indicating that young adults may be reticent toward using amplification (Kochkin, 2005).

Young adults born between 1977 and 1993 are now 18 to 35 years of age and are identified as "millennials," known to embrace diversity, and be optimistic, realistic, self-inventive, individualistic, and determined to "rewrite the rules" (Keeter & Taylor, 2009). Further, they are the most technologically sophisticated generation yet, and consider social networking through Facebook, Twitter, and text messages to be part of everyday life (Keeter & Taylor, 2009). However, because little information is available about young adults who use hearing instruments, it is important to know if millennial hearing aid users are satisfied with their devices and if they show significant differences from norms for outcome measures that address satisfaction.

Satisfaction may be one of many reasons why persons of any age with hearing loss do, or do not take advantage of amplification, including how individuals view themselves and the ways that they are affected by their hearing losses. Satisfaction has been described as a pleasurable emotional experience resulting from the evaluation of product performance relative to expectations or a sense that one's needs have been met, and non-audiologic factors (e.g., patients' perceptions of the services provided by their hearing healthcare professionals and hearing aid stigma) can be important for amplification (Abrams, 2000; Cox & Alexander, 1999; Wong, Hickson, & McPherson, 2003). Cox and Alexander (1999) developed the *Satisfaction of Amplification in Daily Life* (SADL), which users can complete after sufficient acclimatization with amplification. The SADL is a 15-item questionnaire that can be scored according to Global and/or four subscale scores (i.e., Positive Effect, Service and Cost, Negative Features, and Personal Image). Subscale scores are useful in helping to determine, on an individual basis, areas in which hearing aid users would like to see improvements made in their devices. However, Global scores and/or subscale scores alone may not always reflect variations in different hearing aid users' definition of satisfaction. That is, user satisfaction with hearing aids may be different for younger adults than for older persons, because nuances might exist between hearing aid users who differ on factors like age; cause, type, severity, and duration of hearing loss;

level, type, and duration of hearing aid experience; cultural and generational expectations; finances; and stigma among others. Thus, factors that have traditionally been associated and/or heavily weighted with hearing aid user satisfaction in older persons may not apply to young adults. If not, then obtaining data from young adults should lead to better services and treatments for them and result in increased use of and satisfaction with amplification.

User satisfaction with hearing aids has been assessed broadly via national consumer opinion polls such as the U.S. MarkeTrak (Kochkin, 1990, 2005, 2009, 2010) and the European EuroTrak (Hougaard & Ruf, 2011) surveys. Over the past few decades, hearing aid use and satisfaction have been documented primarily for middle-aged adult and geriatric populations (e.g., Humes, Halling, & Coughlin, 1996; Jerram & Purdy, 1997). Although the responses of younger adults have been included in normative samples for outcome measures, most of the data available on self-assessment scales are for middle-aged to elderly adults with acquired hearing losses who are considering the use of hearing aids for the first time. These individuals often are concerned about factors like negative stigma associated with hearing aids (e.g., appearing older when wearing devices) and cost of the instruments, which is often not covered by third-party payers. On the other hand, young adults may have very different experiences and perspectives about hearing loss and hearing aids. Many young adults have congenital hearing losses or developed their losses during childhood, which implies that the early decisions about the use and management of their hearing aids typically were made by their parents or caretakers. Some young adults may develop hearing loss in later childhood, adolescence, or early adulthood from noise exposure, as suggested by a recent study documenting an increase in the prevalence of hearing impairment in U.S. teenagers (Shargorodsky, Curhan, Curhan, & Eavey, 2010). Considering the major transitions that young adults face from being dependent on and living with their parents to an independent life, and from education to the work force, measuring their expectations for and satisfaction with hearing technology is an important step in understanding and meeting the needs of this population.

As part of our research on this topic, we conducted a systematic review of the literature pertaining to hearing aids and young adults, using the search string "hearing aids and benefit and adults," and produced 763 titles. However, only one study was found that looked at young adult hearing aid users exclusively. Cameron et al. (2008) administered the 79-item *Factors Affecting Hearing Aid Use in Adults* (FAHA) questionnaire (Driscoll & Chenoweth, 2007) to 57 participants in Australia between 20 and 26 years of age. Items on the FAHA were rated from *Strongly Disagree* to *Strongly Agree* using a Likert-scale. The participants were a combination of previously collected data from a statistically underpowered, preliminary study, and a new group that was solicited with the help of Australian hearing loss support networks. They found that 35% of their respon-

dents discontinued hearing aid use between the ages of 12 to 15 years, but 49% said that they “would like to wear their hearing aids more often.” They found that hearing aid users’ and non-users’ responses were significantly different on seven items on the survey, which suggested that non-users were more likely to believe that: (a) they did not hear better with their hearing aids on (63%), (b) they did not like the sound quality of hearing aids (50%), (c) hearing aids gave them headaches (58%), (d) hearing aids made background noise too loud (50%), (e) hearing aids were too much hassle (53%), (f) hearing aids were out of their control (55%), and (g) their parents made them go see an audiologist (46%). Cameron et al. (2008) found differences between users and non-users regarding their opinions about sound quality with and control over hearing aids. Cameron et al. (2008) only assessed persons with severe to profound hearing losses and their reasons for discontinuing or refusing amplification, which may differ for those having less severe hearing losses. Unfortunately, Cameron et al. did not provide any normative data for the FAHA and were unable to make comparisons between their young adults and the middle-aged to elderly population, which could be useful in keeping young hearing aid users from becoming non-users. It would be beneficial to conduct a similar study in the U.S. where hearing aids are not all provided free through the public health service as was the case in the Cameron et al. study. Personal cash outlay likely would be an important factor in young persons’ satisfaction with hearing aids.

Clearly, a study investigating young adults’ satisfaction with hearing aids is needed to compare results to existing norms that were based mainly on middle-aged to elderly patients. The SADL should be appropriate for making comparisons of hearing aid use and satisfaction between young adults and the primarily middle-aged to elderly persons on which it was normed (Cox & Alexander, 1999, 2000). Cox and Alexander (1999, 2000) suggested that the SADL questionnaire should be updated periodically and that additional data would be needed for use with young adults. There are two sets of norms for the SADL developed by Cox and Alexander (1999) and Hosford-Dunn and Halpern (2000). Hosford-Dunn and Halpern (2000) explained that the Cox and Alexander (1999) norms were based on samples composed of elderly males from Veterans Affairs Medical Centers and community clinics. So, they developed SADL norms from a population of 375 patients (53% females, 47% males) ranging from 6 to 101 years of age who had been served in a private practice setting. However, because only 22 of the patients in their normative sample were under 60 years of age, having additional SADL results for young adult hearing-aid users should help provide clinicians with reasons for the satisfaction or dissatisfaction that young adults have with their hearing aids.

The purpose of the present study was to assess young adults’ use and satisfaction with hearing aids in a survey with comparisons to norms based primarily on a middle-aged to elderly population of hearing aid users. The specific research

question investigated was: Do young adults have different amounts of satisfaction with hearing aids as measured by the SADL when compared to norms generated from mainly middle-aged to elderly hearing aid users? If so, these findings may indicate a need for counseling of young adults with hearing loss about specific expectations for hearing aid use and ownership. The Institutional Review Board of the University of California Santa Barbara approved this project with a waiver of informed consent. Privacy was ensured by not connecting participants' responses to identifiable information.

METHOD

Participants

Potential participants were invited to respond to an online survey data collection and management website administered via SurveyMonkey.com. Participants were a subset recruited from a large Internet survey and had to satisfy the following inclusion criteria: (a) be between 18 and 35 years of age, (b) have a previously diagnosed hearing loss, and (c) currently use hearing aids. Compliance with the inclusion criteria was ensured via the use of the skip-logic features available on SurveyMonkey.com. Recruitment procedures are described in the procedures section below.

Outcome Measure

The SADL was used to document the participants' satisfaction with amplification. The responses collected for each of the fifteen 7-point scaled items of the questionnaire were compared to the SADL normative data. The items fell into one of the following four subscales: Positive Effect (items 1, 3, 5, 6, 9, and 10 regarding benefit and quality), Service and Cost (items 12, 14, and 15 regarding acquisition and payment factors), Negative Features (items 2, 7, and 11 regarding unwanted noise and telephone clarity), or Personal Image (items 4, 8, and 13 regarding appearance and perceptions of others).

Online Questionnaire

An online questionnaire was developed using the process described by Cummings and Hulley (2007). The questionnaire consisted of demographic questions and the SADL, which was administered and scored according to the guidelines provided by Cox and Alexander (1999). The SADL was modified from the original paper-and-pencil format in which patients are asked to circle letters A through G to indicate their satisfaction with their hearing aids, which necessitated the respondents refer to a legend at the top of the page for a descriptor of each letter. Using the online format, the young adults in the present study simply had to click on a bubble to indicate their responses (see Appendix A); the response options were provided for each item rather than having to refer to the top of the page

as in the paper-and-pencil version. Each bubble was equidistant from the others for consistency in ratings. Also, it should be noted that the original SADL item 11 ("How helpful are your hearing aids on MOST telephones with NO amplifier or loudspeaker?") allows respondents to opt out of the question if they hear well on the telephone without their hearing aids. However, the equivalent item on our survey (#56) did not include that option due to formatting requirements of SurveyMonkey.com. This change may have resulted in some respondents answering this question despite hearing well on the telephone without their hearing aids, which may have affected the results slightly. Nonetheless, great care was taken to employ response formats available on SurveyMonkey.com that most closely resembled those used in the written form of the SADL. Although comparisons to paper-and-pencil versions of the instruments were not made, Thorén et al. (2011) successfully administered several outcome measures including the SADL via an online format to assess the efficacy of Internet-based rehabilitation programs. The survey was designed to be completed in less than 10 min. It was pilot tested on five volunteer participants who met the study inclusion criteria, and their feedback was used to edit, add, and adjust the demographic questions to make them more appropriate for the target population. All participants answered the demographic questions and questions about hearing loss severity. The SADL portion of the questionnaire, as it appeared on SurveyMonkey.com, is shown in Appendix A.

Procedures

Potential participants were a convenience sample of young adults between 18 and 35 years of age. A link to the survey was created and distributed to professional colleagues and national and local hearing loss support groups (e.g., Hearing Loss Association of America and Hearing Loss Nation) who were then asked to share the link with young adults who met the study inclusion criteria. The link was active on SurveyMonkey.com from February through April 2011. The participants self-selected their enrollment into the study by electing to complete the survey, and all responses were kept anonymous. Participants received no incentives for their participation in the survey. As usual for this type of survey, a response rate could not be calculated because the participants were solicited via the Internet and there was no way of knowing how many persons may have received it. One additional weakness of using an anonymous, online survey is that respondents can provide answers that are not true. However, this weakness should have been countered by the fact that targeted respondents were unlikely to provide answers based on social acceptability using this format.

Power Analysis

A power analysis was conducted a priori and revealed that 20 participants would be needed for results to have a statistical power of .80 and probability

of a Type II error of .20. Briefly, a power analysis was calculated by hand to determine adequate sample size for an independent t -test using the following formula:

$$n = \frac{(\sigma_1^2 + \sigma_2^2) \times (z_{1-\alpha/2} + z_{1-\beta})^2}{D^2}$$

Here, z represents a standard normal distribution; α is the probability of a Type I error (.05); β is the probability of a Type II error (for our purposes, it is .20); s is the standard deviation; and D is a clinically relevant difference. The normative data from the Hosford-Dunn and Halpern (2000) study were used in computing the power analysis. They reported means and standard deviations for both Global and subscale SADL scores. The Global score was selected for conducting the power analysis here and it had a mean of 5.0 and a standard deviation of 0.8. We considered that a value of 0.7 (on a 7-point scale) would be a clinically relevant difference (i.e., D), which was obtained by subtracting the value found at the 20th percentile from the mean Global SADL score of the normative group. Therefore, in order to achieve 80% power for detecting a 0.7 difference for the Global score on the SADL (having a reported standard deviation of 0.8), a sample of 20 participants was needed.

Data Preparation and Analysis

Using the skip-logic feature available on SurveyMonkey.com, respondents' demographic responses were first filtered to ensure that they met the age and hearing aid use criteria; those who failed to do so were excluded from the study. The data collected from the SADL were coded using the numerical values 1-7 to correspond to the 7-point scaled answer options. The data were downloaded into an Excel spreadsheet and the SADL subscales (i.e., Positive Effect, Service and Cost, Negative Features, and Personal Image) were calculated for each participant. The means and standard deviations for each subscale were then calculated. Data were submitted to t -tests for independent means to compare these young adults' Global and subscale SADL scores to norms. It is important to note that although the rating scale on the SADL items, by definition, are ordinal (i.e., rank-ordered categories with unequal interval sizes and no absolute zero point), the investigators have largely accepted Cox et al.'s (1999) use of parametric statistics on these data.

RESULTS AND DISCUSSION

Demographics

Of 162 self-selected respondents, 114 met the age and hearing aid use criteria. Of those, 97 completed the SADL questionnaire sufficiently for their responses to be included in the data analysis. Appendix B contains participants' answers to

the demographic items on the questionnaire. Participants were evenly distributed across the acceptable age range for inclusion in this study (mean age was 27.6 years). The participants were 74% females and 26% males. This gender difference may have presented a female bias, but previous studies (e.g., Cameron et al., 2008) have shown similar gender representations. The participants were predominately non-Hispanic/Latino, White/Caucasians. Having to exclude some respondents for not completing a sufficient number of items on the SADL was expected and consistent with previous studies using this outcome measure (e.g., Cox & Alexander, 1999; Hosford-Dunn & Halpern, 2000). However, the 97 participants exceeded the 20 that were required to meet the a priori power analysis for the SADL as described above.

The participants' responses to the demographic questions revealed that over half of them had at least a 4-year college degree and the majority of them were employed either part- or full-time. Use of the SurveyMonkey.com filter feature revealed that most of the participants were aware of, had access to, and took advantage of assistive services and/or equipment at their schools or places of employment. Many of those not using these services reported that they believed that they did not need them. The participants' self-report of hearing loss severity revealed that with the left and right ears combined, severity was distributed as follows: mild (9%), moderate (31%), severe (32%), and profound (25%). Interestingly, the participants' self-assessments of hearing loss severity were similar to their ratings of difficulty when NOT wearing hearing aids, which were: 5% mild, 31% moderate, and 64% severe. Moreover, given the fact that 91% of the participants had self-reported moderate or worse hearing losses, it appears that removing the opt-out item from SADL item #11 (#56 on the online questionnaire) probably had only a minimal effect on the results because most of these participants probably needed to use their hearing aids to hear on the telephone. Although we cannot be sure that these self-reports of hearing loss severity were accurate or symmetrical, over half (57%) of the participants stated that they had hearing losses that were severe or poorer, whereas the rest had losses that were moderate or better, and less than 1% reported they did not have a hearing loss in at least one ear. When asked to rate their hearing on a 1 to 10 scale (1 = *worst* and 10 = *best possible hearing*) similar to that used by Palmer, Solodar, Hurley, Byrne, and Williams (2009), the participants showed benefit ($M = 6.98$) from using hearing aids as compared to using no hearing aids ($M = 3.05$). However, Palmer et al. related self-perception of hearing ability to hearing aid purchase intent. Most of the participants used binaural hearing aids (77%), had experience with both analog and digital technology (~90%), currently wore behind-the-ear hearing aids (86%), started using hearing aids by 5 years of age (73%), and used their hearing aids for 9 to 16 hr a day (84%). These results implied that they relied on and were probably satisfied with their devices. Further, most of the participants reported having seen their hearing professionals within the past 2

years (80%) to discuss their hearing aid use and over half of them chose their most recent hearing aids, indicating that they were actively involved in their hearing healthcare and that they were independent young adults who actually wore hearing aids.

Comparison of Our Young Adults to SADL Norms

Table 1 shows the means, standard deviations, and *t*-test results for these young adults compared to the SADL Global and subscale norms provided by Cox and Alexander (1999) and Hosford-Dunn and Halpern (2000). Note that the numbers of participants listed in Table 1 for both Cox and Alexander's and Hosford-Dunn and Halpern's Global and subscale normative scores varied because not all of the items necessary to generate scores were completed by all participants. The *t*-test revealed that the mean Global score for Hosford-Dunn and

Table 1
Global and Subscale Statistics for the SADL Scores for Our Young Adult Hearing Aid
Current Users (CU) Compared to SADL Private Practice Norms (PPN)^a

Scale	CU	PPN	<i>t</i>	<i>df</i>	<i>p</i> -value
Global					
<i>N</i>	97	257	2.56	352	.0100*
<i>Mean</i>	4.75	5.00			
<i>SD</i>	0.86	0.80			
Positive effect					
<i>N</i>	97	275	1.79	370	.0740
<i>Mean</i>	5.15	4.90			
<i>SD</i>	1.12	1.20			
Service and cost					
<i>N</i>	97	274	4.34	369	.0001*
<i>Mean</i>	4.48	5.00			
<i>SD</i>	1.05	1.00			
Negative features					
<i>N</i>	97	271	0.93	366	.1710
<i>Mean</i>	3.84	4.00			
<i>SD</i>	1.29	1.50			
Personal image					
<i>N</i>	97	270	5.41	365	.0001*
<i>Mean</i>	5.12	5.80			
<i>SD</i>	1.20	1.00			

Note. SADL = Satisfaction with Amplification in Daily Life.

^a"Clinical Application of the Satisfaction with Amplification in Daily Life Scale in Private Practice I: Statistical, Content, and Factorial Validity," by H. Hosford-Dunn and J. Halpern, 2000, *Journal of the American Academy of Audiology*, 11, pp. 523-539.

*significant.

Halpern's (2000) group was significantly higher than that of our young adults. Generally, the higher the SADL score, the more satisfied the hearing aid user. Thus, the statistical difference between the mean Global scores indicated that the Hosford-Dunn and Halpern group was significantly more satisfied than our young adults. The Global scores for our young adults did not differ from the Cox and Alexander data. At the subscale level (see Table 1) differences were observed between our young adults and the Hosford-Dunn and Halpern group on the mean Service and Cost and Personal Image subscales, but not for the Positive Effect or Negative Features subscales. The Hosford-Dunn and Halpern group had a significantly higher mean Service and Cost subscale score than our young adults. Recall that SADL items 12, 14, and 15 determine the Service and Cost subscale score and they ask about the competence of the hearing healthcare provider, reasonability of cost, and dependability of hearing aids. It may be that our young adults did not believe that their hearing aid healthcare providers were as competent or that their hearing aids were too expensive or not as dependable as did the Hosford-Dunn and Halpern group. However, the differences found here may be too small to be considered clinically meaningful, because the means for both groups indicated a considerable degree of satisfaction on these items even though the Cox and Alexander (1999) and Hosford-Dunn and Halpern (2000) data were collected more than a decade ago on older participants.

The significant difference found for the mean Personal Image subscale scores of our young adults and the participants in the Cox and Alexander (1999) and Hosford-Dunn and Halpern (2000) studies may be due to the variation in age of onset of hearing loss and feelings about hearing aids between the groups. Our young adults had a significantly lower mean Personal Image subscale score than those in both of the normative studies. Recall that SADL items 4, 8, and 12 comprise the Personal Image subscale score and ask about the appearance of the hearing aids, perceived noticeability of the hearing loss, and perceived capability of the patients when wearing their devices. Therefore, a lower mean Personal Image subscale score for our young adults indicated that overall they felt that their hearing loss was perhaps somewhat more noticeable, and that they appeared slightly less capable when wearing their hearing aids than did the participants in the normative groups. Again, it should be noted that these were probably more statistically rather than clinically significant differences as all three studies' group means indicated a high degree of satisfaction. Nevertheless, this finding might be expected if these young adults had congenital or prelingual hearing losses that necessitated the use of hearing aids from early childhood. Anecdotally, during the pilot testing of the survey, a young adult commented that he found it difficult to compare the normality of hearing with hearing aids versus without hearing aids because he had *always* had a hearing loss and worn hearing aids. This paradox may indicate that the SADL norms might not be appropriate for young adults, because they may be more likely to have congenital/prelingual rather than later-ac-

quired hearing losses as seen in older groups. This revelation shows that responses on the SADL from young adults might be expected to be different from those of the older participants used in its norms. Having a hearing loss early in life may have made our young adults feel *different* about themselves and/or their interactions with their peers having normal hearing when wearing their hearing aids as opposed to when they did not wear them. Moreover, the young adults may have always felt that their hearing aids were a visible sign of their disability. Alternatively, the Cox and Alexander (1999) and Hosford-Dunn and Halpern (2000) participants were primarily composed of elderly patients who were most likely born with normal hearing and developed their hearing losses during middle-age or later. To them, hearing loss may have simply been a normal component of the aging process and wearing hearing aids was expected for their age group, and thus was perceived as only a slight inconvenience. The results of the present study suggest that further investigation is warranted because it is not known if the significant differences were due to variation in characteristics between the younger and older populations or methods of collecting data in the studies (i.e., over the Internet vs. traditional paper-and-pencil formats or the associated recruitment/sampling procedures).

The present study raises interesting questions about the appropriateness of using an Internet survey where participants self-reported the severity of their hearing losses without having actual audiometric data to support their ratings, and whether results obtained from an online administration of the SADL can be used in lieu of the standardized paper-and-pencil format. Two potential limitations of this approach include possible self-selection bias and unverifiable self-reported demographic information (e.g., hearing loss severity). Self-selection bias occurs in any study when the sample of participants differs in some fundamental ways from peers who did not elect to participate in the study. We do not believe that this type of bias greatly affected the results presented here considering the diversity of the participants as noted from their responses to the demographic questions. Cox and Alexander (1999) and Hosford-Dunn and Halpern (2000) used standardized paper-and-pencil forms of the SADL and reported patients' actual average hearing threshold levels, but the young adults in the present study self-reported their severity of impairment and there was no way of assessing the validity of those reports. However, it is important to note that some of the most respected and widely utilized outcome data on hearing aids and hearing health come from the previous MarkeTrak surveys (e.g., Kochkin 1990, 2001, 2005, 2009, 2010; Kochkin et al., 2010; Kochkin et al., 2011), which were all based on samples of participants' self-reported information. Certainly, this issue deserves further investigation, but due to the online format and the anonymity involved, there was no way to collect audiometric information on the participants in the present study. It seems reasonable, however, that these young adults should have had the ability to make such general ratings given the level of sophistication with

their hearing losses and hearing aid technology that they evidenced in their responses to the questionnaire, especially their self-reporting of hearing loss severity, which corresponded to their ratings of difficulty when NOT wearing hearing aids. Recently, Hannula, Bloigu, Majamaa, Sorri, and Mäki-Torkko (2011) found that patients' self-ratings of hearing difficulty corresponded to their high-frequency audiometric thresholds, which supports the consistency in our young adults' self-reported measures and their estimations of degree of hearing loss. Further, the young adults appeared to be generally well educated, informed about their hearing losses, and active participants in their own hearing health care. Nevertheless, when the young adults in the present study used a 1-10 scale to rate their hearing with and without hearing aids as noted earlier, they did report considerable improvement with amplification, which suggested that they were capable of making and admitting to such perceived differences.

An additional issue raised by the present study is whether using the Internet to collect SADL data online violates the original procedures and norms that were generated in a paper-and-pencil format. We took great care in assuring that the questions and the response options were as close as possible to the normed format. We note here, however, that, as mentioned earlier, this online format involved some minimal formatting changes that were necessary for data collection via SurveyMonkey.Com, which included having participants check a bubble to indicate their responses and omitting the accompanying opt-out option associated with the SADL item 11 regarding telephone use without hearing aids. These changes might prohibit strict comparisons to the SADL norms, but it could be argued that leaving off the check box after SADL item 11 applied to all of the participants in this sample, and thus made little difference in the results. Indeed, if the modification to item 11 is appropriate, then the online presentation of the SADL has some attractive benefits (including speed in acquiring data from wide demographic and geographic samples; visually attractive and useable item layouts as seen in Appendix A; ability to collect, aggregate, and analyze data in real time; and cost effectiveness) over the paper-and-pencil format. One particular advantage of the online format is that rating categories for each question are presented for each item so that respondents can always see what they are rating and just what the options are, whereas, with paper-and-pencil, they must either recall the options or flip back to the top of the page to review them, which is cumbersome and could produce rating errors. Further, accessing the Internet for questionnaires of this nature should be particularly appropriate for millennials who are proficient and frequent users of this technology. A future study should take both types of measurements from participants and compare them for accuracy. Nevertheless, the data presented here indicated that these young adult hearing aid users differed enough from the norms on the Global and two subscale scores of the SADL to warrant further exploration of hearing aid satisfaction in this population.

CONCLUSIONS

From the results of this preliminary study, we concluded that although these young adults' ratings on two of the SADL subscale and Global scores were lower than those of older participants used in the SADL norms, these participants were generally satisfied with their hearing aids. Future studies should determine whether: (a) survey ratings of hearing loss by young adults differ from actual audiometric data, and (b) online and paper-and-pencil protocols for the SADL are equivalent for the same young adult respondents. If so, then the former may be especially appropriate for millennials. Also, future studies should investigate whether additional SADL norms might be appropriate for young adult hearing aid users.

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49. Do you think people notice your hearing loss more when you wear your hearing aids?

[illegible]

50. Do your hearing aids reduce the number of times you have to ask people to repeat?

[illegible]

51. Do you think your hearing aids are worth the trouble?

[illegible]

52. Are you bothered by an inability to get enough loudness from your hearing aids without feedback (whistling)?

[illegible]

53. How content are you with the appearance of your hearing aids?

[illegible]

54. Does wearing your hearing aids improve your self-confidence?

	Not at all	A little	Somewhat	Medium	Considerably	Greatly	Tremendously
Rate here							

55. How natural is the sound from your hearing aids?

[illegible]

56. How helpful are your hearing aids on MOST telephones with NO amplifier or loudspeaker?

[illegible]

57. How competent was the person who provided you with your hearing aids?

	Not at all	A little	Somewhat	Medium	Considerably	Greatly	Tremendously
Rate here _____							

58. Do you think wearing your hearing aids makes you seem less capable?

[illegible]

59. Does the cost of your hearing aids seem reasonable to you?

[illegible]

60. How pleased are you with the dependability (how often they need repairs) of your hearing aids?

[illegible]

APPENDIX B

QUESTIONNAIRE AND PARTICIPANTS' RESPONSES

<u>Item/Question</u>	<u>Response</u>	<u>Number</u>	<u>%</u>
<i>Demographics</i>			
1. Are you between 18 to 35 years of age?	Yes	148	91.9
	No	13	8.1
	Total	161	100.0
	N/A	1	
2. What is your age in years?	18	3	2.4
	19	4	3.2
	20	6	4.8
	21	3	2.4
	22	6	4.8
	23	9	7.3
	24	8	6.5
	25	10	8.1
	26	8	6.5
	27	7	5.6
	28	7	5.6
	29	3	2.4
	30	8	6.5
	31	5	4.0
	32	3	2.4
	33	9	7.3
	34	12	9.7
	35	13	10.5
	Total	124	100.0
	N/A	38	
3. What is your gender?	Male	32	25.2
	Female	95	74.8
	Total	127	100.0
	N/A	35	
4. Indicate whether each of the following best describes your ethnic background.	Hispanic/Latino		
	Yes	6	6.8
	No	77	87.5
	Rather not answer	5	5.7
	Non-Hispanic/Latino		
	Yes	78	72.9
	No	24	22.4
	Rather not answer	5	4.7
	Combination of the above		
	Yes	2	2.6
	No	69	90.8
	Rather not answer	5	6.6
	Total	114	100.0
	N/A	48	

<u>Item/Question</u>	<u>Response</u>	<u>Number</u>	<u>%</u>
5. Indicate whether each of the following best describes your predominate racial group.	White/Caucasian		
	Yes	109	92.4
	No	7	5.9
	Rather not answer	2	1.7
	Black/African American		
	Yes	3	4.1
	No	68	93.2
	Rather not answer	2	2.7
	Asian		
	Yes	8	10.7
	No	65	86.7
	Rather not answer	2	2.7
	Native Hawaiian/Pacific Islander		
	Yes	1	1.4
	No	68	95.8
	Rather not answer	2	2.8
	Native American/Alaska Native		
	Yes	2	2.8
	No	67	94.4
	Rather not answer	2	2.8
	Combination of the above		
	Yes	2	2.9
	No	66	94.3
	Rather not answer	2	2.9
6. What is your highest level of education completed?	High school diploma	21	15.9
	Vocational school degree	4	3.0
	Undergraduate degree (2 year college)	17	12.9
	Undergraduate degree (4 year college)	53	40.2
	Graduate degree	36	27.3
	None of the above	1	0.8
	Total	132	100.0
	N/A	30	
7. In what type of educational program are you presently enrolled?	High school	1	0.8
	Vocational	2	1.5
	Undergraduate (2 year college)	4	3.1
	Undergraduate (4 year college)	30	23.1
	Graduate	33	25.4
	I am not enrolled in an educational program	60	46.2
	Total	130	100.0
	N/A	32	
8. What is your present primary employment status?	Full-time employment (40 hr or > per week)	54	40.9
	Part-time employment (< 40 hr per week)	32	24.2
	Unemployed	28	21.2

<u>Item/Question</u>	<u>Response</u>	<u>Number</u>	<u>%</u>
	Unemployed due to disability	7	5.3
	Presently looking for work	11	8.3
	Total	132	100.0
	N/A	30	
9. Are you aware that assistive services and/or equipment (e.g., note takers, closed captioning, assistive listening devices) for hearing loss are available at many schools and places of employment?	Yes	121	91.7
	No	11	8.3
	Total	132	100.0
	N/A	30	
10. Do you have access to assistive services and/or equipment (e.g., note takers, closed captioning, assistive listening devices) for hearing loss at your school or place of employment?	Yes	102	77.9
	No	29	22.1
	Total	131	100.0
	N/A	31	
11. Do you take advantage of assistive services and/or equipment (e.g., note takers closed captioning, assistive listening devices) for hearing loss at your school or place of employment?	Yes	78	59.5
	No, I do not use them	22	16.8
	No, I do not feel I need them	31	23.7
	Total	133	100.0
12. What is the degree of your hearing loss in each ear?	Right Ear		
	I am not sure	2	1.5
	None (have no difficulty understanding faint or distant speech)	5	3.8
	Mild (can "hear" speech, but miss pieces of words, causing misunderstanding)	11	8.4
	Moderate (understand familiar conversation at a distance of 3 to 5 ft)	33	25.2
	Severe (hear a loud shout 1 ft from the ear)	40	30.5
	Profound (not able to use hearing for communication)	40	30.5
	Left Ear		
	I am not sure	0	0.0
	None (have no difficulty understanding faint or distant hearing)	4	3.1
	Mild (can "hear" speech, but miss pieces of words, causing misunderstanding)	17	13.0

<u>Item/Question</u>	<u>Response</u>	<u>Number</u>	<u>%</u>
	Moderate (understand familiar conversation at a distance of 3 to 5 ft)	36	27.5
	Severe (hear a loud shout 1 ft from the ear)	35	26.7
	Profound (not able to use hearing for communication)	39	29.8
	Total	131	100.0
	N/A	31	
13. Do you currently wear hearing aids?	Yes	106	80.3
	No	26	19.7
	Total	132	100.0
<i>Current Hearing Aid Users (CU)</i>			
14. Please rate your own hearing loss on a scale from 1 to 10, with 10 being the best possible hearing and 1 being the worst possible hearing. First rate without hearing aids, and then rate with hearing aids; please answer both.	Without hearing aids		
	1	32	32.0
	2	24	24.0
	3	11	11.0
	4	8	8.0
	5	7	7.0
	6	8	8.0
	7	5	5.0
	8	4	4.0
	9	1	1.0
	10	0	0.0
	With hearing aids		
	1	0	0.0
	2	0	0.0
	3	9	9.0
	4	8	8.0
	5	8	8.0
	6	6	6.0
	7	16	16.0
	8	40	40.0
	9	6	6.0
	10	7	7.0
	Total	100	100.0
	N/A	62	
15. How much hearing difficulty do you have when you are NOT wearing a hearing aid?	None	1	1.0
	Mild	5	4.8
	Moderate	32	31.4
	Severe	64	62.7
	Total	102	100.0
	N/A	60	
16. Do you use hearing aids in one or both ears?	Both ears	77	76.2
	Only my right ear	11	10.9

<u>Item/Question</u>	<u>Response</u>	<u>Number</u>	<u>%</u>
	Only my left ear	13	12.9
	Total	101	100.0
	N/A	61	
17. At about what age did you start using hearing aids?	Shortly after birth	2	2.0
	1 year of age	15	14.7
	2 years of age	17	16.7
	3 years of age	22	21.6
	4 years of age	10	9.8
	5 years of age	12	11.8
	6 to 15 years of age	8	7.8
	16 to 25 years of age	11	10.8
	26 to 35 years of age	5	4.9
	Total	102	100.0
	N/A	60	
18. About how many years have you used hearing aids?	Less than 1 year	2	2.0
	1 to 5 years	10	9.8
	6 to 15 years	17	16.7
	16 to 25 years	41	40.2
	26 to 35 years	32	31.4
	Total	102	100.0
	N/A	60	
19. About how many times in your life have you received new hearing aids that you have used for 3 months or more?	Analog		
	0	9	9.5
	1	16	16.8
	2	22	23.2
	3	14	14.7
	4	10	10.5
	5	8	8.4
	Greater than 5	16	16.8
	Total	95	100.0
	N/A	66	
	Digital		
	0	6	6.1
	1	29	29.6
	2	36	36.7
	3	14	14.3
	4	8	8.3
	5	2	2.0
	Greater than 5	3	3.1
	Total	98	100.0
	N/A	63	
20. What style of hearing aids do you currently use?	Behind the ear (BTE)	84	88.4
	All in the ear (ITE)	5	5.3
	Completely in the canal (CIC)	6	6.3
	Total	95	100.0
	N/A	67	

<u>Item/Question</u>	<u>Response</u>	<u>Number</u>	<u>%</u>
21. Did you choose your current hearing aids or were they chosen for you (e.g., by family or a professional)?	I chose them	56	55.4
	They were chosen for me	45	44.6
	Total	101	100.0
	N/A	61	
22. What is your daily hearing aid use?	None	1	1.0
	Less than 1 hr per day	0	0.0
	1 to 4 hr per day	1	1.0
	5 to 8 hr per day	16	15.7
	9 to 16 hr per day	84	82.4
	Total	102	100.0
23. When was the last time you saw a hearing professional to have your hearing evaluated?	N/A	60	
	Within the last year	55	53.9
	1 to 2 years ago	25	24.5
	3 to 4 years ago	15	14.7
	5 to 10 years ago	4	3.9
	Greater than 10 years ago	3	2.9
24. When was the last time you saw a hearing professional to discuss your hearing aid use?	Total	102	100.0
	N/A	60	
	Within the last year	67	66.3
	1 to 2 years ago	12	11.9
	3 to 4 years ago	17	16.8
	5 to 10 years ago	4	4.0
	Greater than 10 years ago	1	1.0
	Total	101	100.0
	N/A	61	