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6-Year Impact of Hearing Impairment on Psychosocial and Physiologic Functioning

Sensory changes, such as decreased hearing, can alter an individual's ability to communicate with others and significantly affect interpersonal relationships [1]. Hearing impairment has also been shown to be significantly associated with multiple negative outcomes, including depression, loneliness, altered self-esteem, and diminished functional status [2-5]. Many of the studies done to date, however, have been cross-sectional or included only small numbers of persons. The current study investigates the impact of hearing impairment longitudinally in a cohort of adults aged 65 and older. Participants with hearing impairment at the beginning of the study are compared with those reporting no hear-

ing impairment on physical and mental health outcomes, both at baseline and at follow-up 6 years later. Results support the importance of screening for and treating hearing impairment and the need for further research on approaches to minimize its occurrence.

Methods

Sample. The sample was drawn from the Alameda County Study, a cohort study of factors related to health and mortality that has followed 6,928 adults since 1965. Subjects were originally selected to be a representative sample of Alameda County, California, but have been followed regardless of location or disability status.

In 1984, a subsample of 508 study participants 65 years old or older who had responded to the 1983 survey of the entire cohort were asked additional questions on factors related to physical functioning, mental health, and activities performed. The baseline data set for the current study

combines the data collected in 1984 with questions on basic health and demographics collected in 1983. At the 6-year follow-up in 1990, 381 members of the 1984 cohort were still alive, and 356 (93%) responded to the follow-up questionnaire.

Measures. *Mental health variables* included how often subjects felt depressed, how often they felt left out even with friends, whether it was hard for them to feel close to others, how often they felt lonely, and whether they enjoyed their free time a lot. *Perceived health* was measured by asking subjects to rate their health as excellent, good, fair, or poor. *Activity level* was assessed by asking subjects how often they just sat doing nothing. These same questions had been asked in the baseline interview in 1984, except for frequency of just sitting doing nothing and whether subjects enjoyed their free time a lot.

Hearing impairment was measured with a simple yes/no response to the question, Do you have trouble hear-

Table 1. Baseline Characteristics by Hearing Impairment among 356 Adults Age 65 and Older in 1984, Alameda County Study

BASILINE CHARACTERISTIC	HEARING IMPAIRED N=61	NOT HEARING IMPAIRED N=295
Demographics		
Male	54.1%	38.6%
High school graduate or more	62.3%	67.1%
Black	8.2%	12.5%
Mean age (years)	72.4	71.8
Physical and Mental Health		
Mobility Impaired	16.4%	12.5%
One or more of six chronic conditions	82.0%	71.9%
Fair or poor perceived health	34.4%	20.3%
Often depressed	5.0%	3.4%

Table 2. Association of Baseline Hearing Impairment with Follow-up Outcomes 6 Years Later among 356 Adults Age 65 and Older, Alameda County Study

Follow-up Outcome	OR ^a	95% CI ^a	p value ^a
Often depressed versus sometimes or never ^b	3.62	1.32-9.95	0.01
Feel left out even with friends versus do not ^b	3.01	1.36-6.73	0.01
Just sit doing nothing on an average day versus do not	2.41	1.18-4.92	0.02
Fair or poor perceived health versus good or excellent ^b	2.28	1.20-4.34	0.01
Do not enjoy free time a lot versus do	1.98	1.03-3.82	0.04
Feel lonely or remote from other people versus do not ^b	1.80	0.90-3.58	0.09
Hard for me to feel close to others versus not hard ^b	1.64	0.83-3.24	0.16

^aOdds ratios (OR), confidence intervals (CI), and p values are from logistic regression models comparing those with and without baseline hearing impairment on the indicated outcome at follow-up. All models adjust for age, gender, education, ethnicity, and number of chronic conditions.
^bModel also includes 1984 measure of the indicated outcome variable.

ing (even with a hearing aid)? *Sociodemographic variables* included age, gender, education, and ethnicity (white/black). *Chronic conditions* were based upon reported absence/presence in the past 12 months of diabetes, arthritis, cancer, stroke, asthma, and chronic obstructive pulmonary disease (COPD, defined as bronchitis or emphysema).

Data Analysis. Multiple logistic regression was used to assess the relationships between baseline hearing impairment and the follow-up outcome variables. Results are displayed as odds ratios, which compare those reporting hearing impairment with those not on the likelihood of experiencing the outcome. Baseline age, gender, education, ethnicity, and number of chronic conditions were controlled for in all models. When the outcome measure had also been assessed at baseline, the earlier measure was added as an additional control. For example, in the model when examining the association between baseline hearing impairment and follow-up depression, baseline depression was entered as a control. With

the baseline measure in the model, any observed relationship cannot simply be due to cross-sectional baseline associations (in this example, between depression and hearing loss) predicting the same outcomes at follow-up.

Results

Table 1 presents baseline sample characteristics. Of the 356 participants, 147 (41%) were men and 209 (59%) were women. The majority were white (88%). Mean age at baseline was 72 years (range 65 to 95 years). Hearing impairment was reported by 61 (17.1%) subjects. At the beginning of the study, those who were hearing impaired were more likely to be male, white, mobility impaired, have one or more chronic conditions, report their health as only fair or poor, and say that they were often depressed. Mean age was nearly the same for those reporting hearing impairment and those not reporting hearing impairment.

The consequences of impaired hearing for survivors at the 6-year follow-up in 1990 are shown in Table 2.

Compared with those not hearing impaired, subjects who were hearing impaired in 1984 were significantly more likely to often feel depressed (OR=3.62), often feel left out even with friends (OR=3.01), sometimes just sit doing nothing (OR=2.41), have only fair or poor perceived health (OR=2.28), and not to enjoy their free time a lot (OR=1.98). Associations between hearing impairment and the other two outcomes (sometimes or often feel lonely and hard for me to feel close to others) were relatively strong, but the results were not statistically significant.

Discussion

Data from the current study have important implications for research and practice. Hearing impairment was associated with greater mobility impairment, poorer perceived health, chronic conditions, and feeling depressed even at baseline. However, of major clinical importance is the finding that at 6-year follow-up hearing impairment was associated with more than a threefold greater likelihood

of depression; a threefold greater likelihood of feeling left out; an almost two and one-half times greater likelihood of just sitting doing nothing and having fair or poor perceived health; and twice the likelihood of not enjoying free time. These relationships were significant even when age, gender, education, ethnicity, number of chronic conditions, and relevant baseline measure (when present) were controlled. These data thus strongly support previous literature that suggested an association between hearing loss and multiple negative outcomes. While hearing impairment has not been directly associated with mortality, perceived poor health and depression have been shown to be related to higher levels of both morbidity and mortality; thus hearing impairment may indirectly be associated with mortality.

While multiple factors, such as age, noise, and various medical conditions have been associated with hearing loss [6-10], the actual level of loss may be less important to functioning than the perceived impairment. Studies have shown that perceived hearing disability is related to emotional, social, and communication dysfunction, even with relatively mild or moderate losses found on audiological testing [5]. The current study may support this latter finding in that hearing impairment was self-reported and thus perceived as a problem.

These data have some important implications for practice and research. Increased attention should be given to education about factors that promote hearing impairment and the importance of protecting against inner ear damage from loud noise and about screening for hearing impairment across the life span so that appropriate interventions can be initiated. Individuals need to be aware that repeated exposure to loud noises can

lead to permanent damage and that impaired hearing places them at risk because they are often unable to hear warning sounds, such as smoke alarms, oncoming traffic, and cyclists. Further, once the damage is done, it is generally permanent because the cells of the auditory pathways are very specialized, cannot reproduce, and have limited regenerative ability [11]. Finally, there needs to be additional longitudinal research focusing on the identification of potentially ototoxic factors as well as strategies to minimize exposure to these factors. Health care providers in many settings, including schools, occupational sites, and gerontology, could contribute significantly to these research efforts.

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NP DIALOGUE

Medical Savings Accounts: Real Patient Power

This year's leading health care reform debate focused on whether to allow Americans to open a medical savings account (MSA). NPs should pay close attention to this debate because this new type of health insurance would (1) give patients direct access to NPs, and (2) allow patients to reimburse NPs for their services.

The final health care bill supports a meager MSA experiment. Only 750,000 people who are self-employed or who work for small businesses (50 or fewer employees) will be allowed to open an MSA for a four-year test period. Considering there are more than 10 million self-employed persons, it will be difficult to examine the true effect of MSAs on the health insurance pool. Nevertheless, MSAs are an important policy that NPs should know about.

What is an MSA?

MSAs are tax-deferred bank accounts that allow individuals to set aside money to pay for health care services. Here's how MSAs work:

The employer (or self) would take a portion of money currently spent on workers' health insurance and deposit it into each worker's MSA. The other portion would be used to purchase a catastrophic policy that covers medical expenses after individuals meet a deductible. Congress has proposed that

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