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The body image in hearing aid and cochlear implant users in Turkey

Seda Ozturk[1] · **Ayça A. Çiprut**[1]

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Abstract

Purpose We investigated the relationship between hearing aid or cochlear implants usage and body image, and quality of life.
Methods Of the 96 participants studied, 26 were cochlear implant users, 20 hearing aid users, 20 non-device users with hearing loss, and 30 normal hearing. The inclusion criteria for the study for all groups were subjects 18 years or older with no other physical complaints. The average age of groups and gender distributions were similar. The Body Image Scale (BIS) and World Health Organization Quality of Life Scale were applied to all participants, whereas the International Outcome Inventory for Hearing Aids, Turkish Version, was applied only to device users.
Results A significant difference in body image scores was identified between non device users with hearing loss group and normal hearing group, device users group (HA/CI), and cochlear implant users group. In contrast, no significant difference in body image scores between normal hearing group and the device users group was identified. Finally, a positive correlation between body image scores and quality of life scores in all groups was identified.
Conclusions Non-device users with hearing loss have a lower body image and quality of life than those in the other groups, and device usage has a positive effect on body image and quality of life.

Keywords Body image · Cochlear implant · Hearing aid · Quality of life · Hearing loss

Introduction

Body image was defined as "a multidimensional structure encompassing the attitudes of a person's physical appearance", "it's about our body how it looks to us in our mind" in 1920 by Schilder for the first time. He was interested in its effect on the relationship of individuals with others [14, 32]. Following studies of Schilder, body image has been a concept that was defined and investigated further by others. Pruzinsky and Cash described body dissatisfaction as "negative feelings and thoughts about their own body" in 1990. Similarly, Fisher described it as "negative perception, thoughts, and feelings of a person about their own body" [31].

As known, dissatisfaction with the body or negative body image damages the quality of life [12]. Individuals who have a negative body image have negative thoughts and feelings about their own body this situation negatively affect the self-esteem of individuals. However, individuals who have a low level of self-esteem do not recognize body needs and are not better physically, psychologically [9]. Otherwise, individuals who have a positive body image are physically and psychologically healthy. Moreover, a positive body image also increases self-esteem (how a person feels about own self). A high level of self-esteem indicates that the person's daily life, happiness, and welfare increase [4, 33]. Recent studies have shown that individuals with hearing loss have low self-esteem, although those using cochlear implants (CI) have had self-esteem levels similar to those with normal hearing [30]. However, no detailed study exists to date on the relationship between hearing loss or hearing aid usage and body image, which is known to be highly influential on self-esteem.

The aim of this study is to investigate the effect of hearing loss, hearing aid (HA) use, and cochlear implant (CI) use on the body image in individuals with sensorineural hearing loss. For this reason, we have examined the relationship between body image scores, quality of life scores, speech recognition scores, and hearing loss, hearing aid use, or cochlear implant use.

✉ Seda Ozturk
seda.ozturk@bilgi.edu.tr

[1] Department of Audiology and Speech Disorders, Audiology and Speech Disorders Department, Marmara University, Istanbul, Turkey

Methods

The effect of hearing loss on body image was examined on four groups of subjects: subjects with hearing loss using CI (group 1), subjects with hearing loss using hearing aids (group 2), subjects with hearing loss not using a device (group 3) and subjects with normal hearing (group 4). G *Power software was used to calculate the sample size of the study. When the power of the study was determined as 80% for $P < 0.05$, the sample size for each group was found to be 20 people.

The inclusion criteria for the study were: (1) for all groups, being 18 years or older with no other physical complaints; (2) for group 1, bilateral severe or profound sensorineural hearing loss and the use of CI for at least 1 year; (3) for group 2, bilateral mild-to-moderate sensorineural hearing loss and the use of the HAs for at least 1 year; and (4) for group 3, bilateral mild-to-moderate sensorineural hearing loss for at least 1 year and non-device use. There are 26 participants in group 1, 20 participants in group 2, 20 participants in group 3, and 30 participants in group 4. All groups were matched in terms of age and gender. Speech recognition scores in groups 1 and 2 were measured with the devices at their daily settings. The demographic data of the participants are shown in Table 1.

Data collection tools

All study participants were assessed with the Demographic Information Form, Body Image Scale (BIS), and World Health Organization Quality of Life Scale (WHOQoL-BREF). Moreover, groups 1 and 2 were assessed with the Hearing Instrument Evaluation Inventory [International Outcome Inventory Hearing Aids—Turkish Version (IOI-HA-TR)] and Speech perception was evaluated in aided condition for groups 1 and 2. All participants filled the scales unassisted in the audiology clinic.

Aided speech recognition test was conducted with a monitored live voice at 65 dB HL in a sound-treated test booth at a 0° angle in the free field. We used a phonemically balanced Turkish word list of 25 monosyllabic words [2]. Speech recognition scores were calculated by counting the number of correctly repeated words.

Table 1 Demographic data of participants

	Cochlear implant users (group 1)	Hearing aid users (group 2)	No device users with hearing loss (group 3)	Normal hearing (group 4)
Sex (*N*)				
Female	12	10	12	15
Male	14	10	8	15
Mean age (years)	31.3	37.8	56.8	34
Mean duration of device use (months)	93.42	117.1		
Onset period of hearing loss (*N*)				
Pre-lingual	12	4		
Post-lingual	14	16	20	
Level of education (*N*)				
Primary–secondary school	10	6	11	3
High school	10	7	3	7
Higher education	6	7	6	20
Level of hearing loss (*N*)				
Mild SNHL		7	14	
Moderate SNHL		11	5	
Severe/profound SNHL	26	2	1	
Ear with device (*N*)				
Right ear	17	5		
Left ear	9			
Both ears		15		
Type of hearing aid (*N*)				
Behind-the-ear (BTE, RIC[a])		14		
In-the-ear (CIC[b])		6		

[a]*RIC* Receiver in the canal

[b]*CIC* Completely in canal

Hearing aid assessment inventory (IOI-HA-TR)

The International Outcome Inventory for Hearing Aids (IOI-HA) was developed in a workshop by audiologists from various countries for use in audiological rehabilitation planning of hearing aid users [8]. It is used for the assessment of the hearing aid satisfaction of hearing aid users.

The Turkish version of the inventory validity and reliability was adapted by Şerbetçioğlu et al. in 2009. In the seven-question scale, participants are asked to answer each question on a scale of 1 (worst) to 5 (best). The maximum achievable score is 35. High and low total scores indicate high and low levels of hearing aid satisfaction, respectively [28].

Body image scale

The BIS, originally named Body Cathexis Scale, was developed by Secard and Jourard (1953) and adapted into Turkish by Hovardaoğlu [15], who performed the reliability and validity study of the Turkish version of the scale. The BIS comprises 40 items and evaluates how content people are with the parts and functions of their bodies, another word that body image.

BIS is a Likert-type scale in which each question is scored between 1 and 5 (5 = very much appreciate it, 4 = appreciate it, 3 = indecisive, 2 = do not appreciate it very much, 1 = do not like it). The lowest and highest obtainable scores are 40 and 200, respectively. High and low total scores indicate high and low levels of body image, respectively [15].

WHOQoL-BREF (TR)

WHOQoL-BREF, developed by the World Health Organization, evaluates the quality of life of a person. The WHOQoL-BREF that bases the WHOQoL-100, which comprises 100 questions is an abbreviated version and includes 27 questions.

The Turkish version of WHOQoL-BREF validity and reliability was adapted by Eser et al. in 1999. The results obtained in participants were mailed to the WHOQoL Center in Turkey. Calculated and sent by the center high and low total scores indicate better and low quality of life, respectively [11].

Results

The descriptive statistical results associated with BIS variables of individuals in all groups are shown in Table 2. The highest body image score was in group 1 (CI users), whereas the lowest score was in group 3 (Non-device users with hearing loss). One-way ANOVA analysis was done to determine significant differences in BIS scores among the groups. Shapiro–Wilk analysis was confirmed the normal distribution of the data for each group ($P > 0.05$). The variances were homogeneous to Levene's test for a one-way ANOVA (Levene's test = 1.07; $P > 0.05$). A significant difference among the groups was identified with regard to BIS scores ($F[3.92] = 4.15$; $P < 0.05$; Table 2). A Scheffe test revealed that significant differences in BIS scores between group 1 (CI users) and group 3 (non-device users with hearing loss) and also group 3 (non-device users with hearing loss) and group 4 (normal hearing). Group 1 and group 4 had significantly better BIS scores than group 3.

Then, the respondents in group 1 and group 2 (HA users) were gathered and assessed in one group as individuals using devices (group CI/HA). As a result, a significant relationship was identified between the BIS scores of group CI/HA, group 3, and group 4. The highest BIS score was found in group 4, whereas the lowest BIS score was in group 3 (Table 2). One-way ANOVA analysis was performed to determine whether the BIS scores differed significantly among the groups. Firstly, a Shapiro–Wilk analysis was confirmed the normal distribution of the data ($P > 0.05$). The variances were homogeneous to Levene's test for a one-way ANOVA (Levene's test = 0.37; $P > 0.05$). The ANOVA results indicated a significant difference between the groups concerning BIS scores ($F[2.93] = 5.70$, $P < 0.05$). The Scheffe test was used for this resultant difference was seen to determine relating which groups the BIS scores. Results showed a significant difference between group CI/HA and group 3 and also between group 3 and group 4. Group CI/

Table 2 Descriptive statistics related to BIS variable

	N	Mean	Standard deviation	Minimum	Maximum
Device users (group CI/HA)	46	154.96	24.45	109	200
Cochlear implant users (group 1)	26	157.81	23.32	110	200
Hearing aid users (group 2)	20	151.25	25.98	109	200
Non-device users with hearing loss (group 3)	20	137	17.83	104	166
Healthy individuals (group 4)	30	155.93	19.14	119	192

HA and group 4 had significantly better BIS scores than group 3.

A Pearson correlation analysis was used to determine the relationship between body image, device satisfaction, quality of life, speech recognition, and duration of device use in the all groups.

A significant relationship exists between BIS and quality of life scores ($r=0.44$; $P=0.02$; $P<0.05$) and also between the duration of device use and speech recognition scores for group 1 ($r=0.42$; $P=0.03$; $P<0.05$); these relationships were positive and moderate (Table 3). In addition, the results revealed a positive, moderate, and significant relationship between body image and quality of life for group 2 ($r=0.46$; $P=0.04$; $P<0.05$) (Table 4).

A Pearson correlation analysis revealed a significant positive and moderate relationship between BIS and quality of life scores in group 3 ($r=0.56$; $P=0.01$; $P<0.05$) and group 4 ($r=0.64$; $P=0.00$; $P<0.05$). Quality of life scores increase as the BIS scores increase in group 3 and group 4.

In addition, the quality of life scale has four subscales and Pearson correlation analysis revealed a positive, moderate, and significant relationship between BIS and all subscales

Table 3 Correlation table for individuals in group 1 (CI users)

	Body image	Device satisfaction	Quality of life	Speech recognition	Duration of device use
Body image					
Pearson	1.00	0.13	0.44(*)	− 0.10	− 0.10
P		0.53	0.02	0.61	0.63
Device satisfaction					
Pearson	0.13	1.00	0.26	0.33	− 0.01
P	0.53		0.20	0.10	0.95
Quality of life					
Pearson	0.44(*)	0.26	1.00	0.04	− 0.16
P	0.02	0.20		0.86	0.44
Speech recognition					
Pearson	− 0.10	0.33	0.04	1.00	0.420(*)
P	0.61	0.10	0.86		0.03
Duration of device use					
Pearson	− 0.10	−0.01	− 0.16	0.420(*)	1.00
P	0.63	0.95	0.44	0.03	

*$P<0.05$

Table 4 Correlation table for individuals in group 2 (HA users)

	Body image	Device satisfaction	Quality of life	Speech recognition	Duration of device use
Body image					
Pearson	1.00	0.07	0.46(*)	− 0.06	0.20
P		0.76	0.04	0.80	0.40
Device satisfaction					
Pearson	0.07	1.00	0.42	− 0.03	0.10
P	0.76		0.07	0.91	0.69
Quality of life					
Pearson	0.46(*)	0.42	1.00	0.07	0.06
P	0.04	0.07		0.77	0.80
Speech recognition					
Pearson	− 0.06	− 0.03	0.07	1.00	0.21
P	0.80	0.91	0.77		0.39
Duration of device use					
Pearson	0.20	0.10	0.06	0.21	1.00
P	0.40	0.69	0.80	0.39	

*$P<0.05$

of quality of life for all groups. Subscales and its results are: physical area ($r=0.42$; $P=0.00$; $P<0.05$), social area ($r=0.24$; $P=0.01$; $P<0.05$), environmental area ($r=0.37$; $P=0.00$; $P<0.05$) and mental area ($r=0.38$; $P=0.00$; $P<0.05$).

Impact of gender on BIS score was examined for each group. The highest BIS score was observed in male participants in group 1, whereas the lowest was in males in group 3. The descriptive statistics associated with the BIS variable and genders for each group are shown in Table 5. Two-way ANOVA analysis was used to determine whether the BIS scores differed significantly in association with the effects of gender. First, a Shapiro–Wilk analysis was confirmed the normal distribution of the data ($P>0.05$). The variances were homogeneous to Levene's test for a two-way ANOVA (Levene's test = 0.54; $P>0.05$). Neither the effect of gender on BIS scores was significant (F [3.88] = 0.29; $P>0.05$) nor were BIS scores with regard to gender (F [1.88] = 0.16, $P>005$).

Impact of educational level on body image was examined for each group. The highest BIS score was observed in primary–secondary school graduates in group 1, whereas the lowest scores were in high school graduates in group 3. The descriptive statistical results associated with the BIS score and education level for each group are shown in Table 6. Two-way ANOVA analysis was used to determine significant differences in the BIS scores. First, a Shapiro–Wilk analysis was confirmed the normal distribution of the data ($P>0.05$). The variances were homogeneous to Levene's test for a two-way ANOVA (Levene's test = 0.34; $P>005$). Level of education on BIS scores was not significant (F [6.84] = 1.41, $P>0.05$). There was no difference in BIS scores with regard to level of education (F [2.84] = 0.18, $P>0.05$).

Table 5 Descriptive statistics related to BIS variable

Group	Sex	Mean	Standard deviation	*N*
Cochlear implant (group 1)	Male	161.93	25.07	14
	Female	153.00	21.11	12
Hearing aid users (group 2)	Male	151.50	23.14	10
	Female	151.00	29.82	10
Non-device users with hearing loss (group 3)	Male	136.25	20.95	8
	Female	137.50	16.40	12
Normal hearing (group 4)	Male	155.53	18.16	15
	Female	156.33	20.71	15

Discussion

A decrease in one's body image perception is known to harm the quality of life as well as it is causing a lack of self-reliance, alcoholism, increasing the likelihood of extreme exercise, and eating disorders [3, 5]. Individuals with hearing loss have difficulty in understanding and following conversations which can decrease their quality of life. Moreover, they have got low self-esteem, which is associated with low body image [24, 29]. We know that many of the stated problems associated with hearing loss can be eliminated with the use of recent technologies at the right time [22].

We investigated a detailed study of the effects of technologies (such as CI and HA use) that eliminate hearing loss problems, to a large extent, on the individual's body image. Among the four groups studied, the highest BIS score was reported in group 1 (CI users), whereas the lowest score was in group 3 (non-device users with hearing loss). The significant difference between group 3 (non-device users with hearing loss) and group 4 (normal hearing) indicated that hearing loss harms body image.

In addition, it should be noted that a similar statistically significant difference was identified between group 1 (CI

Table 6 Descriptive statistics related to BIS variable

Group	Education	Mean	Standard deviation	*N*
Cochlear implant (group 1)	Primary–secondary school	162.90	27.31	10
	High school	161.60	19.39	10
	Higher education	143.00	18.86	6
Hearing aid (group 2)	Primary–secondary school	143.83	21.43	6
	High school	146.00	29.18	7
	Higher education	162.86	25.67	7
Non-device users with hearing loss (group 3)	Primary–secondary school	138.27	17.73	11
	High school	135.67	18.15	3
	Higher education	135.33	20.95	6
Normal hearing (group 4)	Primary–secondary school	141.00	10.82	3
	High school	155.43	19.17	7
	Higher education	158.35	19.74	20

users) and group 3 (non-device users with hearing loss), and also between the device usage group (CI/HA) and group 3 (non-device users with hearing loss). This result shows that has been a positive impact on the body image of the device's usage. Moreover, results show that the device user's group and group 4 (normal hearing) have a similar body image score. These results mean that usage of a hearing aid or a cochlear implant has positively impacted body image. Furthermore, device's (HA or CI) usage for individuals with hearing loss may prevent possible negative effects on the psychological and sociologic that may develop owing to negative body image. This result supports the study mentioned about the positive impact of hearing aid use by Lott et al. [17].

Conversely, a study on this shows a different result in our study. This study is about the relationship between social phobia, anxiety, body image, and paranoid thought and reported that hearing aid users have a negative body image than normal-hearing individuals [10]. The study mentioned did not explain the inclusion and exclusion criteria of the participants; however, body image is impacted by culture, gender, media influence, age, social status, ethnicity, etc. Studies show that different social groups have different perceptions of body image, such as gender and age. In addition, an individual's beliefs and self-esteem also are reported to influence body image. For example, women and adolescents have had a lower body image than men and adults, respectively [6, 14, 21]. Thereby if you want to investigate the impact of hearing aid/cochlear implant usage or hearing loss on body image, you must attend to the features of participants in the group.

For this reason, our study was attentive to the fact that the gender and education levels of the participants were similar. In addition, we showed that gender and education levels in the studies group did not affect body image by statistical. Therefore, we can say that the significant difference in the groups' BIS scores is related to hearing loss and device use (HA and CI). On the other side, a study by Hovardaoğlu [15] on healthy individuals demonstrated that women had a lower body image score than men. Their finding that sex influence is not a resultant may be related to the number of participants. Another substantial issue is the impact of culture on body image. Both the lack of similar studies in Turkey and other cultures limits interpretation about differences in results.

This study includes participants with all degrees of sensorineural hearing loss. However, we did not aim to examine the relationship between the degree of hearing loss and body image. We aimed to investigate how the body image of all participants was affected when they used devices suited for their hearing loss. For this reason, this study has included users of devices suitable for their hearing loss. In addition, group 3 (non-device users with hearing loss) consists of frequently individuals with mild sensorineural hearing loss, and this group's participants have not used a suitable device for their hearing loss. We have observed statistically that the body image of this group were worse than the individuals with normal hearing. On the other, body image scores of individuals using HA or CI users have observed no like this decrease. This showed the positive effect of HA or CI use for individuals with hearing loss. Therefore, we can say that the use of a suitable device positively affects the body image of individuals regardless of the degree of hearing loss. This result supports Nordvik et al.'s study of can eliminate the negative effects of hearing loss with the use of suitable devices and at the right time intervention [22]. To understand the relationship between the degree of hearing loss and body image it would be good to conduct structured other studies focusing on this variable.

Self-esteem refers to self-confidence that a person has for themselves and the level of self-acceptance [25]. Many studies have reported a significant relationship between body image and self-esteem, that is to say, improvement in the perception of body image can have a positive effect on self-esteem [13, 23]. In addition, a study with children said that children with hearing loss needed more effort into increasing their self-esteem than the normal-hearing children and they could have a similar level of self-esteem via special education [30]. Besides, a study of the self-esteem of CI users and normal-hearing participants has demonstrated no significant difference in self-esteem between the two groups [27]. These support our study's results about device usage's positive impact on body image or hearing loss has a negative impact on body image. Consequently, this significant relationship between self-esteem and body image emphasized the importance of our study on the relationship between body image, hearing loss, and the use of devices.

Some variables to be maybe related to the body image of individuals with hearing loss also were investigated in our study, including quality of life, satisfaction with hearing aid use, duration of device use, and speech recognition score with a device (HA/CI). An important finding is, concurring with previous studies, this study has shown that was obtained a linear and significant relationship between body image and quality of life. It was identified to be a significant relationship between quality of life subscales (physical area, social area, environmental area, and mental area) and body image for all participants. Many studies examining the relationship between quality of life and device usage show that usage of hearing aid or cochlear implants have a positive effect on the quality of life. There was said a decrease in quality of life scores of non-device users with hearing loss [7, 18, 20]. On the other side, quality of life is known to be influenced by body image. Studies examining the relationship between body image and quality of life show that a positive body image is effective in improving quality of life,

whereas a negative body image caused a low quality of life [19, 21]. These results have supported the effect of device usage or hearing loss on both body image and the quality of life.

No studies have analyzed the relationship between the other variables in the study (speech recognition score with a device, device satisfaction, and duration of device use) and body image. We believe that all these variables are related to body image, although this study found no significant relationship between body image and speech recognition score, device satisfaction, or duration of device use. Because was known to the relationship between quality of life and body image, satisfaction with device usage, speech recognition score, duration of device users [1, 16, 26]. On the other hand, this study shows a significant relationship between the duration of device use and speech recognition for group 1(CI users) but no significant relationship between other variables was found. This was thought to be related to the fact that the study was structured based on body image.

The limitation of the study may be that all the participants included in the study were adults with hearing loss but the body image may be more affected in adolescents. The effect of hearing loss, device use, and body image can be investigated in the younger age groups.

In conclusion, this study showed a positive effect on body image of device usage (CI or HA), and individuals of non-device users of hearing loss have a negative body image than device users or normal-hearing individuals. 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. In addition, the significant and linear relationship between quality of life and body image shows that body image is also a variable in the effects of hearing loss.

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