



Evaluation of self-esteem in hearing aid and cochlear implant users

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Abstract

Purpose We investigated the relationship between hearing aid or cochlear implant use and self-esteem, quality of life, hearing quality, and speech perception.

Methods Of the 120 participants studied, 29 were cochlear implant users, 26 were hearing aid users, 33 were non-device users with hearing loss, and 32 had normal hearing. Each individual included in the study WHOQOL–BREF Quality-of-Life Scale, Rosenberg Self-Esteem and Speech, Spatial Perception and Qualities of Hearing Scale was applied.

Results We found that the self-esteem level of the group with hearing loss, but without a device, was significantly lower than that of the group with a cochlear implant/hearing aid. There was a moderately statistically significant relationship between self-esteem, quality of life, speech perception, and hearing quality.

Conclusions Using hearing aid and cochlear implants increases self-esteem among people with hearing impairments. Self-esteem is associated with quality of life, speech perception, and hearing quality.

Keywords Self-esteem · Quality of life · Hearing loss · Hearing aid · Cochlear implant

Introduction

Hearing loss and related communication problems are a problem that reduces quality of living and leads to isolation from social life. Many people perceive hearing loss as an annoying attribute or stigma. People with hearing impairments may cut off their social relationships because of the stigma. A shift in social identity and a sense of social

uncertainty may result from these behaviours and emotions [9, 21].

Hearing aids and implants can be used to compensate for hearing loss. These devices improve the communication skills of people with hearing loss and bring them closer to people with normal hearing [4].

Considering the psychological and social effects of hearing loss, we may think that the self-esteem of people with hearing loss will also be affected. People who are socially isolated because of hearing loss also have lower self-esteem [20]. Self-esteem is a concept that plays a key role in improving the quality of life. In its broadest sense, self-esteem refers to the view we have of our self-evaluation. The concept of self grows because of social interactions based on feedback received by the individual from the environment [1, 11]. It is known that the decrease in self-esteem negatively affects life [19]. People with low self-esteem easily despair, have low self-confidence, are hesitant to present ideas and express themselves, and display more psychopathological symptoms.

Self-esteem among adults with hearing loss is recognised as an important factor affecting satisfaction with hearing aids and cochlear implants [12, 15]. Low self-esteem predicts higher psychological distress for people with postlingual hearing impairment [7, 15]. There are more studies in the literature on this subject in children and adolescents.

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These studies report low self-esteem in those with hearing loss compared to children with normal hearing [2, 3, 23–25].

We have hypothesised that hearing loss damages self-esteem, and that the use of cochlear implants and hearing aids increases self-esteem. This study aims to investigate the effects of hearing loss, hearing aid (HA) use, and cochlear implant (CI) use on self-esteem in individuals with postlingual sensorineural hearing loss. Therefore, we examined the relationship between self-esteem scores, quality-of-life scores, hearing loss, hearing aid use, or cochlear implant use.

Materials and methods

Participants

The effect of hearing loss on self-esteem was examined in four groups of subjects: subjects with hearing loss using a cochlear implant (CI), subjects with hearing loss using hearing aids (HA), subjects with hearing loss not using a device, and subjects with normal hearing (NH). 32 (22 women, 10 men) individuals (mean 28.9 ± 11.4 years) with NH, 33 (12 women, 21 men) individuals (mean 54.3 ± 10.1 years) with hearing loss but not using devices, 26 (13 women, 13 men) individuals (mean 46.8 ± 17.7 years) with HA and 29 (17 women, 12 men) individuals (mean 43.5 ± 12.1 years) with CI participated in the study. G*Power software was used to calculate the sample size of the study. When the power of

the study was determined as 80% for $p < 0.05$, we found the sample size for each group to be 32 people.

Participants in the study area are between the ages of 18–65. All the device-using groups are individuals who have postlingual, sensorineural hearing loss and have been using the cochlear implant/hearing aid regularly for at least 6 months. Age, gender, hearing loss, duration of hearing loss, ear in which device/cochlear implant was used, and device/cochlear implant usage time of all groups included in the study are shown in Table 1. All procedures performed in studies involving human participants were under the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the Ethics Committee of the University of Marmara (No. 09.2018.845).

Procedures

All participants underwent a hearing test within 6 months of data collection. Hearing tests were performed using Interacoustics AC40 audiometer (Interacoustics A/S, Assens, Denmark) and TDH 39 earphones (Telephonics, Farmingdale, NY). Each individual included in the study WHOQOL–BREF Quality-of-Life Scale [8], Rosenberg Self-Esteem Scale [5] and Speech, Spatial Perception and Qualities of Hearing Scale [13, 14] was applied.

Table 1 Demographic and hearing loss-related information of the participants

	Cochlear implant users (CI)	Hearing aid users (HA)	People with hearing loss but not using devices	Normal hearing
Gender (<i>N</i>)				
Women	17	13	12	22
Men	12	13	21	10
Average age (years \pm SD)	43.5 ± 12.1 (24–65)	46.8 ± 17.7 (18–65)	54.3 ± 10.1 (31–65)	28.9 ± 11.4 (20–65)
Device usage time average (year)	6.5	9.9		
The duration of hearing loss average (year)	24.7	16.5	6.8	
Degree of hearing loss (<i>N</i>)				
Mild SNHL		5	18	
Moderate SNHL		14	13	
Severe/profound SNHL	29	7	2	
Device ear (<i>N</i>)				
Bilateral	1	8		
Unilateral	24	18		
Bimodal	4			

Data collection tools

Three different scales were used in the study. All participants filled the scales unassisted in the audiology clinic.

World Health Organization Quality-of-Life Scale-Short Form (WHOQOL-BREF)

The World Health Organization developed the comprehensive World Health Organization-Quality of Life (WHOQOL), which measures a person's well-being and allows for cross-cultural comparisons. Based on the pilot studies conducted in 15 centres in the world, WHOQOL-BREF with 26 questions selected from WHOQOL-100 with 100 questions was used. Eser et al. adapted into Turkish it [8].

Rosenberg Self-Esteem Scale (RSES)

The Rosenberg Self-Esteem Scale was developed by Morris Rosenberg in 1965 as a self-esteem measurement tool for adolescents [18]. Cuhadaroglu translated the scale into Turkish in 1985 and made it usable in Turkey by conducting validity and reliability studies for adults [5]. The lowest and highest obtainable scores are 10 and 40, respectively. High and low total scores show high and low levels of self-esteem, respectively.

Speech, Spatial Perception, and Qualities of Hearing Scale (SSQ)

William Noble and Stuart Gatehouse developed the Speech, Spatial Perception, and Qualities of Hearing Scale in England in 2004 with a study involving 153 participants. An adaptation of the scale to Turkish and validity and reliability analyses were done by Kilic [13, 14]. The scale comprises 49 questions and three subheadings: speech perception, spatial perception, and hearing quality. While answering, the person gives points between 0 and 10 for each question. In this study, the subheadings of speech perception and hearing quality were used.

Statistical analysis

IBM SPSS Statistics for Windows, Version 23.0 (International Business Machines-Statistical Package for Social Sciences, Chicago, IL) program was used for data analysis. We performed one-way ANOVA to examine significant differences between the groups regarding self-esteem and quality of life. We used Shapiro Wilk test for normality. We assessed the homogeneity of the variances according to the Levene statistics. The Bonferroni correction was applied when the variances were homogeneous in the post hoc tests, and we used the Tamhane technique when it was heterogeneous.

To determine how the self-esteem of the four groups is related to other variables; self-esteem was taken as the dependent variable, the others as the explanatory variable and modelled with a multiple linear regression model. The regression model assumed linearity, constant variance, and normal distribution. Linearity and constant variance assumptions were analyzed graphically. We observed a non-linear relation between the age variable and self-esteem (Fig. 1). For this reason, the semiparametric regression model was used with the age variable as the non-parametric variable. It added the age variable to the model with the spline function. Shapiro Wilk test was used for normality. In addition, by examining the variance increase factor, it was verified if multicollinearity existed or not.

Pearson's correlation analysis was done to examine the relationship between self-esteem varies by quality of life, quality of hearing, and perception of speech in the SSQ.

A p value of <0.05 was considered significant in all analyses.

Results

Cronbach Alpha confidence coefficient

The internal coherence of the scales used in the study was calculated with the Cronbach's alpha coefficient. For all scales, values higher than the accepted threshold of 70% were got.

Self-esteem

When we look at the descriptive statistics for self-esteem in the four groups, the highest self-esteem score belongs to those with normal hearing, while the lowest self-esteem score belongs to individuals with hearing loss who do not use a device (Table 2).

According to the results of the semiparametric regression, no significant differences were observed between the groups when the normal hearing group was taken as a reference. It

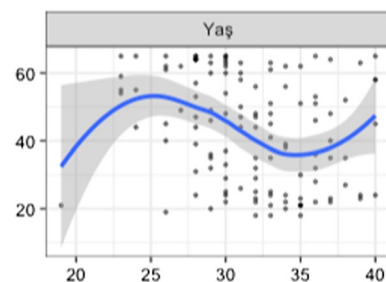


Fig. 1 Graph showing the relationship of age variable with self-esteem

Table 2 Descriptive statistics on the self-esteem variable

	<i>N</i>	Mean	Standard deviation	Minimum	Maximum
CI users	29	32.68	3.63	26	38
HA users	26	30.69	4.46	19	39
Non-device users with hearing loss	33	28.93	3.78	23	40
NH individuals	32	34.37	3.48	29	40

Table 3 Semi-parametric regression results concerning the normal hearing group

	Coefficient	Standard error	<i>t</i>	<i>p</i>
CI users	4.106421	2.870619	1.430	0.15
HA users	0.497653	1.933718	0.257	0.25
Hearing loss not using devices	-2.333984	1.631886	-1.430	0.15
Quality of life	0.105756	0.028642	3.692	<0.001*
Degree of hearing loss	-1.263268	0.579816	-2.179	0.03*
SSQ-hearing quality	-0.002122	0.012184	-0.174	0.86
Age				0.54

Dependent variable: self-esteem

 R^2 (adjusted)=0.347* $p < 0.05$ **Table 4** Semi-parametric regression results concerning the group with hearing loss

	Coefficient	Standard error	<i>t</i>	<i>p</i>
CI users	6.440405	1.868506	3.447	<0.001*
HA users	2.831637	1.033377	2.740	0.007*
NH	2.333984	1.631886	1.430	0.15
Quality of life	0.105756	0.028642	3.692	<0.001*
Degree of hearing loss	-1.263268	0.579816	-2.179	0.03*
SSQ-Hearing Quality	-0.002122	0.012184	-0.174	0.86
Age				0.54

Dependent variable: self-esteem

 R^2 (adjusted)=0.347* $p < 0.05$

has been observed that as the quality of life increases, self-esteem increases, and as the degree of hearing loss increases, self-esteem decreases. The results of the semi-parametric regression performed concerning the normal hearing group are shown in Table 3.

According to the semi-parametric regression results made concerning the group with hearing loss who did not use the device, the self-esteem level of the group using CI ($p < 0.001$) and HA ($p = 0.007$) was found to be higher. Similar to the regression results made concerning the

normal hearing group, it was observed that as the quality of life increases, self-esteem increases, and as hearing loss increases, self-esteem decreases. The results of semi-parametric regression performed concerning the group with hearing loss are shown in Table 4.

Quality of life

When we look at the descriptive statistics of the groups related to the quality of life, the highest quality-of-life score

Table 5 Descriptive statistics on quality of life

	<i>N</i>	Mean	Standard deviation	Minimum	Maximum
CI users	29	99.96	12.1	72	121
HA users	26	92.3	15.18	55	129
Non-device users with hearing loss	33	91.6	14.4	56	116
NH individuals	32	98.53	10.59	77	119

Table 6 ANOVA results of quality-of-life scores by groups

Source of variance	Sum of squares	Sd	Mean square	<i>F</i>	<i>p</i>
Between groups	1635.773	3	545.258	3.164	0.02*
Within groups	19,990.352	116	172.331		
Total	21,626.125	119			

* $p < 0.05$

is for individuals using cochlear implants, while the lowest quality-of-life score is for individuals with hearing loss but not using a device (Table 5). According to the ANOVA results, there was a significant difference between the groups in terms of quality-of-life scores, $F(3,116) = 3.164$; $p = 0.027$ (Table 6).

Hearing quality and speech perception

There is a positive, moderate and significant correlation between self-esteem, quality of life ($r=0.441$, $p<0.001$), SSQ hearing quality ($r=0.445$, $p<0.001$) and SSQ speech perception ($r=0.412$, $p<0.001$).

Discussion

In this study, the effects of hearing aid and cochlear implant use on self-esteem were investigated. In addition, the relationship between variables such as quality of life, speech perception, hearing quality, and self-esteem was investigated. We have hypothesised that hearing loss damages self-esteem, and that the use of cochlear implants and hearing aids increases self-esteem.

In our results, while the group using cochlear implants and hearing aids differed significantly from those who did not use devices in terms of self-esteem, it did not differ from those with normal hearing. This difference may be because the use of the device has a positively impact on self-esteem by improving communication skills [24]. In previous studies, adolescents using cochlear implants and a control group with normal hearing were compared, and no difference was observed in terms of self-esteem [17, 22]. Studies are reporting low self-esteem in those with hearing loss compared to children with normal hearing [2, 3, 23–25]. Likewise, studies have shown that adults with postlingual hearing loss have lower self-esteem [7, 15]. Individuals who do not have severe hearing loss or who use CI have similar self-esteem to the general population [16]. This is because people often catch up with normal hearing persons with cochlear implant surgery followed by intensive auditory training. People move closer to normal with a properly adjusted hearing aid and auditory training based on the type, degree, and configuration of the person's hearing loss. For this reason, it has been observed that the use of hearing aids/cochlear implants in individuals with hearing loss may be a factor contributing to the increase in self-esteem.

In the semi-parametric regression results made concerning the normal hearing group, when the age variable was added to the model, we found no significant difference between the normal hearing group and the hearing loss group. This is thought to be because of the high number of individuals with mild hearing loss and the low number of individuals with severe hearing loss in our group with hearing loss. This is the limitations of our study. Individuals with mild hearing loss can continue their lives without using a hearing aid, as their communication skills in daily life are not affected much, unlike those with severe hearing loss. The results of the regression analysis showed that the more the level of hearing loss increased, the lower the

self-esteem. As hearing loss increases, people's communication skills will be affected more and the difficulties they encounter in social life will increase, so their psychological and social influence also increases, and therefore, their self-esteem levels are also affected.

When the quality-of-life evaluation results of the groups was examined, we saw that the lowest quality-of-life score belonged to the group with hearing loss but not using a device. We observed that the highest quality-of-life score belonged to CI users. It is known that hearing loss has negative effects on the quality of life and the use of CI increases the quality of life [6, 10]. It was observed that the average quality-of-life scores of the hearing aid users and the hearing loss group were close to each other. This may be because the HA users in the study had a long period of hearing loss, although the duration of hearing aid use was short.

In the correlation results between the quality-of-life results and self-esteem, it was observed that as the quality of life increased, self-esteem increased. When looking at descriptive statistics of self-esteem and quality of life, we found the lowest score in the group that does not use a device. This shows that the drop in self-esteem and quality of life observed in the group that does not use the device is associated with hearing loss. Therefore, self-esteem and quality of life should be evaluated independently of each other.

A positive, moderate, significant relationship was found when the relationship between self-esteem, speech perception, and hearing quality was examined. There is no study looking at the relationship between self-esteem, speech perception, and hearing quality. Due to hearing loss, we expect speech perception and hearing quality to decrease. Speech perception and hearing quality are related to communication and affect self-esteem.

The limitation of the study may be the small number of participants. The relationship between self-esteem and hearing loss can be investigated in a larger sample group. The group with hearing loss but not using a device is not evenly distributed in terms of hearing loss degrees. In this respect, a re-evaluation can be made on a homogeneously distributed group.

Conclusions

We have demonstrated that device use (HA/CI) has a positively affects on self-esteem and quality of life. In addition, the relationship between self-esteem, quality of life, speech perception and hearing quality shows that besides factors, such as satisfaction and quality of life, which are frequently evaluated after device use, psychological factors should also be considered. Therefore, we suggested that the use of a hearing aid or cochlear implant can positively affect the psychological and sociologic status of individuals with hearing loss.

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Declarations

Conflict of interest The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the Ethics Committee of the University of X (No. 09.2018.845).

Consent to participate Informed consent was obtained from all individual participants included in the study.

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