

TABLE 2. Descriptive statistics for the Hearing Handicap Inventory for the Elderly

Item Number	Item	n	Mean (SD)	Median	Range	Assigned 0 Response (%)
S-1.	Does a hearing problem cause you to use the phone less often than you would like?	1064	0.45 (1.12)	0	0–4	901 (84.7)
E-2.*	Does a hearing problem cause you to feel embarrassed when meeting new people?	1064	0.70 (1.22)	0	0–4	766 (72.0)
S-3.	Does a hearing problem cause you to avoid groups of people?	1064	0.54 (1.15)	0	0–4	849 (79.8)
E-4.	Does a hearing problem make you irritable?	1063	0.68 (1.17)	0	0–4	764 (71.9)
E-5.*	Does a hearing problem cause you to feel frustrated when talking to members of your family?	1064	1.08 (1.43)	0	0–4	627 (58.9)
S-6.	Does a hearing problem cause you difficulty when attending a party?	1064	1.32 (1.57)	0	0–4	569 (53.5)
E-7.	Does a hearing problem cause you to feel “stupid” or “dumb”?	1064	0.48 (1.06)	0	0–4	865 (81.3)
S-8.*	Do you have difficulty hearing when someone speaks in a whisper?	1064	2.30 (1.58)	2	0–4	266 (25.0)
E-9.*	Do you feel handicapped by a hearing problem?	1064	0.82 (1.34)	0	0–4	740 (69.5)
S-10.*	Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbors?	1064	0.84 (1.28)	0	0–4	705 (66.3)
S-11.*	Does a hearing problem cause you to attend religious services less often than you would like?	1064	0.17 (0.71)	0	0–4	999 (93.9)
E-12.	Does a hearing problem cause you to be nervous?	1064	0.37 (0.94)	0	0–4	901 (84.7)
S-13.	Does a hearing problem cause you to visit friends, relatives, or neighbors less often than you would like?	1063	0.20 (0.76)	0	0–4	985 (92.7)
E-14.*	Does a hearing problem cause you to have arguments with family members?	1064	0.55 (1.10)	0	0–4	828 (77.8)
S-15.*	Does a hearing problem cause you difficulty when listening to TV or radio?	1064	1.49 (1.54)	2	0–4	485 (45.6)
S-16.	Does a hearing problem cause you to go shopping less often than you would like?	1064	0.10 (0.53)	0	0–4	1020 (95.9)
E-17.	Does any problem or difficulty with your hearing upset you at all?	1064	1.10 (1.40)	0	0–4	607 (57.0)
E-18.	Does a hearing problem cause you to want to be by yourself?	1064	0.25 (0.81)	0	0–4	959 (90.1)
S-19.	Does a hearing problem cause you to talk to family members less often than you would like?	1064	0.30 (0.88)	0	0–4	940 (88.3)
E-20.*	Do you feel that any difficulty with your hearing limits or hampers your personal or social life?	1064	0.72 (1.26)	0	0–4	766 (72.0)
S-21.*	Does a hearing problem cause you difficulty when in a restaurant with relatives or friends?	1064	1.31 (1.48)	0	0–4	538 (50.6)
E-22.	Does a hearing problem cause you to feel depressed?	1064	0.22 (0.73)	0	0–4	969 (91.1)
S-23.	Does a hearing problem cause you to listen to TV or radio less often than you would like?	1064	0.33 (0.99)	0	0–4	945 (88.8)
E-24.	Does a hearing problem cause you to feel uncomfortable when talking to friends?	1064	0.68 (1.13)	0	0–4	751 (70.6)
E-25.	Does a hearing problem cause you to feel left out when you are with a group of people?	1064	0.89 (1.31)	0	0–4	691 (64.9)

*Item included on the Hearing Handicap Inventory for the Elderly screening version. Items with “S” and “E” prefix comprised the original social/situational and emotional subscales, respectively.

initial test battery is completed, subjects are scheduled annually to obtain updated demographic information and medical and hearing health histories, and an audiogram. The full test battery is repeated every 2 to 3 years.

After an amendment to the study protocol in 2015, all subjects are administered a modified version of the HHIE/A that includes all 28 items from the HHIE and the HHIA, regardless of subjects’ age. Per the protocol, the HHIE for subjects aged 60 years and older at the time of assessment is scored using the 25 items from the HHIE and the HHIA for subjects who are less

than 60 years is scored using the 25 HHIA items. Before 2015, the original HHIE was administered to subjects aged 60 years and older and the original HHIA was administered to subjects less than 60 years. In the years before the HHIA was developed, the HHIE was administered to all subjects, regardless of age.

A total of 1447 subjects from the study completed the initial test battery, including the HHIE/A. At the time of completion of the baseline HHIE/A, 1068 subjects were aged 60 years or older and 379 subjects were less than 60 years. A total of 74 subjects less than 60 years completed the HHIE and 4 subjects

TABLE 3. Descriptive statistics for the Hearing Handicap Inventory for Adults

Item Number	Item	n	Mean (SD)	Median	Range	Assigned 0 Response (%)
S-1.	Does a hearing problem cause you to use the phone less often than you would like?	305	0.37 (0.90)	0	0–4	257 (84.3)
E-2.*	Does a hearing problem cause you to feel embarrassed when meeting new people?	305	0.45 (0.99)	0	0–4	248 (81.3)
S-3.	Does a hearing problem cause you to avoid groups of people?	305	0.28 (0.81)	0	0–4	270 (88.5)
E-4.	Does a hearing problem make you irritable?	305	0.58 (1.14)	0	0–4	234 (76.7)
E-5.*	Does a hearing problem cause you to feel frustrated when talking to members of your family?	305	0.64 (1.23)	0	0–4	231 (75.7)
S-6.	Does a hearing problem cause you difficulty when attending a party?	305	0.75 (1.29)	0	0–4	219 (71.8)
S-7.*	Does a hearing problem cause difficulty hearing/ understanding coworkers, clients, or customers?	305	0.85 (1.33)	0	0–4	206 (67.5)
E-8.*	Do you feel handicapped by a hearing problem?	305	0.37 (0.94)	0	0–4	260 (85.2)
S-9.*	Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbors?	305	0.50 (1.04)	0	0–4	240 (78.7)
E-10.	Does a hearing problem cause you to feel frustrated when talking to coworkers, clients, or customers?	305	0.65 (1.21)	0	0–4	228 (74.8)
S-11.*	Does a hearing problem cause you difficulty in the movies or theater?	305	0.49 (1.09)	0	0–4	247 (81.0)
E-12.	Does a hearing problem cause you to be nervous?	305	0.21 (0.63)	0	0–4	274 (89.8)
S-13.	Does a hearing problem cause you to visit friends, relatives, or neighbors less often than you would like?	305	0.10 (0.53)	0	0–4	292 (95.7)
E-14.*	Does a hearing problem cause you to have arguments with family members?	305	0.36 (0.90)	0	0–4	258 (84.6)
S-15.*	Does a hearing problem cause you difficulty when listening to TV or radio?	305	0.88 (1.32)	0	0–4	200 (65.6)
S-16.	Does a hearing problem cause you to go shopping less often than you would like?	305	0.04 (0.32)	0	0–4	300 (98.4)
E-17.	Does any problem or difficulty with your hearing upset you at all?	305	0.62 (1.14)	0	0–4	228 (74.8)
E-18.	Does a hearing problem cause you to want to be by yourself?	304	0.18 (0.68)	0	0–4	281 (92.4)
S-19.	Does a hearing problem cause you to talk to family members less often than you would like?	305	0.20 (0.72)	0	0–4	281 (92.1)
E-20.*	Do you feel that any difficulty with your hearing limits or hampers your personal or social life?	305	0.39 (0.95)	0	0–4	255 (83.6)
S-21.*	Does a hearing problem cause you difficulty when in a restaurant with relatives or friends?	305	0.69 (1.20)	0	0–4	220 (72.1)
E-22.	Does a hearing problem cause you to feel depressed?	305	0.15 (0.62)	0	0–4	286 (93.8)
S-23.	Does a hearing problem cause you to listen to TV or radio less often than you would like?	305	0.15 (0.60)	0	0–4	285 (93.4)
E-24.	Does a hearing problem cause you to feel uncomfortable when talking to friends?	305	0.37 (0.81)	0	0–4	251 (82.3)
E-25.	Does a hearing problem cause you to feel left out when you are with a group of people?	305	0.45 (0.99)	0	0–4	248 (81.3)

*Item included on the Hearing Handicap Inventory for Adults screening version.

aged 60 years and older completed the HHIA; these subjects were excluded from the dimensionality assessment. Thus, 1064 subjects who completed the HHIE and 305 subjects who completed the HHIA were included in the analysis exploring dimensionality of the scales.

Psychometric Analysis

The following section introduces the method used to evaluate the discriminant validity of the original subscales of the HHIE/A in addition to the nonparametric IRT approaches used to explore dimensionality of the items and reevaluate the scales.

Discriminant Validity: Evaluating the Distinctiveness of the Subscales • The HTMT ratio of polychoric correlations was used to evaluate the discriminant validity of the two latent constructs (emotional and social/situational) of the HHIE/A (Henseler et al. 2015). The HTMT is an estimate of the correlation between two constructs and as such, values that are smaller than one suggest that the two constructs differ. The estimated correlation between the two constructs includes two types of correlations: (a) the correlations between items from different constructs (i.e., one item from emotional and one item from social/situational) and (b) the correlations