

Who Wants a Hearing Aid? Personality Profiles of Hearing Aid Seekers

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Objective: Evidence indicates that elderly hearing-impaired people who use amplification live happier, healthier, and longer lives than those who do not. Nevertheless, only a small fraction (approximately 23%) of hearing-impaired adults actually seek and use hearing aids. This study explored the personalities of hearing aid seekers in an attempt to determine whether those who seek hearing aids are systematically different from the general population.

Design: In this cross-sectional survey, self-report data were obtained from 230 older adults with bilateral, symmetrical, sensorineural, mild to moderately severe hearing impairment. Subjects were representative of patients served either in a publicly funded hospital-based system (VA) or in a free-standing private practice system (PP). All subjects were seeking new hearing aids. Subjects completed a comprehensive personality questionnaire (NEO-Five-Factor Inventory) as well as questionnaires determining locus of control and preferred coping strategies.

Results: Individuals who seek amplification are not simply a random sample of the general population and presumably not a random sample of the hearing-impaired population. Compared with the typical adult, hearing aid seekers tended to be more pragmatic and routine-oriented and probably less imaginative in coming up with novel approaches to dealing with a complex problem such as hearing impairment. These individuals also were found to feel relatively more personally powerful in dealing with life's challenges. Further, hearing aid seekers reported using social support coping strategies less frequently than their non-hearing-impaired peers. In addition, there were significant differences in personality patterns between hearing aid seekers in the PP and VA systems. Differences noted in the personality traits of Openness and Neuroticism might be a useful guide to selecting treatment approaches and expectations for patients in each setting. Additional differences in Agreeableness imply that patients in the private practice system were more trusting than those in the general population, whereas this was not seen for patients in the public health VA system. One interpretation of this finding is that hearing-impaired individuals who are more

suspicious and cynical are reluctant to try amplification in the PP system. This observation underscores the need to improve the public image of hearing health care to increase the uptake of hearing aids in general.

Conclusions: Although individual hearing aid seekers display personality characteristics within the range of normal, this study suggested that they are not simply a random sample of the general population. Possible explanations are offered for significant personality differences, and potential clinical relevance is noted for some effects. The data also point to a need to improve the public image of hearing health care in the PP system.

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Effective rehabilitation of sensory deficits in older age significantly affects quality of life and even mortality rates (e.g., Appollonio, Carabellese, Fratola, & Trabucchi, 1996; Bridges & Bentler, 1998; Crandell, 1998; Lamden, St. Leger, & Raveglia, 1995; Mulrow, Aguilar, Endicott, Tuley, Velez, & Charlip, et al., 1990). The accumulating body of evidence shows that elderly hearing-impaired people who use amplification live happier, healthier, and longer lives than those who do not. Despite the known benefits of amplification, only a small fraction (approximately 23%) of hearing-impaired adults actually use hearing aids (Kochkin, 2001).

Until the advent of miniaturized digital hearing aids, it was widely held that hearing aid penetration would increase in proportion to technological improvements in instrument design. Recent innovations have produced undisputed improvements in hearing aid technology, and surveys show that satisfaction with these modernized hearing aids has improved somewhat (Kochkin, 2000). Nevertheless, penetration of hearing aids among the elderly hearing-impaired population has increased marginally, if at all, compared with a decade ago (Kochkin, 1990; Kochkin, 2001). These disappointing findings, which have been consistent over many years, clearly indicate that there is a need to increase uptake and acceptance of hearing aids among individuals whose lives could be enriched by amplification. In addition, the results imply that the barriers to increasing the

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effectiveness of hearing aids encompass more than inadequate hardware.

What, then, is the problem? Why do some individuals who have a hearing loss seek and appreciate treatment with amplification, whereas many others do not? Several researchers have attempted to address this question by comparing the characteristics of individuals who seek hearing aids with those of others who could be expected to profit from amplification but do not seek it (e.g., Fino, Bess, Lichtenstein, & Logan, 1992; Humphrey, Herbst, & Faurqi, 1981; Swan & Gatehouse, 1990; van den Brink, Wit, Kempen, & van Heuvelen, 1996). A review of these studies reveals several consistent themes, summarized below.

- Individuals with greater audiometric threshold impairment are more likely to seek amplification.
- Among individuals with the same impairments, those with greater self-reported disablement* resulting from the impairment are more likely to seek amplification.
- Individuals who do not seek amplification despite diagnosed impairment often display a constellation of attitudes that mitigate against seeking hearing aids. For example, they tend to believe that hearing aids are too costly, too conspicuous, and/or not very helpful.

Overall, these studies confirm clinician observations that the decision about whether or not to pursue amplification is largely determined by a complex interplay between the physiological impairment and the individual's reaction to the impairment within the context of his or her daily life. Further, it has been demonstrated that attitudes toward hearing loss, hearing aid outcomes, and health behaviors in general are related to personality (e.g., Cox, Alexander & Gray, 1999; Gatehouse, 1994; Kikuchi, Inoue, Ito, Masada, Yoshimura, & Wantanabe, 1999; Saunders & Cienkowski, 1996). This leads to the hypothesis that seeking hearing aids as a response to hearing loss may be associated with basic personality attributes. This article reports a study that explored this hypothesis.

Personality and Related Variables

An individual's personality is his or her characteristic style of thinking, feeling, and behaving. Much research indicates that an individual's basic personality comprises five fundamental traits or

factors and that these remain rather stable across the lifespan after approximately age 30 yr (Costa & McCrae, 1997). The five personality domains cannot be completely described within the constraints of this brief space. Therefore, an attempt has been made to describe some of the aspects of each dimension that might, on theoretical grounds, be expected to be related to seeking hearing aids. The five factors are:

- Neuroticism (N): Individuals high on this factor are predisposed to experience negative emotions such as anger, embarrassment, and guilt. They tend to be hostile and anxious and cope relatively poorly with stressful situations. They have low self-confidence and are likely to blame others for their problems. Persons low in Neuroticism are relaxed and calm and cope well with stress.
- Extraversion (E): Individuals high on this factor are outgoing, enthusiastic, optimistic, and self-confident. They enjoy other people and large social gatherings. Persons low in Extraversion tend to be reserved and independent but are not necessarily unhappy or pessimistic.
- Openness (O): Individuals high on this factor are variety-seeking and intellectually curious. They are aesthetically sensitive and feel their emotions keenly. They are insightful, broad-minded, and ready to try something new. Persons low in Openness prefer the routine and familiar. They tend to be pragmatic, conforming, and conventional.
- Agreeableness (A): Individuals high on this factor tend to be trusting, peaceable, and warm-hearted. They are sympathetic and helpful to other people and believe that others will want to help them in return. Persons low in Agreeableness are more suspicious, assertive, shrewd, skeptical, and demanding.
- Conscientiousness (C): Persons high in Conscientiousness are proactive individuals who plan and carry out activities in an organized way. They tend to be methodical, thorough, and determined to succeed. Persons low in Conscientiousness are more absent-minded, impatient, and careless.

In addition to the five basic personality traits, there is another class of variables, such as Responsibility or Dependence, which are viewed as ways of expressing the basic personality traits. An individual's standing on these variables may change over the years, depending on particular circumstances and life events. A search of the relevant literature suggested that two such additional variables, Locus of Control (LOC) and Coping Style Preferences, might be important modulators of the relationship between personality and help-seeking behavior in hearing-impaired subjects.

*The term disablement is used in this article to encompass both activity limitations and participation restrictions as defined by the *International Classification of Functioning, Disability and Health* (ICF, 2001). The term disability is avoided because its meaning is ambiguous.

LOC measures explore the individual's belief in his or her ability to have control over what happens to him or her. There is a large literature exploring the relationship between LOC and reactions to stress and adversity. Relevant to the current study, associations have been reported between LOC and compliance with health care regimens (e.g., Kent, Mathews, & White, 1984; Steptoe & Wardle, 2001), distress from tinnitus and other sounds (e.g., Cox et al., 1999; Scott, Lindberg, Melin, & Lyttkens, 1990), and adjustment to the limitations of aging (e.g., Hunter, Linn, Harris, & Pratt, 1980; Lachman, 1986). Garstecki and Erler (1998) reported that differences in LOC were associated with hearing aid-seeking behavior, but only for women, not for men.

Coping strategies are behaviors that individuals use to help them manage difficult or stressful situations. The likelihood of an individual's choosing to pursue amplification, and/or persevering with it, might partially be predicted by his or her coping strategies. Although the specific situation influences coping tactics to some extent, each individual tends to prefer a particular generalized coping style, and some styles appear to be more effective than others in resolving stressful situations (e.g., Carver, Scheier & Weintraub, 1989; Endler & Parker, 1990). Some research exists to support a relationship between coping style and self-assessments in the health domain (Denollet, 1991). Although there have been studies of hearing-specific coping tactics (e.g., Gomez & Madey, 2001; Hallberg & Carlsson, 1991), research has not explored the relationship between generalized coping styles and acceptance of amplification.

Because individuals with different personalities tend to react differently to the stresses of daily life, it is reasonable to postulate that in the presence of a diagnosed (or strongly suspected) hearing impairment, some personality types will recognize the impact of the impairment on their daily activities and relationships and will be motivated to take action to minimize the problems. Other personality types might be unwilling or unable to recognize problems resulting from impairment, or they may feel unable to do anything effective about the problems, so they avoid taking action. Garstecki & Erler, (1998) addressed this topic in a study that compared individuals who complied with amplification recommendations with those who failed to comply. They explored two variables related to personality (depression and ego-strength) and determined that these variables were not associated with compliance behavior. It might be necessary to use more comprehensive measures of personality to educe relationships between personality and hearing aid seeking.

Does Adult-Onset Hearing Loss Change Personality?

Before this line of inquiry is followed very far, it is important to consider the possibility that hearing loss per se may initiate systematic personality changes in those who have it. If so, it would be expected that hearing aid seekers would reveal a personality pattern different from the general population, but this observation would not be particularly useful in elucidating the factors that may motivate or underlie hearing aid seeking. Two types of literature provide evidence relevant to this concern. The first category considers the psychosocial impact of disabilities in general. Recent reviews in this genre have noted a significant disconnect between popular opinion and research findings regarding the association between personality characteristics and particular disabilities (e.g., Smart, 2001; Wright, 1983). In a representative statement, Shontz (1991) (p. 108) concluded "Though many efforts have been made to correlate disability with overall personality maladjustment, no systematic evidence has yet been published to show that reactions involving psychiatric disturbance occur any more frequently with a truly representative sample of people with disabilities than within the general population."

The second category of literature addresses the psychological impact of hearing impairment specifically. In assessing the existing research on this matter, we considered only studies of individuals with mild to severe hearing impairment because these are the potential hearing aid candidates.† The literature is relatively sparse and reviews of early studies have noted numerous methodological flaws in such issues as sampling, controls, and test measures (Meadow-Orlans, 1991; Rosen, 1979). Overall, reviews of this literature point to a conclusion that psychosocial adjustment to mild to severe hearing impairment is highly individualized. Rosen (1979) (p. 249) concluded that "the hearing-impaired as a group have not been established to differ from the general population on psychiatric or psychological variables." Similarly, Thomas (1984) (p. 151) concluded that acquired hearing loss "does not bring about any measurable change in personality whatsoever." In perhaps the most careful and comprehensive study to date, Demorest and Erdman (Reference Note 1) conducted a battery of normed psychological measures on a diverse sample of 271 hearing-im-

†There is a considerable body of literature, going back many years, which explored personality and associated variables in individuals with profound deafness, especially those with prelingual impairments. Because these individuals are not candidates for conventional hearing aids, this literature is not relevant to the present study.

paired adults. The results clearly demonstrated that adults with hearing impairment, as a group, do not differ from unselected adults on psychosocial variables. The authors concluded that hearing impairment does not have a direct systematic effect on psychological adjustment.

These reviews indicate that studies of disability in general, and hearing-impairment in particular, are both consistent with the conclusion that hearing loss per se does not initiate systematic personality changes in those who have it.‡ Based on these findings, it is reasonable to assume that the general population of adults with mild to severe hearing impairment displays the same personality tendencies and variabilities as the unselected general population. Thus, relevant to the current study, if the subset of hearing-impaired persons who become hearing aid seekers display personality characteristics that are systematically different from the general population, this information might be useful in promoting insight into the underlying bases of hearing aid-seeking behavior.

Is the Dispensing Milieu Important?

Another potentially definitive issue in hearing aid seeking is the milieu in which the hearing aid is dispensed. For example, there is a sharp contrast between a publicly funded hospital-based setting such as the U.S. Veterans (VA) hospitals, and the free-standing, hearing-specific private practice (PP) dispensary. In the VA system, patients might be self-referred but are often referred from other clinics. They often have other health conditions and they might not have originally presented with a hearing problem at all. In the PP system, patients are mostly self-referred and are always there for hearing problems. There are also differences in financial commitment by the hearing aid seeker. In the VA system, patients receive hearing aids without charge, whereas this is seldom true in the PP system (Kirkwood, 2001, Kochkin, 2001). Hearing aid costs frequently have been cited as a factor that affects hearing aid-seeking behavior (e.g., Garstecki & Erler, 1998).

Do these distinctions change the dynamics of hearing aid seeking so that the types of individuals who solicit hearing aids in a publicly supported hospital system are different from those who enter the private practice arena? If individuals in a VA-

‡It is well established that hearing impairment is sometimes associated with varieties of psychological distress such as anxiety, loneliness, and fatigue. These are situational responses, not basic personality characteristics. Furthermore, individuals with the same audiometric profiles often differ markedly in their manifestation of these symptoms.

type system are substantially different from those in the PP sector, optimal rehabilitation techniques might differ for the two groups. Also, it might be inappropriate to generalize research findings from one group to the other.

Research Questions

Based on all these considerations, this paper describes an exploration of personality profiles and related variables in elderly hearing aid seekers. There were two primary research questions: (1) Are individuals who choose to pursue amplification significantly different from general population norms in terms of their personality trait levels, sense of personal control, or preferred coping strategies? (2) Do hearing aid seekers in the private practice system have different personalities, sense of personal control, and preferred coping strategies from those in the public health system?

METHODS

Participants were patients who were seeking hearing aids at one of ten audiology clinics. Five clinics were located in VA Medical Centers and provided services and hearing aids without charge to eligible veterans. Five clinics were PP clinics that charged for hearing aids and services. The clinics were situated in six different states and the District of Columbia in the United States.

Subjects

There were a total of 230 subjects, 151 veterans (VA) and 79 PP patients. All of the VA subjects were men; 26 of the PP subjects were men and 53 were women. Inclusion criteria were bilateral, symmetrical, sensorineural, mild to moderately severe hearing impairment; sufficient vision and reading ability to comprehend and respond to the questionnaires; generally good health; 60 yr old or older§; and noninstitutionalized. The average age of the VA subjects was 72 (SD, 7.15; range, 41–87). The average age of the PP subjects was 75 (SD, 7.93; range, 59–95). Forty-one percent of subjects were previous hearing aid users; 59% were acquiring their first hearing aid. The proportion of new versus experienced users was about the same for VA and PP patients. Figure 1 depicts the composite audiograms of the VA subjects and of the men and women PP subjects.

§Due to error, eight subjects younger than 60 yr of age were included (seven VA subjects and one PP subject).

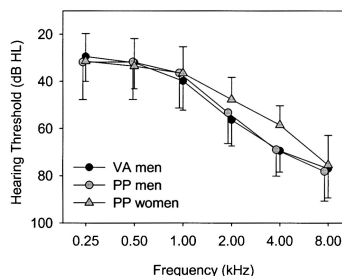


Fig. 1. Composite audiograms of the public health (VA) subjects and of the men and women private practice (PP) subjects. Bars show 1 SD.

Procedure

All subjects were recruited when they presented for a routine clinic visit. Subject recruitment procedures were as follows in each clinical setting: in a given week, the first patient who met the inclusion criteria was invited to participate in the research. If that individual declined, the next eligible patient was invited to participate, and so on. No more than one new subject per week was recruited at each site. Each subject completed the set of questionnaires after the decision to obtain new hearing aids and before extensive counseling about new hearing aids or the fitting/adjustment process was provided by the audiologist. The entire set of questionnaires required about 60 to 90 minutes to complete. They were completed by the subject in the audiologist's office. In addition to the personality, control, and coping questionnaires that are the topic of this paper, there were questionnaires about general health, hearing aid expectations, and disablement associated with hearing loss. Data from these will be reported elsewhere.

Personality was assessed by using the NEO Five-Factor Inventory (NEO-FFI). The NEO-FFI is a 60-item version of the Revised NEO Personality Inventory (Costa & McCrae, 1992). It provides a measure of the five personality dimensions that have recently been recognized by many psychologists as encompassing the major domains of personality in a wide variety of cultures (McCrae & Costa, 1997). Because many other personality measures are strongly related to some or all of the five traits (Marshall, Wortman, Vickers, Kusulas, & Hervig, 1994; McCrae & John, 1992), the five-factor model of personality is appealing in its high face validity, comprehensiveness, efficiency, and connections to previous research data. It is important to note that the NEO-FFI is intended for the description of variations in normal personality. Thus, it is ideally suited for use in studies of the relationships between personality and other phenomena in individuals who do not have psychopathology.

LOC was measured by using the Levenson generalized Internality, Powerful Others, and Chance (I, P, and C) scales (Levenson, 1981). The 24 items in the Levenson scales measure LOC as a multidimensional construct in which an individual obtains separate scores for belief in internal control, control by Powerful Others, and control by chance events or fate. We hypothesized that hearing aid seeking would be more strongly associated with high scores for internal control.

Coping style was measured by using the Coping Strategy Indicator (Amirkhan, 1990). This 33-item scale quantifies coping in three independent dimensions: problem solving, support-seeking, and avoidance. In this questionnaire, the subject reports on the behaviors he or she actually used in coping with a recent and important stressful event (not necessarily dealing with hearing). Problem solving involves activities such as setting goals and weighing options. Support seeking involves confiding in friends, seeking reassurance, and so on. Avoidance strategies include things such as distracting oneself, avoiding people, fantasizing, and so on. On theoretical grounds, it seems likely that hearing aid seeking would be more likely in individuals with certain coping strategies. We hypothesized that hearing aid seekers would display relatively high use of problem-solving coping and relatively low use of avoidance as a coping strategy.

Reliability and validity specifications for the three psychological tests used in this study are reported in the psychological literature. The interested reader is referred to Costa & McCrae (1992), Levenson (1981), Amirkhan (1994), and Clark et al. (1995) for further details.

Scoring and Norms

Norms have been established for the NEO-FFI through the use of a sample of 500 men and 500 women carefully selected to match the U.S. Census projections for 1995. Subjects ranged in age from 21 to 96 yr. Although it is not a universally held view (e.g., Helson, Kwan, John, & Jones, 2002), there is a large body of empiric support for the stability of mean trait level across ages (e.g., Costa, Herbst, McCrae & Siegler, 2000). This indicates that the same norms are appropriate for adults of all ages. Although mean NEO-FFI scores are very similar for men and women, there are small gender differences for some traits. NEO-FFI scores are largely independent of years of education (Costa & McCrae, 1992).

The range of possible scores for each NEO-FFI factor is 0 to 48. The customary method of scoring the NEO-FFI involves transforming an individual's

TABLE 1. Linear correlation coefficients showing associations between personality traits, locus of control scales, coping strategies, and audiometric hearing loss

NEO Trait	Problem Solving	Social Support	Avoidance	Internal Control	Powerful Others	Chance or Fate	PTA
N	-0.175†	0.100	0.523†	-0.308†	0.334†	0.375†	0.117
E	0.231†	0.103	-0.312†	0.265†	-0.204†	-0.227†	-0.076
O	0.303†	0.167*	-0.145*	0.085	-0.113	-0.154*	-0.064
A	0.053	0.151*	-0.431†	0.203†	-0.333†	-0.329†	-0.013
C	0.177†	0.030	-0.304†	0.287†	-0.164*	-0.210†	-0.039

N = neuroticism, *E* = extraversion, *O* = openness, *A* = agreeableness, *C* = conscientiousness, *PTA* = average threshold for both ears combined (500 Hz, 1000 Hz, 2000 Hz). *N* = 230.
**p* < 0.05, †*p* < 0.01.

raw score for each of the five factors into a standardized score format using the equation

$$\text{Transformed score} = \frac{10[(\text{raw score} - \text{mean score}) / \text{standard deviation}] + 50$$

In this paper, NEO scores are presented in raw form and in transformed format. As recommended by the test developers, transformed scores are interpreted as follows: 45 to 55 = average, 56 to 65 = high, 35 to 44 = low, 66 and higher = very high, 34 and lower = very low (Costa & McCrae, 1992). As an extra precaution against any confounding of results with gender effects, the mean scores used in the transformations were gender-specific means for adult men and women (Costa & McCrae, 1992).

The Levensen I, P, and C scales to measure LOC have been used frequently in psychological studies. Because the Internal, Powerful Others, and Chance LOC scales are independent, it is theoretically possible for a subject to score high or low on all three scales. The possible range of scores on each scale is 0 to 48. A higher score on a scale is indicative of greater belief in that source of control over one's life. I, P, and C scale results have been reported for subjects in a wide variety of demographic categories (e.g., pain patients, prisoners, rural dwellers). Despite this widespread use, it was not possible to identify published norms that seemed to characterize an appropriate comparison group for the present study. As a result, a separate investigation was conducted to generate norms for comparison with hearing aid seekers. The study is described in Appendix A.

The structure of the Coping Strategies Indicator (CSI) is similar to that of the LOC scales in that it yields scores for three independent strategies for coping with stressful circumstances (problem solving, seeking social support, and avoidance). Theoretically, it is possible for a subject to score high or low on all three coping scales. The possible range of scores on each scale is 11 to 33. Norms for the CSI have been published for a sample of 954 adults

(Amirkhan, 1994). However, the age, health, and hearing status of the normative group were not reported. To evaluate the published CSI norms for use in this study, additional normative data were collected. These are described in Appendix A.

RESULTS

A variety of statistical methods were chosen to evaluate the data, depending on whether individual data were available for analyses or only group normative data. No Bonferroni adjustments were made; instead, exact probability values are reported to facilitate interpretation. Any difference with an associated probability value greater than 0.05 was considered nonsignificant.

Associations Among Variables

Table 1 gives linear correlation coefficients that quantify the relationships among personality traits and the other variables (hearing loss, LOC, and coping mechanisms) for the 230 subjects. Any relationship between hearing loss and personality in this group of subjects is assessed by the correlations between personality and severity of hearing loss (bilateral average of pure-tone thresholds at 500 Hz, 1000 Hz, and 2000 Hz) for each personality trait score. As shown in the right-hand column of Table 1, the correlation coefficients between hearing loss and the N, E, O, A, and C, traits were all negligible, indicating that individuals with more severe hearing loss did not have different personalities from those with less severe hearing loss. Thus, the results in this investigation were consistent with the large body of existing research (cited earlier) indicating that hearing loss per se is not associated with systematic differences in personality.

Personality of Hearing Aid Seekers and Differences Across Dispensing Environments

The mean (untransformed) N, E, O, A, and C scores for the combined subject group (*N* = 230) are shown in Figure 2, compared with published norms

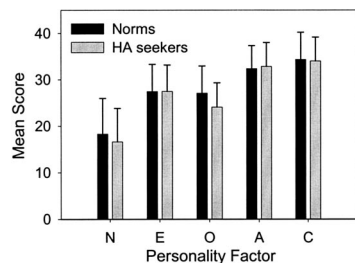


Fig. 2. Mean personality trait scores for the entire subject group ($N = 230$) compared with published mean scores for adults. N, neuroticism; E, extraversion; O, openness; A, agreeableness; C, conscientiousness; HA, Hearing aid; Norms, general population adults.

(Costa & McCrae, 1992). The norms have been weighted appropriately for the numbers of men and women in this study sample. Although not shown, mean scores for the five personality traits were essentially the same for new and experienced hearing aid users. A multivariate analysis of variance (ANOVA) confirmed that there were no significant differences associated with experience for any trait. Thus, new and experienced users were combined for analyses.

Figure 2 illustrates that the mean factor scores for hearing aid seekers generally were close to the norms for the test. Thus, the typical hearing aid seeker is not strikingly different from a typical adult in the general population. Nevertheless, when the data were further explored by using one-way ANOVA to compare the hearing aid seekers with norms for each factor, significant differences were detected in both the Neuroticism and the Openness domains. Hearing aid seekers displayed lower Neuroticism scores ($F(1,1228) = 8.8, p = 0.003$) and lower Openness scores ($F(1,1228) = 51.1, p < 0.001$) than the general population of adults.

The combined group of subjects was then split into VA and PP subgroups. For each personality domain, the mean scores for each subgroup were compared with the published norms by using one-way ANOVA. It was determined that both VA and PP subjects scored lower than the norms on Openness [for VA subjects: $F(1,649) = 45.44, p < 0.001$; for PP subjects: $F(1,1077) = 7.71, p = 0.006$]. The other significant differences involved only the PP subjects. The PP subjects scored less than the norms on Neuroticism ($F(1,1077) = 14.07, p < 0.001$), and higher than the norms on Agreeableness ($F(1,1077) = 5.86, p = 0.016$).

Finally, the VA and PP subjects were compared with each other in each personality domain. This is depicted in Figure 3, with scores displayed in transformed format. Depicting transformed scores facilitates the evaluation of differences between hearing

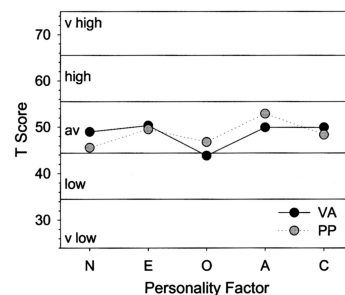


Fig. 3. Mean transformed scores in each NEO Five-Factor Inventory personality domain for the VA and PP subjects.

aid seekers and the general population because the mean transformed score in the general population is 50 on each domain, and the ranges of average, high, and low scores are illustrated. Figure 3 indicates that with the exception of the Openness score for VA subjects, which was very slightly below average, both data sets fell within the range of average. However, there appeared to be some differences between the subgroups: The mean scores for VA and PP subjects were similar for the E and C domains but more different for the N, O, and A domains.

These observations were explored by using a multivariate ANOVA (SPSS GLM procedure) to test the differences between VA and PP subjects in each domain. The results confirmed the visual impressions: Relative to PP subjects, VA subjects scored significantly higher on Neuroticism ($F(1,228) = 6.7, p = 0.01$), lower on Openness ($F(1,228) = 5.6, p = 0.02$), and lower on Agreeableness ($F(1,228) = 4.4, p = 0.04$).

LOC

As noted earlier, the Internal, Powerful Others, and Chance LOC scales are independent. Thus, it is theoretically possible for a subject to score high or low on all three scales. The mean I, P, and C scores for hearing aid seekers (VA and PP combined) and the norms for age-matched adults with none or mild hearing problems (from Appendix A) are depicted in Figure 4. These data were evaluated by using multivariate ANOVA. Results indicated that the hearing aid seekers yielded significantly higher scores than the general elderly population on the Internal control scale ($F(1,330) = 16.46, p < 0.001$). However, hearing aid seekers (combined across dispensing sites) and the general population yielded essentially identical mean scores on the Powerful Others and Chance scales ($p > 0.05$ for both comparisons).

Figure 5 depicts the mean LOC scores for subjects from the VA and PP practice settings, compared with the norms. Multivariate statistical analyses with subsequent pairwise comparisons revealed the following:

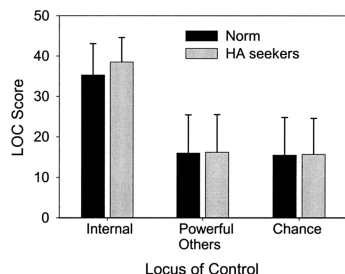


Fig. 4. Mean LOC scores for hearing aid (HA) seekers and the corresponding age-matched adults (Norm). Bars show 1 SD.

- For belief in internal control, scores for VA and PP were not significantly different from each other ($p = 0.46$), but both groups scored higher than the norms (for VA, $p < 0.001$; for PP, $p = 0.006$).
- For belief in control by Powerful Others, VA subjects scored higher than PP subjects ($p = 0.003$), although neither group was significantly different from the norms ($p < 0.09$ for both).
- For belief in control by chance, VA subjects scored higher than PP subjects ($p = 0.004$), although neither group was significantly different from the norms ($p < 0.1$ for both).

Coping Strategies

The structure of the CSI is similar to that of the LOC scales in that it yields scores for three independent strategies for coping with stressful circumstances (Problem Solving, Social Support, and Avoidance). Theoretically, it is possible for a subject to score high or low on all three coping scales. The mean scores for hearing aid seekers (VA and PP combined) and the norms for age-matched adults with none or mild hearing problems (from Appendix A) are depicted in Figure 6. These data were evaluated by using multivariate ANOVA. Results indicated that the hearing aid seekers yielded significantly lower scores than the general elderly population on all three coping strategies [Problem Solving $F(1,327) = 5.9, p = 0.015$; Social Support

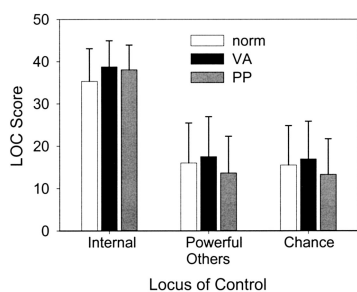


Fig. 5. Mean LOC scores for VA and PP subjects and the general population of age-matched adults (norm). Bars show 1 SD.

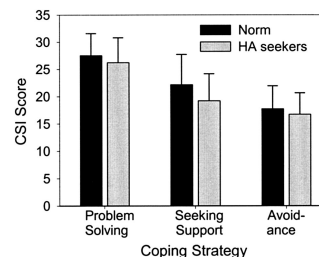


Fig. 6. Mean score in each type of coping strategy (Coping Strategy Indicator, CSI) for hearing aid (HA) seekers and the corresponding age-matched adults (Norm). Bars show 1 SD.

$F(1,327) = 23.3, p < 0.001$; Avoidance $F(1,327) = 4.29, p = 0.039$].

Figure 7 illustrates the relative strength of the three coping strategies for subjects from the VA and PP practice settings, compared with the norms. Multivariate statistical analyses with subsequent pairwise comparisons revealed the following:

- PP subjects reported significantly lower use of problem-solving coping strategies than the normative group ($p = 0.01$). VA subjects reported use of problem solving intermediate between the PP subjects and the norms but not significantly different from either ($p = 0.29$ and $p = 0.062$, respectively).
- Both VA and PP subjects reported significantly less use of social support coping than the norms (VA $p < 0.001$, PP $p = 0.01$). There was not a significant difference between VA and PP subjects ($p = 0.6$).
- PP subjects reported use of avoidance coping that was significantly lower than the norms ($p = 0.002$) and significantly lower than the VA subjects ($p = 0.015$). Use of avoidance by VA subjects did not differ from the norms ($p = 0.3$).

DISCUSSION

Are VA and PP Hearing Aid Seekers Different From the General Population?

The subjects in this investigation displayed a typical range of normal personality characteristics.

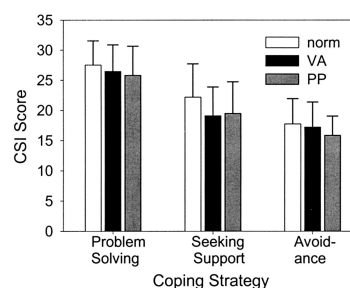


Fig. 7. Mean scores in each type of coping strategy (CSI) for VA and PP subjects and the general population of age-matched adults (norm). Bars show 1 SD.

In addition, the lack of association between personality trait scores and severity of hearing loss is consistent with the position that adult-onset hearing loss does not result in systematic personality effects. Nevertheless, the results indicated that individuals who seek hearing aids do have some systematically different personality characteristics when compared with appropriate general population norms.

When VA and PP subjects were combined without regard for dispensing environment (Fig. 2), hearing aid seekers obtained lower scores than the general population for Neuroticism and Openness. It is interesting to note a parallel between these results and those of Kikuchi et al. (1999). Those authors found that lower Neuroticism and Openness scores were each associated with higher levels of health-promoting behavior in young adults. To the extent that hearing aid seeking is seen to be a health-promoting behavior, our results are consistent with those of Kikuchi et al.

When VA and PP subjects were analyzed separately, both subgroups scored lower than the norms on Openness. This suggests that relatively lower scores on Openness is a general characteristic of hearing aid seeking. Because of this finding, it is of some interest to examine the characteristics of the Openness dimension more closely. Individuals high in Openness seek insights and experiences. They appreciate possibilities that are missed by others, and they pay close attention to their experiences and analyze them. In addition, they have a high tolerance for ambiguity and complexity. On the other hand, individuals low in Openness are more conventional, practical, and cautious than higher scorers. They are not given to innovative thinking or seeking insights.

Given these characteristics of Openness, we postulate that hearing-impaired individuals who are higher in Openness may be more successful in grasping and using strategies other than amplification, such as communication repair and situational control, to contend with their everyday hearing problems. In addition, because higher Openness is associated with creativity and tolerance for ambiguity, it is possible that these individuals are more effective speech readers than those with lower Openness. Overall, hearing-impaired individuals who are higher in Openness may feel less need of amplification because they are dispositionally better equipped to capitalize on ecological variables to compensate for the disablements associated with hearing problems.

This line of reasoning suggests that individuals who seek amplification for mild to moderately severe hearing loss do so partly because they have not been

successful in formulating or using other approaches to alleviate their hearing problems. This proposition is consistent with data reported by Field & Haggard (1989) showing that a group of new hearing aid users had less knowledge of communication strategies than a random group of normal-hearing, first-year psychology students. Further support is found in the work of Andersson (1998), showing that when hearing aid users received instruction in communication strategies, their daily average hearing aid use actually decreased, which suggests that new knowledge about communication management was substituted for amplification in some situations.

Although the combined group of hearing aid seekers was found to score lower than the norms for Neuroticism, this result was determined to be due entirely to the low scores of the PP subjects. VA subjects' Neuroticism scores were equal to norms, on average. Practitioners may be surprised to learn that hearing aid seekers in the private system were significantly lower in Neuroticism than the general population average, because individuals seeking amplification quite frequently appear relatively distressed in the clinical setting. However, it should be kept in mind that typical hearing aid seekers are often struggling with situational problems brought on by their hearing difficulties. That is, their distress may be situational rather than dispositional. The fact that hearing-impaired individuals may be distressed because of their hearing disablements does not imply that they are necessarily high in the trait of Neuroticism.

In an attempt to understand the implications of finding relatively low Neuroticism in PP hearing aid seekers, it is valuable to review the characteristics of Neuroticism that are found in the range of normal personalities. Individuals who score high in Neuroticism are prone to worry and they may feel unable to cope with problems. They are more likely to experience frustration, discouragement, and hopelessness. Persons high in Neuroticism are more likely to experience shame and embarrassment. They are sensitive to ridicule and may have feelings of inferiority. On the other end of the continuum, persons lower in Neuroticism are more calm, confident, and optimistic and less anxious, tense, and irritable than those who score higher. They have a higher tolerance for frustration and are less susceptible to shame, embarrassment, ridicule, and feelings of inferiority.

Considering these attributes of Neuroticism, it is plausible to postulate that hearing-impaired persons who score higher in Neuroticism might be more likely to experience stigma associated with both hearing loss and hearing aids. These individuals could be less willing to seek hearing help because

admitting the hearing problem is too embarrassing and shameful. In addition, they may feel that there is little likelihood that they actually can be helped. As a result, a disproportionate number of them may refuse to seek help. Although this postulate is reasonable, it is not clear why the effects were seen only in the private practice system.

It was noted also that the PP hearing aid seekers scored higher than the general population on Agreeableness and that this difference was not seen for the VA hearing aid seekers. To provide further insight into potential implications of this finding, it is useful to consider the characteristics of the Agreeableness trait. This personality dimension is concerned with preferences in interpersonal interactions. Individuals who are high in Agreeableness tend to trust in the motivations of others. They are forgiving, generous, and tolerant. Those low in Agreeableness tend to be suspicious of other's motives, skeptical about claims, critical of statements, argumentative, and assertive.

Based on these characteristics of agreeableness, the results of this investigation indicate that the typical PP patient is more trusting, cooperative, and tolerant and less argumentative and cynical than the general population. It seems possible that this difference is related to the negative publicity, both official and word-of-mouth, that has been associated with hearing aids and private dispensing practices over the years. Hearing-impaired individuals who are more suspicious, demanding, and intolerant (i.e., lower in A) are more likely to be affected by this publicity and less likely to be prepared to explore the potential value of hearing aids dispensed within the much maligned private practice system.

Differences Between VA and PP Subjects

When VA and PP subjects were compared with each other, they differed significantly on three personality factors (Fig. 3). The typical PP subject was significantly higher in Openness, lower in Neuroticism, and higher in Agreeableness than the typical VA subject. It is of interest to consider the potential implications of these results.

Because they are generally different in Openness, typical VA and PP patients might profit from different approaches to treatment. Level of Openness to new experiences might be especially important in determining optimal treatment methods because the process of hearing testing and hearing aid fitting is novel for many patients (see McCrae, 1991). Individuals higher in Openness can be expected to welcome the insights provided by test results and to seek to understand the ramifications of hearing loss in their own lives. They will be inquisitive about new

approaches and willing to experiment with amplification strategies. Individuals lower in Openness will be less curious and more rigid. They would be expected to prefer more directive problem-solving, such as practical, education-oriented advice about the best amplification for them.

Differences in Neuroticism might not affect preferred treatment approach as much as differences in Openness. However, clinicians should bear in mind that hearing-impaired individuals who are higher in Neuroticism will probably continue to experience unpleasant emotions, even with effective hearing aid treatments, because their psychological discomfort is dispositional as well as situational. Those lower in Neuroticism, on the other hand, will be more able to use the advice and support from the hearing care provider to substantially resolve many situational hearing problems. This can produce considerable relief from disagreeable emotional consequences of hearing loss.

The differences in Agreeableness between VA and PP hearing aid seekers is one of the most intriguing findings of this study. As noted above, we postulate that potential patients in the PP system who are lower in Agreeableness may choose not to seek help because of suspicion about the motives of dispensers and the effectiveness of devices. Further, it is possible that this difference between VA and PP patients is strongly influenced by financial concerns. As hearing aid technology has become more sophisticated, hearing aid costs have substantially increased (Kochkin, 2001). Purchase of two contemporary hearing aids now requires a financial outlay that is very significant for most PP patients. Given the disparity in financial demands for private-pay and VA patients, it would not be surprising if this variable had an effect on the types of personalities who seek hearing aids in each system. Because VA patients receive hearing care and hearing aids without charge, and from practitioners who do not have a vested interest in selling devices, they could logically be expected to be less influenced by Agreeableness in deciding whether to seek help. The results of this investigation are consistent with this hypothesis. This outcome points to a continuing imperative to improve public education about hearing health care.

Personal Control, Coping Strategies, and Hearing Aid Seeking

LOC and coping strategies are related to personality (e.g., Amirkhan, Risinger & Swickert, 1995) but are not as stable over the life span as basic personality attributes. Life circumstances and experiences can affect an individual's beliefs about his or

her control over events (e.g., Hunter et al., 1980). Similarly, new and more useful coping strategies can be learned, and this is often the goal of therapeutic programs (e.g., Andersson, Melin, Scott & Lindberg, 1995).

It is logical to postulate that hearing aid seekers will be individuals who have relatively strong internal control because such people believe that they, themselves, are responsible for what happens to them and that they are capable of taking charge of their own situation and doing what is necessary to produce a desired outcome. The results of this study, illustrated in Figures 4 and 5, support this idea. Hearing aid seekers from VA and PP settings were seen to have higher levels of internal control than the general age-matched population. This result was found for VA and PP subjects analyzed separately as well as combined; thus, it would appear to be a general characteristic of hearing aid seeking. These results are consistent with the report of Steptoe & Wardle (2001), in which higher internal and lower chance LOC scores were associated with more healthy behavior choices in young adults.

We also observed (Figs. 4 and 5) that neither VA nor PP subjects were different from normative subjects in terms of their beliefs in control by external forces (Powerful Others or Chance). However, VA subjects reported significantly more external LOC (both P and C scales) than PP subjects. This finding might be related to the fact that VA subjects reported themselves to be significantly less healthy than PP subjects. This difference in self-reported health is not a topic of this paper, but it was noted in responses of VA and PP subjects to the SF-36 health status questionnaire (Ware & Sherbourne, 1992). Other studies have reported that external LOC tends to increase among elderly subjects who have health problems (e.g., Hunter et al., 1980; Lachman, 1986). It is also possible that the explanation for this finding lies in other demographic differences between VA and PP subjects: These might include socioeconomic differences, ethnic differences, or differences in military backgrounds. Further study would be needed to pinpoint the effects of these variables.

Although our expectations about internal LOC were supported in these data, our hypotheses regarding coping strategies in hearing aid seekers were not supported. We expected to find that hearing aid seekers tend to use problem-solving coping strategies relatively often and avoidance coping relatively infrequently. Seeking a hearing aid is a positive action to alleviate hearing difficulties and is therefore problem-solving behavior. Further, it seems logical that individuals who avoid confronting a problem would not often be found in a hearing aid

dispensary. The results of this study did not support those suppositions. As illustrated in Figure 6, the frequency of use of the three coping strategies shows the same pattern for the hearing aid seekers as for the normative group: Problem solving is used more often than seeking social support, which is in turn used more than avoidance.

Hearing aid seekers overall were found to use all three coping strategies less often than the age-matched general population without hearing problems. It is especially interesting that the finding of lower use of social support coping was observed in both VA and PP hearing aid seekers. Because both groups reported lower than normative use of social support coping, this appears to be a general characteristic associated with hearing aid seeking. One interpretation for this result is that hearing-impaired individuals who seek and receive relatively high levels of social support have less need for amplification, because significant others make special efforts to minimize the disablements associated with hearing loss.

We also entertained the possibility that the result for social support coping has its basis in the gender distribution of the subject group (more men than women) versus that of the local normative group (more women than men), as described in Appendix A. It has been reported that women have more social support than men do (e.g., Okamoto & Tanaka, 2004) and that women place more importance than men do on effective social communication (e.g., Garstecki & Erler, 1999). However, it is not clear whether women are more likely than men to use social support as a coping device. In our normative data (see Appendix A), we did not observe a statistically significant difference between men and women in their use of social support seeking. Overall, a gender-based explanation for low use of social support coping in hearing aid seekers does not seem credible.

As illustrated in Figure 7, there were small but significant effects indicating that the results for problem solving and avoidance coping were mainly due to the responses of PP subjects. In retrospect, it seems likely that these results were seen because self-reported coping strategies were modulated by personality characteristics. The psychological literature offers considerable support for this position (e.g., O'Brien & DeLongis, 1996). Table 1 reveals that use of problem-solving coping was most strongly associated with Openness, and avoidance coping was most strongly associated with Neuroticism. It is plausible, therefore, that because the entire group was found to be lower than average on Openness, and PP subjects were lower than average on Neuroticism, it could be expected that the group

also would be relatively low in use of problem-solving and avoidance-coping strategies. This explanation is consistent with the notion that an individual's personality makeup plays an important role in their choice of coping mechanisms.

CONCLUSION

The motivation for this study emerged from a recognized need to grapple with the low penetration of hearing health care despite its known substantial effectiveness. It is hoped that a more complete understanding of the characteristics of individuals who do seek services will point the way to a viable approach to engaging more of the hearing-impaired persons who are currently staying on the sidelines. The viability of the approach used in this study rests on twin assumptions: (1) that hearing-impaired individuals constitute a random sample of personality types (i.e., that there are not specific personality types that are more likely to develop objective hearing loss), and (2) the hearing loss itself does not result in systematic changes in an individual's basic personality. We believe these assumptions are reasonable and are supported by such data as are available (reviewed earlier).

The results of this investigation revealed that there were three consistent differences between typical hearing aid seekers in both dispensing environments and general population averages. Hearing aid seekers were lower in Openness, higher in Internal LOC, and lower in use of social support coping mechanisms. Further, when we partitioned hearing aid seekers into those who sought their hearing aids in an independent private practice and those who received them free of charge in a comprehensive health care setting (VA hospital), additional differences were seen in basic personality, feelings of control, and coping strategies. Although the statistically significant effects reported in this investigation were not very large in an absolute sense, they were mostly interpretable in a plausible way. The results point to the following propositions:

- (1) Hearing-impaired individuals who are more susceptible to shame and embarrassment (those who are higher in N) do not tend to seek hearing aids in the private practice system. This finding implies that hearing aid stigma continues to be a force that inhibits hearing aid seeking for a substantial proportion of hearing-impaired individuals. An effective program of public education to alleviate this concern is highly desirable.
- (2) Hearing-impaired individuals who are more insightful and analytical (higher in O) and those who have a relatively high level of social

support tend to seek nonamplification solutions for their hearing disablements. These persons could be even more effectively helped if they would accept amplification. Public education that addressed this issue specifically might be useful in drawing these individuals to a hearing care facility.

- (3) Hearing-impaired persons who are more skeptical and suspicious (low in A) are less likely to seek hearing help in a private dispensing practice. This reinforces the need to improve the fitting practices and public image of amplification devices. It might be difficult to achieve this within the current high pricing structure of the profession.
- (4) Individuals who are patients in public health clinics, such as the VA system, tend to be systematically different in some ways from those in private dispensing practices. It is possible that different rehabilitative approaches might be most effective for these two types of patients.

Finally, it is important to keep in mind that this study was concerned with group trends. As we focus on mean data, it is easy to lose sight of the fact that individual hearing aid seekers displayed a wide diversity in personality profiles, LOC, and coping strategies. To increase hearing aid penetration and improve the effectiveness of services, it is important for audiologists to gain expertise in recognizing different ways of thinking, feeling, and behaving in hearing aid seekers and adjusting therapeutic procedures to maximize the effectiveness of communication with each individual patient.

APPENDIX A

Norms for LOC and Coping Strategies Scales

Subjects in this investigation were older, community-dwelling, relatively healthy adults with hearing loss. To achieve the goals of the study, it was important to compare the subjects' control orientation and coping strategies with their counterparts in the general population without significant hearing loss. Although the Internal, Powerful Others, and Chance Scales (Levenson, 1981) used to measure LOC orientation have been widely used and reported in the psychological literature, there were no published norms that seemed appropriate for this investigation. Furthermore, although norms for the Problem Solving, Seeking Social Support, and Avoidance Scales of the CSI (Amirkhan, 1994) have been published for a sample of 954 adults, the age, health, and hearing status of the normative group

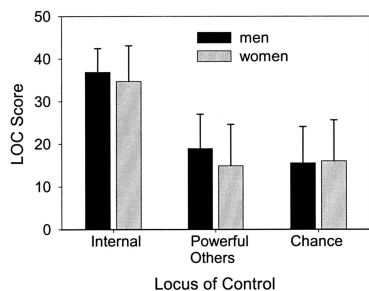


Fig. A1. Mean scores and standard deviations for the normative group for LOC scales. Data are shown separately for men and women.

were not reported. Thus, it was necessary to generate new normative data for use in this study.

Subjects and Procedure

The same subjects completed both LOC and CSI questionnaires. Inclusion criteria were age of 55 yr or more; community-dwelling; self-reported health that was fair, good, or excellent; and self-reported hearing difficulty either none or mild. Subjects were a volunteer sample recruited from a variety of church and civic organizations in the Eastern United States.

A total of 126 potential subjects submitted LOC and CSI questionnaires. In the scoring process, a questionnaire was eliminated if there were any missing or ambiguous responses. In the final tally, there were 102 complete LOC questionnaires and 99 complete CSI questionnaires. Roughly 30% were men and 70% were women. Age distribution was <60 = 9%, 60s = 57%, 70s = 27%, 80+ = 8%.

Results

Figures A1 and A2 illustrate the mean scores and standard deviations for the normative group for both questionnaires. Data are given separately for men and women. Multivariate analysis was performed on the data for each questionnaire to explore the significance of differences in mean scores for men and

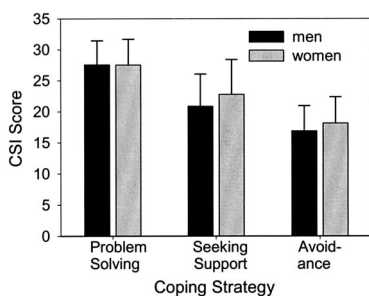


Fig. A2. Mean scores and standard deviations for the normative group for CSI scales. Data are shown separately for men and women.

TABLE A1. Means and standard deviations for three Locus of Control scales and three Coping Strategy Indicator scales

Questionnaire, Scale	Mean score	Standard Deviation
LOC, Internal	35.3	7.76
LOC, Powerful Others	16.0	9.46
LOC, Chance or fate	15.48	9.32
CSI, Problem solving	27.5	4.03
CSI, Seeking Support	22.2	5.52
CSI, Avoidance	17.7	4.20

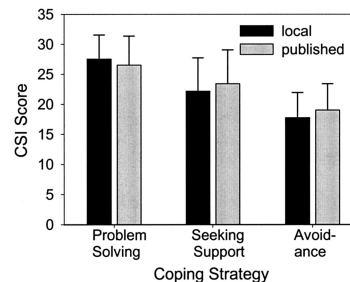


Fig. A3. Mean scores and standard deviations for the local normative group compared with the published normative group for the CSI scales.

women in each scale. None of the six differences (three scales in each questionnaire) between men and women was statistically significant at the $p < 0.05$ α level (the difference for the LOC Powerful Others scale approached significance, with $p = 0.053$). Based on these results and on the minimal absolute differences between men and women's mean scores, it was decided to combine men and women into a single group for the norms. Table A1 gives the final norms for each questionnaire.

As noted above, published norms do exist for the CSI scales (Amirkhan, 1994). They are based on 954 subjects of unspecified age, health, and hearing status. Figure A3 illustrates the published CSI norms and those determined in this study for healthy, older, subjects with age-normal hearing. There were very small absolute differences between the two sets of means. To explore these differences, norms obtained in this study for each of the three scales were compared with the published norms, using one-way ANOVA. Results indicated that the differences were statistically significant for all three scales [problem solving $F(1,1051) = 3.94$, $p = 0.048$; seeking support $F(1,1051) = 4.21$, $p = 0.04$; avoidance $F(1,1051) = 7.78$, $p = 0.005$]. Based on this finding, it was determined to use the norms obtained in this study rather than the published norms for comparison with hearing aid seekers.

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