

Measuring the Effectiveness of Hearing Aids with the Revised Age-Related Hearing Loss Questionnaire

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Purpose: This study investigated the validity and reliability of the revised age-related hearing loss questionnaire (R-ARHLQ) and its effectiveness for the wearing of hearing aids by comparing before and after the wearing of hearing aids.

Methods: Total thirty-four seniors ranging from mild, moderate, and severe hearing loss depending on the total scores of the R-ARHLQ participated in this study. The factor analysis, construct and criterion-related validity, item reliability, internal consistency, test-retest reliability of the R-ARHLQ, and the effectiveness of the wearing of hearing aids were analyzed by various statistically methods.

Results: The contents of the R-ARHLQ was grouped into four subcategories: Communication Attitude (10 questions), Communication Difficulty (6 questions), Communication Environment (4 questions), and Communication Interruption (5 questions). The construct validity of the R-ARHLQ ranged from .389 ($p < 0.05$) to .943 ($p < 0.01$). The criterion-related validity with the self-assessment for hearing screening of the elderly-revised (SHSE-R) ranged from .385 ($p < 0.05$) to .837 ($p < 0.01$). The item reliability ranged from .818 to .987 ($p < 0.001$) while the internal consistency ranged from .849 to .922 and the test-retest reliability was .99 ($p < 0.001$). The R-ARHLQ of three different groups (mild, moderate, and severe groups) was significantly different among before the wearing of hearing aids and two weeks and four weeks after the wearing of hearing aids.

Conclusions: This suggests that the R-ARHLQ can be used as a clinically useful screening tool and a subjective diagnosis tool for the age-related hearing loss.

Keywords: Revised age-related hearing loss questionnaire, Age-related hearing loss, Age-related hearing loss questionnaire, Validity, Reliability, Hearing aids



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INTRODUCTION

Based on the population of seniors (above 65 years old) of the total population in a nation, united nations (UN) classified aging (above 7%), aged (above 14%), and super aged (above 20%) society. According to the Statistics Korea (2024), the Korean society enters the super aged society in 2025 (20.3%) and reaches 40.1% in 2050 [1]. In the super aged society, hearing loss is one of common chronic diseases affecting the life of elderly caused by genetic defect, aging, noise, ototoxic drugs, head trauma, stress, and so on. It is estimated that about 30% seniors have hearing loss, called age-related hearing loss, presbycusis [2]. Age-related hearing loss (presbycusis) is a progressive bilateral symmetrical sensorineural hearing loss associated with the process of aging [3].

According to the pathological causes and the degree of hearing loss, Schuknecht cat-

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egorized sensory, neural, metabolic, cochlear, and mixed presbycusis [4-8]. Although each category of presbycusis shows different characteristics of hearing, presbycusis indicates common characteristics of high frequency hearing loss, difficulty of sound localization and lateralization, reduction in speech recognition, intelligibility, and understanding, and decrease in hearing in noise [8]. These lead to difficulty in everyday life, avoidance in social communication with others, social isolation, reduction in quality of life, loss in self-confidence, and communication breakdown and interruption [8,9].

Since age-related hearing loss starts early and progresses slowly, the elderly often fails to realize the seriousness of hearing loss in their daily life [8]. The failure in recognition of hearing problem results in late management of aural rehabilitation, which may increase the personal and social costs [9]. Although a lot of seniors with hearing problems visit the primary medical care centers, seniors may only recognize their hearing problem as an unavoidable aging phenomenon [8]. Furthermore, the primary care centers may not refer to otorhinolaryngological clinic because they do not perceive the importance of hearing problem on everyday life [8]. Seniors with hearing loss may not visit the otology clinic due to their physical or psychological conditions [8]. Therefore, the age-related hearing loss questionnaire is necessary to be developed as a clinically quick and self-reported screening tool to help the early aural rehabilitation of the elderly with hearing loss [8,9].

Some researchers tried to develop the hearing loss questionnaire as early diagnosis tool of the elderly hearing loss in Korea. The Hearing Handicap Inventory for the Elderly-Screening (HHIE-S), Korean Hearing Handicap Inventory for the Elderly (K-HHIE), and Self-Assessment for Hearing Screening of the Elderly-Revised (SHSE-R) are developed as the clinical tools for the elderly with hearing loss [10-12]. The HHIE-S composed of total 10 questions (5 questions of emotional difficulties and 5 questions of social difficulties) to fit the conditions in Korea based on the Hearing Handicap Inventory for the Elderly (HHIE) composed of total 25 questions (13 questions of emotional difficulties and 12 questions of social difficulties) originally developed by Ventry and Weinstein (1982) [10,13]. However, the sensitivity and specificity of the HHIE-S was not high because the standardization process of HHIE-S was not enough and HHIE-S used the portable audiometry [8,11]. After considering the cross-cultural adaptation process, K-HHIE made total 25 questions composed of 4 subgroups of social relations, emotion, hearing, communication.

SHSE-R composed of 20 questions (12 questions of distracting condition, 4 questions of general issues, and 4 questions of working memory) with 5-point Likert scale [12]. All questions of HHIE-S and K-HHIE asked social and emotional conditions caused by hearing loss. However, these questions may make the seniors embarrassed and unanswered because they asked social and emotional conditions resulted from hearing loss although they do not recognize whether they have a hearing problem [8,9]. Furthermore, the SHSE was modified due to some obscure questions and ambiguous words [12]. In summary, the HHIE-S, the K-HHIE, and SHSE-R include the incompleteness of standardization process, lack in consistency of test environment, and general questions of hearing problems, which do not reflect the characteristics of aging related hearing loss.

Based on ten self-diagnosis criteria of hearing problems reported by Korea Disease Control and Prevention Agency [14] and the hearing characteristics of age-related hearing loss reported by audiologists working at local hearing aid centers, the age-related hearing loss questionnaire (ARHLQ) was developed by Choi [8]. The final ARHLQ composed of total 23 questions (9 questions of communication difficulty, 5 questions of communication environments, 5 questions of emotion and other's reaction, and 3 questions of communication strategy) with 5-point Likert scale [9]. The content and construct validity and test-retest reliability of the ARHLQ were positively high and very consistent [9]. However, since the ARHLQ composed only twenty-three questions and contained the three questions which do not reflect the characteristics of the age-related hearing loss, the five additional questions are made and replaced the three questions. Finally, the twenty-five questions were completed so that the total scores of the R-ARHLQ reach 100 points. Furthermore, the effectiveness of the revised ARHLQ was investigated with the use of hearing aids. The scores of the R-ARHLQ were compared between before and after the wearing of hearing aids and the criterion validity of the ARHLQ was reviewed with SHSE-R. Therefore, the clinical usefulness of the R-ARHLQ was verified by the wearing of hearing aids.

METHODS

Subjects

Based on the definition of age-related hearing loss suggested by Korea Disease Control and Prevention Agency [14], age-related hearing loss refers to a progressive bilateral symmetri-

Table 1. Distribution of the number and age of subjects/groups by the degree of hearing loss

Degree of hearing loss	Number and age of subjects
Mild (26 dB–40 dB)	3 (75.33±2.03)
Moderate (41 dB–55 dB)	9 (78.00±2.69)
Moderate severe (56 dB–70 dB)	13 (75.38±1.66)
Severe (71 dB–90 dB)	9 (78.56±1.09)
Total	34 (76.91±5.28)

cal sensorineural hearing loss which are not caused by acoustic trauma, ototoxic drugs, ear diseases, noise exposure, ear surgery, and family history of hearing loss and associated with the process of aging in seniors over 65 years old [8,9]. Conforming to the above-mentioned criteria, thirty-four subjects with various degrees of hearing loss participated in this study. These subjects were recruited from a variety of provinces such as Busan Metropolitan City, Daegu Metropolitan City, Gyeongsangnam-do, and Jeju Special Self-Governing Province. The information of the number and age of the subjects by the degrees of hearing threshold are described above (Table 1).

Procedures

The ARHLQ developed by Choi is composed of 23 questions [8]. Five additional questions were developed by five hearing professionals who has worked in audiology for more than 10 years after obtaining the master's degree in audiology. Two questions of newly developed five questions were added so that total scores of the questionnaire reach 100 points (4 points for each question). The age-related hearing loss questionnaire used in this study consisted of 25 questions. The response of R-ARHLQ was compared immediately after measuring the hearing threshold, two weeks later, and two and four weeks after wearing hearing aids.

Pure-tone audiometry (AD629, Interacoustics A/S, Middel-fart, Denmark) was performed to confirm the types, degrees, and configurations of hearing loss through air-conduction (TDH 39, Telephonics Co., Farmingdale, USA) and bone-conduction (B71, RadioEar, Middelfart, Denmark). Hearing thresholds for air-conduction and bone-conduction were obtained at frequencies of 0.25, 0.5, 1, 2, 4, 6, 8 kHz and 0.25, 0.5, 1, 2, 4 kHz, respectively. The degrees of hearing threshold were obtained by $(a+2b+2c+d)/6$ (a = hearing threshold at 500 Hz, b = hearing threshold at 1,000 Hz, c = hearing threshold at 2,000 Hz, and d = hearing threshold at 4,000 Hz).

The participants checked and answered the R-ARHLQ and the SHSE-R questionnaire by themselves. When it is difficult for participants to check and respond the questionnaires directly because of the problem of vision and literacy, the researcher read them directly and checked instead based on the subject's response.

Revision of age-related hearing loss questionnaire

The ARHLQ developed by Choi was used as a clinical screening tool to detect in early stage of the aging related hearing loss and evaluate the communication difficulties caused by hearing loss and confirm the effectiveness of aural rehabilitation [8]. The ARHLQ originally consisted of total twenty-four questions of four subcategories (9 questions for Communication Difficulty, 6 questions for Communication Environment, 6 questions for Emotion and Other's Reaction, and 3 questions for Communication Strategy). One question (question 16) of the Communication Environment lacks the commonality so that the question is not included in the questionnaire. Finally, the ARHLQ consisted of twenty-three questions with four subcategories (9 questions for Communication Difficulty, 5 questions for Communication Environment, 6 questions for Emotion and Other's Reaction, and 3 questions for Communication Strategy). The ARHLQ with twenty-three questions makes the total score less than 100, so it was inconvenient and incomplete to use in clinical practice.

Five hearing professionals who has worked in audiology for more than 10 years after obtaining the master's degree in audiology checked the twenty-three questions questionnaire and excluded three questions because they do not reflect the characteristics of the ARHL. The removed questions were "It's harder to communicate with women and children than with men," "It is difficult to hear the pastor's sermon or the priest's lecture in church or cathedral," and "It is easy to understand words I know or familiar words, but difficult to understand words I don't know or unfamiliar words." They suggested five additional questions reflecting the characteristics of the ARHL. The newly added questions were "I ask the other person to speak slowly because I felt their words were too fast," "I don't hear my name when it is called in a hospital or a public institution," "I've heard the announcement wrong on the subway or bus," "It is difficult to talk without facing the other person's face," and "I've asked other people to say it again when they speak." Each question was responded on the 5 point Likert scale of ① never ② occasionally ③ about half of the time ④ frequently ⑤ always.

Self-assessment for hearing screening of the elderly-revised

The Self-Assessment for Hearing Screening of the Elderly (SHSE) developed by Kim et al. consisted of 20 questions of three subcategories (10 questions of Distracting Condition, 7 questions of General Issues, and 3 questions of Working Memory) on the 5-point Likert scale [① never (0%) ② occasionally (25%) ③ about half of the time (50%) ④ frequently (75%) ⑤ always (100%)] [15]. The SHSE was revised by You et al. due to the obscure questions and ambiguous words [12]. The SHSE-R contained the same subcategories with reorganized different questions (12 questions of Distracting Condition, 4 questions of General Issues, and 4 questions of Working Memory) [12]. The SHSE-R was used to indicate the criterion validity with the R-ARHLQ.

Statistics

The statistical package for data analysis was used with IBM SPSS version 19.0 (Statistic Packages for Social Science; IBM Inc., Armonk, NY, USA). This study strived to verify its content, construct, and criterion-related validity and test-retest reliability of R-ARHLQ (the Revised Aging Related Hearing Loss Questionnaire) based on the factor analysis of R-ARHLQ. Furthermore, this study investigated the effectiveness of the wearing of hearing aids by comparing before and after the use of hearing aids. The content, construct, and criteria validity were evaluated by Pearson's correlation coefficient, the Kaiser-Meyer-Olkin test for nonparametric independent samples, and Cronbach alpha coefficients. The effectiveness of the wearing of hearing aids was analyzed by nonparametric repeated measurement such as Friedman test and Wilcoxon's sign ranked test for the mean comparison was performed for statistical significance. The statistical significance was determined by p values of less than 0.5.

RESULTS

In this study, all participants were assigned into three groups (mild, moderate, severe groups) based on the score of the R-ARHLQ. The score of the aging related hearing loss questionnaire ranged from 0 (minimal score) to 100 points (maximal score). Zero score indicates no problem of aging related hearing loss while hundred score represents profound problem of aging related hearing loss. The baseline of three groups classification was determined by 33 and 67 points [16]. Mild group displays the scores less than 33 points while moderate group exhibits the scores between 33 and 67 points. Finally, severe

group indicates the scores over 67 points. Thirteen seniors belong to the mild group (3 seniors with mild hearing loss, 9 seniors with moderate hearing loss, and 1 senior with moderate-severe hearing loss). Thirteen participants belong to the moderate group (12 seniors with moderate-severe hearing loss and 1 senior with severe hearing loss) while eight subjects belong to the severe group (8 seniors with severe hearing loss). The scores of the R-ARHLQ were compared among immediately after measuring the hearing threshold, two weeks later, and two and four weeks after wearing hearing aids.

Factor analysis of the R-ARHLQ

As the results of the factor analysis of the R-ARHLQ, the Kaiser-Meyer-Olkin value for standard formation appropriateness was 0.744 and the approximate chi-square value of Bartlett's sphericity test was 657.925 ($p < 0.001$). Considering the commonality of all questions of over 0.4 and the eigen value of the principal component analysis of over 1, the factor analysis confirmed 4 factors.

As shown in Table 2, the R-ARHLQ consisted of twenty-five questions with four subcategories of Communication Attitude (10 questions), Communication Difficulty (6 questions), Communication Environment (4 questions), and Communication Interruption (5 questions). The communication attitude (CA) included questions 5, 8, 11, 14, 15, 16, 19, 20, 22, and 24 while the communication difficulty (CD) contained questions 2, 6, 9, 10, 17, and 18. The communication environment (CE) included questions 3, 7, 12, and 25 while the communication interruption (CI) contained questions 1, 4, 13, 21, and 23. These four factors explained 62.3% of the total variance. In more detail, the factor 1 explained 21.4%, the factor 2 15.4%, the factor 3 13.7%, and the factor 4 11.7%, respectively.

Construct validity of the R-ARHLQ

The construct validity was analyzed with Pearson's correlation coefficients to confirm the correlation among total score and subcategory scores of the R-ARHLQ. The subcategories of the R-ARHLQ were CA, CD, CE, and CI. As shown in Table 3, the total and the CA scores of R-ARHLQ shows a high positive correlation ($r = 0.943$, $p < 0.01$) while the total score and the CD score of the R-ARHLQ also displays a high positive correlation ($r = 0.887$, $p < 0.01$). The total score and the CI score of the R-ARHLQ also represents a high positive correlation ($r = 0.737$, $p < 0.01$) while the total score and the CE score of the R-ARHLQ shows relatively a high positive correlation ($r = 0.695$, $p < 0.01$).

Table 2. Four-factor solution of the 25 items of the R-ARHLQ

Subcategory	Item	Factor loading			
		1	2	3	4
Communication attitudes	16	0.801			
	11	0.763			
	19	0.693			
	24	0.675			
	5	0.593			
	8	0.576			
	14	0.536			
	22	0.529			
	20	0.526			
	15	0.450			
Communication difficulty	18		0.737		
	10		0.618		
	2		0.613		
	9		0.606		
	17		0.539		
	6		0.520		
Communication environment	12			0.891	
	3			0.623	
	25			0.622	
	7			0.591	
Communication interruption	1				0.701
	13				0.689
	23				0.674
	4				0.539
	21				0.443
Eigen value		5.348	3.855	3.433	2.936
Explained variance (%)		21.392	15.420	13.732	11.742
Accumulative variance (%)		21.392	36.812	50.544	62.286
Number of items		10	6	4	5

Pearson's correlation coefficients were analyzed by the correlation among the subcategory scores of the R-ARHLQ. As shown in Table 4, the CA and the CD of the R-ARHLQ shows a high positive correlation ($r=0.793$, $p<0.01$) while the CA score and the CI of the R-ARHLQ also displays a high positive correlation ($r=0.626$, $p<0.01$). The CA score and the CE of the R-ARHLQ also represents a high positive correlation ($r=0.587$, $p<0.01$). The CD score and the CE of the R-ARHLQ shows a high positive correlation ($r=0.549$, $p<0.01$) while the CD score and the CI of the R-ARHLQ also displays a high positive correlation ($r=0.527$, $p<0.01$). The CE score and the CI of the

R-ARHLQ shows a positive correlation ($r=0.389$, $p<0.05$).

Criterion-related validity of the R-ARHLQ

The criterion-related validity analyzed by Pearson's correlation coefficients investigate the correlation between the R-ARHLQ and the SHSE-R. Total score of the R-ARHLQ and total score of the SHSE-R shows a high positive correlation ($r=0.837$, $p<0.01$) as shown in Table 4.

The correlations among subcategory scores of the R-ARHLQ and subcategory scores of the SHSE-R were analyzed with Pearson's correlation coefficients. As shown in Table 4,

Table 3. Construct validity of the R-ARHLQ

	Total	Communication attitudes	Communication difficulty	Communication environment	Communication interruption
Total	1				
Communication attitudes	.943**	1			
Communication difficulty	.887**	.793**	1		
Communication environment	.695**	.587**	.549**	1	
Communication interruption	.737**	.626**	.527**	.389*	1

* $p < 0.05$, ** $p < 0.01$.**Table 4.** Correlation between the R-ARHLQ and the SHSE-R

	Communication attitudes	Communication difficulty	Communication environment	Communication interruption	R-ARHLQ
General issues	.737**	.736**	.516**	.663**	.802**
Distracting conditions	.726**	.668**	.492**	.774**	.773**
Working memory	.654**	.583**	.385*	.735**	.690**
SHSE-R	.779**	.741**	.519**	.779**	.837**

* $p < 0.05$, ** $p < 0.01$.

the CA of the R-ARHLQ and the General Issues (GI) of the SHSE-R shows a high positive correlation ($r = 0.737$, $p < 0.01$). The CA of the R-ARHLQ and the Distracting Conditions (DC) of the SHSE-R displays a high positive correlation ($r = 0.726$, $p < 0.01$). The CA of the R-ARHLQ and the Working Memory (WM) of the SHSE-R represents a high positive correlation ($r = 0.654$, $p < 0.01$). The CD of the R-ARHLQ and the GI of the SHSE-R shows a high positive correlation ($r = 0.736$, $p < 0.01$). The CD of the R-ARHLQ and the DC of the SHSE-R displays a high positive correlation ($r = 0.668$, $p < 0.01$). The CD of the R-ARHLQ and the Working Memory (WM) of the SHSE-R represents a high positive correlation ($r = 0.583$, $p < 0.01$). The CI of the R-ARHLQ and the DC of the SHSE-R shows a high positive correlation ($r = 0.774$, $p < 0.01$). The CI of the R-ARHLQ and the Working Memory (WM) of the SHSE-R displays a high positive correlation ($r = 0.735$, $p < 0.01$). The CI of the R-ARHLQ and the GI of the SHSE-R represents a high positive correlation ($r = 0.663$, $p < 0.01$). The CE of the R-ARHLQ and the GI of the SHSE-R shows a high positive correlation ($r = 0.516$, $p < 0.01$). The CE of the R-ARHLQ and the DC of the SHSE-R displays a positive correlation ($r = 0.492$, $p < 0.01$). The CE of the R-ARHLQ and the WM of the SHSE-R represents a positive correlation ($r = 0.385$, $p < 0.05$).

Reliability of the R-ARHLQ

Item reliability of the R-ARHLQ

The R-ARHLQ immediately after measuring the hearing

threshold in pure-tone audiometry and two weeks later were evaluated for test-retest reliability by Pearson's correlation coefficient. The item reliability of test-retest ranged from .818 to .987 ($p < 0.001$). The test-retest reliability of the R-ARHLQ is shown in Table 5.

Internal consistency of the R-ARHLQ

Internal consistency among total and subcategory (CA, CD, CE, and CI) scores of the R-ARHLQ was analyzed by Cronbach's Alpha Coefficient as shown in Table 6. The internal consistency was very high (over .80) among total and subcategory (CA, CD, CE, and CI) scores of the R-ARHLQ. The highest internal consistency was .922 in the CE subcategory of the R-ARHLQ. The internal consistency of the subcategory of the R-ARHLQ was .919, .886, and .871 for CI, CD, and CA, respectively. The internal consistency of the total score of the R-ARHLQ was still high (.849).

Test-retest reliability of the R-ARHLQ

The R-ARHLQ was retested at two weeks after the first test. The test-retest reliability was analyzed by Pearson's correlation coefficients. The test-retest reliability of the R-ARHLQ was very high (.990) as shown in Table 7 ($r = 0.990$, $p < 0.001$).

Effectiveness of the wearing of hearing aids with the R-ARHLQ

The mean and standard deviation of total score of the R-AR-

Table 5. Test-retest reliability of the R-ARHLQ

Item	Correlation coefficient	p-value
1	.967***	0.000
2	.873***	0.000
3	.837***	0.000
4	.903***	0.000
5	.961***	0.000
6	.949***	0.000
7	.928***	0.000
8	.971***	0.000
9	.955***	0.000
10	.916***	0.000
11	.899***	0.000
12	.925***	0.000
13	.933***	0.000
14	.884***	0.000
15	.975***	0.000
16	.943***	0.000
17	.987***	0.000
18	.962***	0.000
19	.818***	0.000
20	.971***	0.000
21	.949***	0.000
22	.911***	0.000
23	.931***	0.000
24	.925***	0.000
25	.949***	0.000

*** $p < 0.001$.

HLQ for mild group was 2.98 ± 0.42 before the wearing of hearing aids, 2.12 ± 0.52 two weeks after the wearing of hearing aid, and 1.80 ± 0.43 four weeks after the wearing of hearing aids. The mean and standard deviation of total score of the R-ARHLQ for moderate group was 3.82 ± 0.19 before the wearing of hearing aids, 2.84 ± 0.24 two weeks after the wearing of hearing aid, and 2.49 ± 0.35 four weeks after the wearing of hearing aids. The mean and standard deviation of total score of the R-ARHLQ for severe group was 4.20 ± 0.12 before the wearing of hearing aids, 3.23 ± 0.30 two weeks after the wearing of hearing aid, and 2.58 ± 0.52 four weeks after the wearing of hearing aids. Using the ANOVA nonparametric repeated measurement as Friedman test, the statistical significances in the degrees of aging related hearing loss (mild, moderate, and severe groups) before and after the wearing of hearing aids ($\chi^2(2) = 26.000$, $p < 0.001$, $\chi^2(2) = 26.000$, $p < 0.001$, $\chi^2(2) = 16.000$,

Table 6. Internal consistency among the total and subcategory scores of the R-ARHLQ

Subcategory	Cronbach's alpha	Item
Communication attitudes	.871	10
Communication difficulty	.886	6
Communication environment	.922	4
Communication interruption	.919	5
Total	.849	25

Table 7. Test-retest correlation of the R-ARHLQ

	Test	Retest
Test	1	
Retest	.990***	1

*** $p < 0.001$.

$p < 0.001$) were observed as shown in Figure 1. In the CA, the statistical significances in the degrees of aging related hearing loss before and after the wearing of hearing aids ($\chi^2(2) = 25.529$, $p < 0.001$, $\chi^2(2) = 26.000$, $p < 0.001$, $\chi^2(2) = 16.000$, $p < 0.001$), were observed as shown in Figure 2. In the CD, the statistical significances in the degrees of aging related hearing loss before and after the wearing of hearing aids ($\chi^2(2) = 25.529$, $p < 0.001$, $\chi^2(2) = 25.120$, $p < 0.001$, $\chi^2(2) = 16.000$, $p < 0.001$) were observed as shown in Figure 3. In the CE, the statistical significances in the degrees of aging related hearing loss before and after the wearing of hearing aids ($\chi^2(2) = 24.500$, $p < 0.001$, $\chi^2(2) = 24.500$, $p < 0.001$, $\chi^2(2) = 14.857$, $p < 0.001$), were observed as shown in Figure 4. In the CI, the statistical significances in the degrees of aging related hearing loss before and after the wearing of hearing aids ($\chi^2(2) = 20.419$, $p < 0.001$, $\chi^2(2) = 21.415$, $p < 0.001$, $\chi^2(2) = 12.214$, $p < 0.01$), were observed as shown in Figure 5.

With Wilcoxon's post hoc test, the total scores of the R-ARHLQ were compared among before the wearing of hearing aids, two weeks after the wearing of hearing aids, and four weeks after the wearing of hearing aids. In the mild group, there were significant differences among before, two weeks, and four weeks after the wearing of hearing aids as shown in Table 8. In more detail, there were statistically significant differences between before and two weeks after the wearing of hearing aids ($Z = -3.180$, $p < 0.01$), between two and four weeks after the wearing of hearing aids ($Z = -3.186$, $p < 0.01$), between before and four weeks after the wearing of hearing aids ($Z = -3.183$, $p < 0.01$). In the moderate group, there were statistically significant differences among before, two weeks, and four

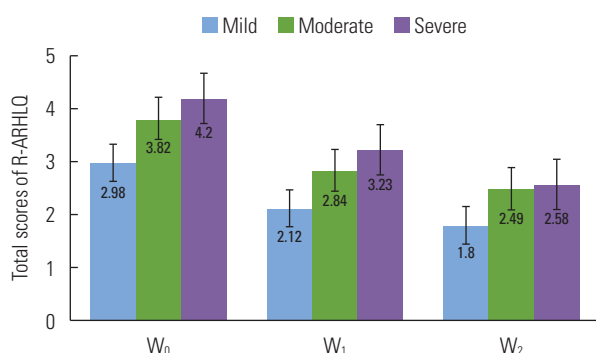


Figure 1. Comparison among the total scores of the R-ARHLQ before and after the wearing of hearing aids (W₀: before the wearing of hearing aids, W₁: 2 weeks after the wearing of hearing aids, W₂: 4 weeks after the wearing of hearing aids).

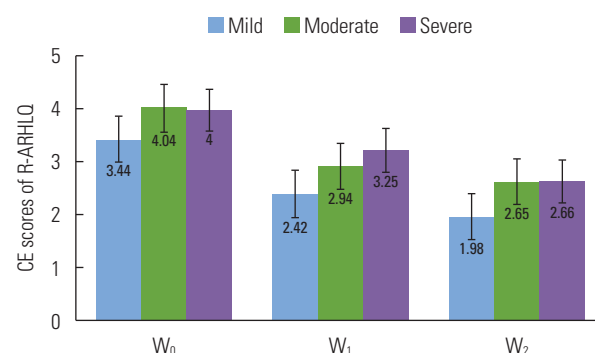


Figure 4. Comparison among the CE scores of the R-ARHLQ before and after the wearing of hearing aids (W₀: before the wearing of hearing aids, W₁: 2 weeks after the wearing of hearing aids, W₂: 4 weeks after the wearing of hearing aids).

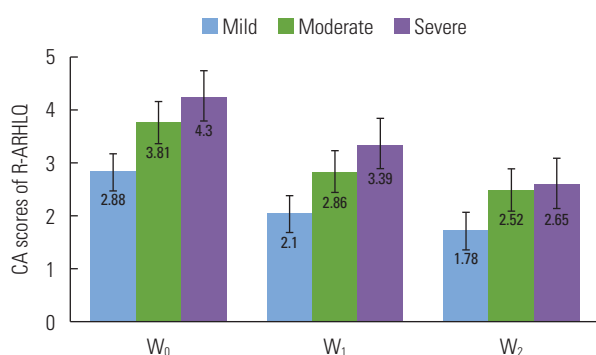


Figure 2. Comparison among the CA scores of the R-ARHLQ before and after the wearing of hearing aids (W₀: before the wearing of hearing aids, W₁: 2 weeks after the wearing of hearing aids, W₂: 4 weeks after the wearing of hearing aids).

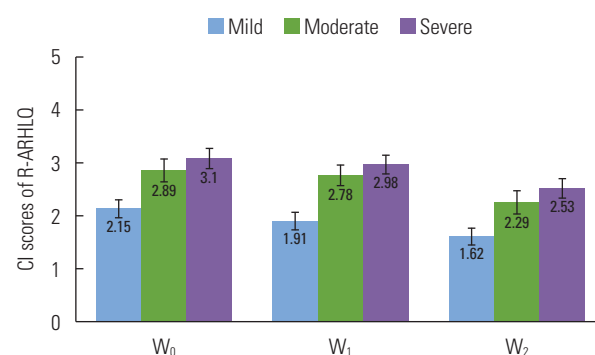


Figure 5. Comparison among the CI scores of the R-ARHLQ before and after the wearing of hearing aids (W₀: before the wearing of hearing aids, W₁: 2 weeks after the wearing of hearing aids, W₂: 4 weeks after the wearing of hearing aids).

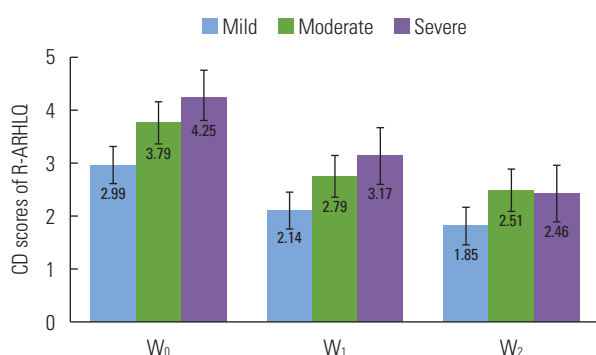


Figure 3. Comparison among the CD scores of the R-ARHLQ before and after the wearing of hearing aids (W₀: Before the wearing of hearing aids, W₁: 2 weeks after the wearing of hearing aids, W₂: 4 weeks after the wearing of hearing aids).

weeks after the wearing of hearing aids as shown in Table 8. In more detail, there were statistically significant differences between before and two weeks after the wearing of hearing aids

($Z = -3.187$, $p < 0.01$), between two and four weeks after the wearing of hearing aids ($Z = -3.187$, $p < 0.01$), between before and four weeks after the wearing of hearing aids ($Z = -3.188$, $p < 0.01$). In the severe group, there were statistically significant differences among before, two weeks, and four weeks after the wearing of hearing aids as shown in Table 8. In more detail, there were statistically significant differences between before and two weeks after the wearing of hearing aids ($Z = -2.530$, $p < 0.05$), between two and four weeks after the wearing of hearing aids ($Z = -2.527$, $p < 0.05$), between before and four weeks after the wearing of hearing aids ($Z = -2.524$, $p < 0.05$).

The CA scores of the R-ARHLQ were compared among before the wearing of hearing aids, two weeks after the wearing of hearing aids, and four weeks after the wearing of hearing aids. In the mild group, there were significant differences among before, two weeks, and four weeks after the wearing of hearing aids as shown in Table 8. In more detail, there were

Table 8. Comparison of the R-ARHLQ before the wearing of hearing aids, 2 weeks after the wearing of hearing aids, and 4 weeks after the wearing of hearing aids by the three different (mild, moderate, and severe) groups

Subcategory	Groups (N)	Average ranking	Ranking sum	Comparison	Z	p
Communication attitudes	Mild (13)	7.00	91.00	W ₀ -W ₁	-3.191**	0.001
		6.50	78.00	W ₁ -W ₂	-3.075**	0.002
		7.00	91.00	W ₂ -W ₀	-3.075**	0.002
	Moderate (13)	7.00	91.00	W ₀ -W ₁	-3.185**	0.001
		7.00	91.00	W ₁ -W ₂	-3.194**	0.001
		7.00	91.00	W ₂ -W ₀	-3.183**	0.001
	Severe (8)	4.50	36.00	W ₀ -W ₁	-2.533*	0.011
		4.50	36.00	W ₁ -W ₂	-2.527*	0.012
		4.50	36.00	W ₂ -W ₀	-2.527*	0.012
Communication difficulty	Mild (13)	7.00	91.00	W ₀ -W ₁	-3.187**	0.001
		6.50	78.00	W ₁ -W ₂	-3.114**	0.002
		7.00	91.00	W ₂ -W ₀	-3.183**	0.001
	Moderate (13)	7.00	91.00	W ₀ -W ₁	-3.220**	0.001
		6.00	66.00	W ₁ -W ₂	-2.979**	0.003
		7.00	91.00	W ₂ -W ₀	-3.203**	0.001
	Severe (8)	4.50	36.00	W ₀ -W ₁	-2.555*	0.011
		4.50	36.00	W ₁ -W ₂	-2.585*	0.010
		4.50	36.00	W ₂ -W ₀	-2.552*	0.011
Communication environment	Mild (13)	7.00	91.00	W ₀ -W ₁	-3.210**	0.001
		5.00	45.00	W ₁ -W ₂	-2.684**	0.007
		7.00	91.00	W ₂ -W ₀	-3.190**	0.001
	Moderate (13)	7.00	91.00	W ₀ -W ₁	-3.207**	0.001
		5.00	45.00	W ₁ -W ₂	-2.719**	0.007
		7.00	91.00	W ₂ -W ₀	-3.195**	0.001
	Severe (8)	4.50	36.00	W ₀ -W ₁	-2.558*	0.011
		2.50	10.00	W ₁ -W ₂	-1.841	0.066
		4.50	36.00	W ₂ -W ₀	-2.524*	0.012
Communication interruption	Mild (13)	4.79	33.50	W ₀ -W ₁	-2.203*	0.028
		6.00	66.00	W ₁ -W ₂	-3.020**	0.003
		6.50	78.00	W ₂ -W ₀	-3.082**	0.002
	Moderate (13)	3.50	21.00	W ₀ -W ₁	-2.333*	0.020
		6.00	66.00	W ₁ -W ₂	-2.953**	0.003
		6.50	78.00	W ₂ -W ₀	-3.089**	0.002
	Severe (8)	3.33	10.00	W ₀ -W ₁	-.707	0.480
		4.00	28.00	W ₁ -W ₂	-2.414*	0.016
		4.50	36.00	W ₂ -W ₀	-2.549*	0.011
Total	Mild (13)	7.00	91.00	W ₀ -W ₁	-3.180**	0.001
		7.00	91.00	W ₁ -W ₂	-3.186**	0.001
		7.00	91.00	W ₂ -W ₀	-3.183**	0.001
	Moderate (13)	7.00	91.00	W ₀ -W ₁	-3.187**	0.001
		7.00	91.00	W ₁ -W ₂	-3.187**	0.001
		7.00	91.00	W ₂ -W ₀	-3.188**	0.001
	Severe (8)	4.50	36.00	W ₀ -W ₁	-2.530*	0.011
		4.50	36.00	W ₁ -W ₂	-2.527*	0.012
		4.50	36.00	W ₂ -W ₀	-2.524*	0.012

W₀: Before wearing a hearing aid, W₁: After 2 weeks of wearing hearing aids, W₂: After 4 weeks of wearing hearing aids. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

two and four weeks after the wearing of hearing aids ($Z = -2.953, p < 0.01$), between before and four weeks after the wearing of hearing aids ($Z = -3.089, p < 0.01$). In the severe group, there were statistically significant differences among before, two weeks, and four weeks after the wearing of hearing aids as shown in Table 8. In more detail, there were statistically significant differences between two and four weeks after the wearing of hearing aids ($Z = -2.414, p < 0.05$) and between before and four weeks after the wearing of hearing aids ($Z = -2.549, p < 0.05$). There was no statistically significant difference between before and two weeks after the wearing of hearing aids ($Z = -0.707, p > 0.05$).

DISCUSSION

The ARHLQ developed by Choi has been used as a clinical screening tool to confirm the aging related hearing loss [8]. Although the validity and reliability of the ARHLQ were verified, the ARHLQ consisted of 23 questions with four subcategories (9 questions for Communication Difficulty, 5 questions for Communication Environment, 6 questions for Emotion and Other's Reaction, and 3 questions for Communication Strategy). The total score of the ARHLQ was less than 100 points and inconvenient to use in the clinical practice of audiology. Therefore, the ARHLQ was revised to attain 100 points as the perfect score with 25 questions. Three newly developed questions replaced with the existing three questions and two newly questions were added. So, the revised age-related hearing loss questionnaire (R-ARHLQ) consisted of 25 questions in the four subcategories. Each question of the R-ARHLQ was responded on the 5 point Likert scale of ① never ② occasionally ③ about half of the time ④ frequently ⑤ always.

Therefore, this study investigated the validity and reliability of the R-ARHLQ and the effectiveness of the wearing of hearing aids with the R-ARHLQ. The construct and the criterion-related validity of the R-ARHLQ were determined by Pearson's correlation coefficients. The item, internal, and test-retest reliability of the R-ARHLQ were determined by Pearson's correlation coefficient, Cronbach's alpha coefficient, and Pearson's correlation coefficient, respectively. For measuring the effectiveness of the wearing of hearing aids with the R-ARHLQ, thirty-four participants are divided into the mild, moderate, and severe groups based on the total score of the R-ARHLQ. The total scores of the R-ARHLQ by these groups were compared among before the wearing of hearing aids, two weeks

after the wearing of hearing aids, and four weeks after the wearing of hearing aids.

The revised age-related hearing loss questionnaire

The age-related hearing loss questionnaire developed by Choi consisted of the 23 questions in four subcategories (9 questions for Communication Difficulty, 5 questions for Communication Environment, 6 questions for Emotion and Other's Reaction, and 3 questions for Communication Strategy) [8,9]. The age-related appropriateness of all questions of the ARHLQ were checked by five hearing professionals who has worked in audiology for more than 10 years after obtaining the master's degree in audiology. Three questions of the ARHLQ were found to be inappropriate because they did not reflect the characteristics of the aging related hearing loss well. The three questions are "It's harder to communicate with women and children than with men", "It is difficult to hear the pastor's sermon or the priest's lecture in church or cathedral", and "It is easy to understand words I know or familiar words, but difficult to understand words I don't know or unfamiliar words". Furthermore, the hearing professionals developed five new questions which do reflect the characteristics of the age-related hearing loss well. These newly questions are "I ask the other person to speak slowly because I felt their words were too fast", "I don't hear my name when it is called in a hospital or a public institution", "I've heard the announcement wrong on the subway or bus", "It is difficult to talk without facing the other person's face", and "I've asked other people to say it again when they speak". The final R-ARHLQ was completed and consisted of 25 questions. All the question in the R-ARHLQ is presented in the appendix 1.

The contents of the R-ARHLQ are classified by the factor analysis to confirm the subcategory. Considering the standard formation appropriateness, sphericity test, and the commonality of all questions, the four subcategories were grouped by the factor analysis. The R-ARHLQ consisted of twenty-five questions with four subcategories of Communication Attitude (CA, 10 questions), Communication Difficulty (CD, 6 questions), Communication Environment (CE, 4 questions), and Communication Interruption (CI, 5 questions). The questions 5, 8, 11, 14, 15, 16, 19, 20, 22, and 24 belong to the CA while the questions 2, 6, 9, 10, 17, and 18 fall within the CD. The questions 3, 7, 12, and 25 belong to the CE while the questions 1, 4, 13, 21, and 23 fall within the CI. These four factors explained 62.3% of the total variance since each factor explained 21.4%, 15.4%, 13.7%, and 11.7%, respectively.

The validity of the revised-aging related hearing loss questionnaire

By using Pearson's correlation coefficients, the construct validity was analyzed among the total score and the subcategory scores of the R-ARHLQ and among the subcategory scores of the R-ARHLQ. The correlation of the total score and each subcategory score was .943 for the CA score, .887 for the CD score, .737 for the CI score, and .695 for the CE, which indicate high positive correlations ($p < 0.01$). The correlation among each subcategory was .793 for the CA and the CD, .626 for the CA and the CI, .587 for the CA and the CE, .549 for the CD and the CE, .527 for the CD and the CI, and .389 for the CE and the CI, which indicate high positive correlations ($p < 0.01$ or 0.05).

By using Pearson's correlation coefficients, the criterion-related validity was investigated between the total scores of the R-ARHLQ and of the SHSE-R and among each subcategory score of the R-ARHLQ and the SHSE-R. The correlation between the total scores of the R-ARHLQ and the SHSE-R was .837, which is positively high ($p < 0.01$). The correlation among each subcategory scores of the R-ARHLQ and the SHSE-R was .737 for the CA of the R-ARHLQ and the GI of the SHSE-R, .726 for the CA of the R-ARHLQ and the DC of the SHSE-R, .654 for the CA of the R-ARHLQ and the WM of the SHSE-R, .736 for the CD of the R-ARHLQ and the GI of the SHSE-R, .668 for the CD of the R-ARHLQ and the DC of the SHSE-R, .583 for the CD of the R-ARHLQ and the WM of the SHSE-R, .774 for the CI of the R-ARHLQ and the DC of the SHSE-R, .735 for the CI of the R-ARHLQ and the WM of the SHSE-R, .663 for the CI of the R-ARHLQ and the GI of the SHSE-R, .516 for the CE of the R-ARHLQ and the GI of the SHSE-R, .492 for the CE of the R-ARHLQ and the DC of the SHSE-R, and .385 for the CE of the R-ARHLQ and the WM of the SHSE-R, which are positively high ($p < 0.01$ or 0.05).

Based on the high correlation among the total score and the subcategory scores of the R-ARHLQ, among the subcategory scores of the R-ARHLQ, between the total scores of the R-ARHLQ and of the SHSE-R, and among each subcategory score of the R-ARHLQ and the SHSE-R, the R-ARHLQ is very valid. This indicates that the R-ARHLQ can be used as a clinically useful screening tool for monitoring the aging related hearing loss.

The reliability of the revised-aging related hearing loss questionnaire

By using Pearson's correlation coefficients, each question of the R-ARHLQ was investigated between immediately after measuring the hearing threshold in pure-tone audiometry and two weeks later for test-retest reliability. The reliability of

test-retest ranged from .818 for question 19 to .987 for question 17, which is positively high ($p < 0.01$). By using Cronbach's Alpha Coefficients, the internal consistency among total and subcategory scores (CA, CD, CE, and CI) of the R-ARHLQ was .922 for the CE, .919 for the CI, .886 for the CD, and .871 for the CA, respectively. The internal consistency of the total score of the R-ARHLQ was .849, which is positively high. By using Pearson's correlation coefficients, the correlation of the R-ARHLQ was obtained between the first test and two weeks after the first test. The test-retest reliability of the R-ARHLQ was .990, which indicate positively high.

Based on the high correlations in the item reliability of each question of the R-ARHLQ, the internal consistency among total and subcategory scores (CA, CD, CE, and CI) of the R-ARHLQ, and the test-retest reliability between the first test and two weeks after the first test, the R-ARHLQ is very reliable and consistent. This indicates that the R-ARHLQ can be a clinically reliable screening tool for the aging related hearing loss.

Effectiveness of the wearing of hearing aids with the revised-aging related hearing loss questionnaire

To measure the effectiveness of the wearing of hearing aids with the R-ARHLQ, all participants were divided into mild, moderate, severe groups based on the score of the R-ARHLQ. The total score of the R-ARHLQ ranged from minimal score (0) to the maximal score (100). Low scores of the R-ARHLQ indicate less aging related hearing loss while high scores suggest more aging related hearing loss. The baseline of mild, moderate, and severe groups was determined by 33 and 67 points [16]. The mild group displays the scores less than 33 points while the moderate group exhibits the scores between 33 and 67 points and the severe group indicates the scores over 67 points. The number of the subjects in the mild, moderate, and severe groups is 13, 13, 8, respectively. The scores of the R-ARHLQ were compared among immediately after measuring the hearing threshold, and two and four weeks after wearing hearing aids.

The total score of the R-ARHLQ for the mild, moderate, and severe groups before the wearing of hearing aids was decreased at two weeks after the wearing of hearing aid, and more decreased at four weeks after the wearing of hearing aids. The total score of the R-ARHLQ for the severe groups before and after the wearing of hearing was highest compared to the scores of other groups. The total score of the R-ARHLQ for the moderate groups before and after the wearing of hearing was more than to the those of the mild group. The subcate-

gory score of the R-ARHLQ for the mild, moderate, and severe groups before and after the wearing of hearing aids followed the similar pattern as the total score. The CA, CD, CE, and CI scores of the R-ARHLQ before the wearing of hearing aids were decreased at two weeks after the wearing of hearing aid, and more decreased at four weeks after the wearing of hearing aids. The CA, CD, CE, and CI scores of the R-ARHLQ for the severe groups before and after the wearing of hearing was highest compared to the those of other groups. The CA, CD, CE, and CI scores of the R-ARHLQ for the moderate groups before and after the wearing of hearing was more than to the those of the mild group.

When the total scores of the R-ARHLQ were compared among before the wearing of hearing aids, two weeks after the wearing of hearing aids, and four weeks after the wearing of hearing aids, In the mild, moderate, and severe groups, there were significant differences among before, two weeks, and four weeks after the wearing of hearing aids. When the CA and CD scores of the R-ARHLQ were compared among before the wearing of hearing aids, two weeks after the wearing of hearing aids, and four weeks after the wearing of hearing aids, in the mild, moderate, and severe groups, there were significant differences among before, two weeks, and four weeks after the wearing of hearing aids. When the CE scores of the R-ARHLQ were compared among before the wearing of hearing aids, two weeks after the wearing of hearing aids, and four weeks after the wearing of hearing aids, in the mild and moderate groups, there were significant differences among before, two weeks, and four weeks after the wearing of hearing aids. However, in the severe group, there were statistically significant differences between before and two weeks after the wearing of hearing aids and between before and four weeks after the wearing of hearing aids. There was no statistically significant difference between two and four weeks after the wearing of hearing aids. When the CI scores of the R-ARHLQ were compared among before the wearing of hearing aids, two weeks after the wearing of hearing aids, and four weeks after the wearing of hearing aids, in the mild and moderate groups, there were significant differences among before, two weeks, and four weeks after the wearing of hearing aids. However, in the severe group, there were statistically significant differences between two and four weeks after the wearing of hearing aids and between before and four weeks after the wearing of hearing aids. There was no statistically significant difference between before and two weeks after the wearing of hearing aids.

The scores of the R-ARHLQ do reflect the degree of the aging related hearing loss well. In other words, the scores of the R-ARHLQ were changed properly depending on the degree of the aging related hearing loss. The higher the scores on the R-ARHLQ, the more severe the degree of the aging related hearing loss, but vice versa. These results indicate that the R-ARHLQ can be used to evaluate the degree of the aging related hearing loss and measure the effectiveness of the use of hearing aids by comparing the scores of the R-ARHLQ before and after the wearing of hearing aids. Therefore, the R-ARHLQ can be used as a clinically useful screening tool for evaluating the aging related hearing loss.

CONCLUSION

This study revised the ARHLQ developed by Choi (2023) because some questions in the questionnaire do not reflect the characteristics of the aging related hearing loss and the questionnaire is inconvenient to use because of the insufficient number of the questions. The ARHLQ was analyzed by five hearing professionals who has worked in audiology for more than 10 years after obtaining the master's degree in audiology. Three questions were found to be inappropriate and replaced with newly additional questions. The R-ARHLQ was completed and consisted of 25 questions. The total score of the R-ARHLQ ranged from 0 to 100 points since each question has a maximum of 4 points. After the factor analysis of the R-ARHLQ, the 25 questions of the questionnaire were classified into four subcategories (communication attitude, communication difficulty, communication environment, and communication interruption). The CA contains the questions 5, 8, 11, 14, 15, 16, 19, 20, 22, and 24 while the CD includes the questions 2, 6, 9, 10, 17, and 18. The CE contains questions 3, 7, 12, and 25 while the CI includes the questions 1, 4, 13, 21, and 23.

The validity and reliability of the R-ARHLQ was investigated with thirty-four seniors ranging from mild, moderate, and severe hearing loss depending on the total scores of the R-ARHLQ. The R-ARHLQ showed very high validity and reliability. This indicates that the R-ARHLQ does reflect the characteristics of the aging related hearing loss. Furthermore, the R-ARHLQ measured properly the effectiveness of the use of hearing aids by comparing the scores before and after the wearing of hearing aids. This suggests that the R-ARHLQ can be used as a clinically useful screening tool for the aging related hearing loss. This can be a subjective diagnosis tool to measure the effectiveness of the wearing of hearing aids for seniors needed

aural rehabilitation. The R-ARHLQ helps to find the hearing loss for seniors who do not properly recognize their low levels of hearing loss.

Despite the significance of this study, future study is necessary to overcome or supplement the limitations of this study. First, it is not proper to generalize this study due to the small number of subjects, the restricted residential area of the recruited subjects, and unbalanced number of the elderly depending on the degree of hearing loss. Second, this study conducted the questionnaire before the wearing of hearing aids, two weeks after the wearing of hearing aids, and four weeks after the wearing of hearing aids. The effectiveness of the use of hearing aids can be affected by the time of the wearing of hearing aids and the time of retest after the wearing of hearing aids. This study investigated the short-term time wearing hearing aids. However, future study is necessary to conduct a longitudinal study of 3 or 6 months after the wearing of hearing aids. Furthermore, the constructs and contents of the aging related hearing loss should be continually monitored depending on the internal and external factors affecting the aging related hearing loss.

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APPENDIX 1

The Revised Age-Related Hearing Loss Questionnaire (R-ARHLO) by Kang and Choi (2024)

※ Below are general questions about you. Please carefully read the questions in the following questionnaire and indicate whether the items accurately reflect the characteristics of age-related hearing loss.

① Never ② Occasionally ③ About half of the time ④ Frequently ⑤ Always

- | | | | | | |
|--|---|---|---|---|---|
| 1. I have trouble talking on the phone with other people. | ① | ② | ③ | ④ | ⑤ |
| 2. It is hard to participate in conversations because I can't hear well. | ① | ② | ③ | ④ | ⑤ |
| 3. It is difficult to have conversations with others in noisy places. | ① | ② | ③ | ④ | ⑤ |
| 4. My family complain that the TV sound is too loud at home. | ① | ② | ③ | ④ | ⑤ |
| 5. I sometimes feel depressed because I can't hear well. | ① | ② | ③ | ④ | ⑤ |
| 6. I understand roughly what others say because I can't hear well. | ① | ② | ③ | ④ | ⑤ |
| 7. I've misunderstood what others said. | ① | ② | ③ | ④ | ⑤ |
| 8. I've reacted inappropriately because I misunderstood what others said. | ① | ② | ③ | ④ | ⑤ |
| 9. I've been told to be slowly respond to other's questions. | ① | ② | ③ | ④ | ⑤ |
| 10. I have difficulty communicating with others in cafe or public places. | ① | ② | ③ | ④ | ⑤ |
| 11. I have difficulty talking with others on the subway or the bus. | ① | ② | ③ | ④ | ⑤ |
| 12. I have difficulty talking in the places of two or more people. | ① | ② | ③ | ④ | ⑤ |
| 13. I don't know if there are birds in the apartment or park these days. | ① | ② | ③ | ④ | ⑤ |
| 14. I can hear better when I talk to others by looking at the movement of mouth. | ① | ② | ③ | ④ | ⑤ |
| 15. People say my voice is loud when I talk to others. | ① | ② | ③ | ④ | ⑤ |
| 16. I can hear what people are saying, but it is hard to understand what others say clearly. | ① | ② | ③ | ④ | ⑤ |
| 17. People speak louder than others when they talk to me. | ① | ② | ③ | ④ | ⑤ |
| 18. I keep my ears close to others to listen better when they talk to me. | ① | ② | ③ | ④ | ⑤ |
| 19. It is difficult for me to hear a soft sound for some time. | ① | ② | ③ | ④ | ⑤ |
| 20. I feel less confident when speaking with others because of my hearing difficulties. | ① | ② | ③ | ④ | ⑤ |
| 21. I ask the other person to speak slowly because I felt their words were too fast. | ① | ② | ③ | ④ | ⑤ |
| 22. I don't hear my name when it was called in a hospital or public institution. | ① | ② | ③ | ④ | ⑤ |
| 23. I've heard the announcements wrong on the subway or bus. | ① | ② | ③ | ④ | ⑤ |
| 24. It is difficult to talk without facing the other person's face. | ① | ② | ③ | ④ | ⑤ |
| 25. I've asked other people to say it again when they speak. | ① | ② | ③ | ④ | ⑤ |

APPENDIX 2

The Revised Age-Related Hearing Loss Questionnaire (R-ARHLQ) by Kang and Choi (2024)

※ 아래는 귀하에 관한 일반적인 사항에 대한 물음입니다. 아래의 설문지의 질문을 잘 읽고 질문 문항이 노인성 난청의 특징을 잘 나타내는 지를 해당하는 곳에 √ 표시해주시기 바랍니다.

보기 ① 전혀 그렇지 않다 ② 그렇지 않다 ③ 보통이다 ④ 그렇다 ⑤ 항상 그렇다

* 질문 문항

- | | | | | | |
|---|---|---|---|---|---|
| 1. 다른 사람들과 전화 통화하는 데 어려움이 있다. | ① | ② | ③ | ④ | ⑤ |
| 2. 말소리가 잘 안 들려 대화에 참여하기가 어렵다. | ① | ② | ③ | ④ | ⑤ |
| 3. 시끄러운 곳에서 대화하는 것에 어려움이 있다. | ① | ② | ③ | ④ | ⑤ |
| 4. 집에서 TV소리가 너무 크다고 가족들이 불평을 한다. | ① | ② | ③ | ④ | ⑤ |
| 5. 말소리가 잘 안 들려서 가끔 우울감을 느낀다. | ① | ② | ③ | ④ | ⑤ |
| 6. 말소리가 잘 안 들려서 다른 사람들의 말을 대충 이해한다. | ① | ② | ③ | ④ | ⑤ |
| 7. 다른 사람의 말을 잘못 알아들은 적이 있다. | ① | ② | ③ | ④ | ⑤ |
| 8. 다른 사람의 말을 잘못 알아들어 부적절한 반응을 보인 적이 있다. | ① | ② | ③ | ④ | ⑤ |
| 9. 다른 사람의 질문에 반응이 느리다는 말을 듣는다. | ① | ② | ③ | ④ | ⑤ |
| 10. 카페나 다른 공공장소에서 다른 사람들과 의사소통 하는 데 어려움이 있다. | ① | ② | ③ | ④ | ⑤ |
| 11. 전철이나 버스 안에서 다른 사람들과 대화하는 데 어려움이 있다. | ① | ② | ③ | ④ | ⑤ |
| 12. 두 사람 이상이 있는 곳에서 대화하는 데 어려움이 있다. | ① | ② | ③ | ④ | ⑤ |
| 13. 요즘 아파트나 공원에 새가 있는지 없는지를 잘 모른다. | ① | ② | ③ | ④ | ⑤ |
| 14. 다른 사람들과 이야기할 때 입모양을 보고 대화하는 것이 더 잘 들린다. | ① | ② | ③ | ④ | ⑤ |
| 15. 다른 사람들과 말을 할 때 내 목소리가 크다고 말한다. | ① | ② | ③ | ④ | ⑤ |
| 16. 말소리는 들리는데 명료하게 무슨 말인지 이해하기가 힘들다. | ① | ② | ③ | ④ | ⑤ |
| 17. 다른 사람들이 나에게 말을 할 때 다른 사람보다 크게 말한다. | ① | ② | ③ | ④ | ⑤ |
| 18. 다른 사람들이 말을 할 때 잘 듣기 위하여 귀를 상대방에게 가깝게 한다. | ① | ② | ③ | ④ | ⑤ |
| 19. 언제부터 작은 소리가 잘 안 들린다. | ① | ② | ③ | ④ | ⑤ |
| 20. 다른 사람들과 대화를 할 때 잘 안 들려서 자신감이 떨어진다. | ① | ② | ③ | ④ | ⑤ |
| 21. 상대방의 말이 너무 빠르다고 느껴서 천천히 말해 달라고 요청한 적이 있다. | ① | ② | ③ | ④ | ⑤ |
| 22. 병원이나 공공기관에서 내 이름을 부를 때, 듣지 못한 적이 있다. | ① | ② | ③ | ④ | ⑤ |
| 23. 전철이나 버스안에서 안내방송을 잘 못들은 적이 있다. | ① | ② | ③ | ④ | ⑤ |
| 24. 상대방의 얼굴을 마주보지 않고 대화하는 데 어려움이 있다. | ① | ② | ③ | ④ | ⑤ |
| 25. 다른 사람들이 말을 할 때 다시 말해 달라고 요청한 적이 있다. | ① | ② | ③ | ④ | ⑤ |