



SATISFACTION WITH THE USE OF HEARING AIDS IN EVERYDAY LIFE IN BOSNIA AND HERZEGOVINA

Original scientific paper

Esad H. Mahmutovic¹, Husnija Hasanbegovic², Marinko Tomic³

¹Center for Education and Rehabilitation of DHH Students Tuzla, Bosnia and Herzegovina

²University of Tuzla, Department of Education and Rehabilitation, Bosnia and Herzegovina

³Third elementary School, Brcko, Bosnia and Herzegovina

Received: 2023/06/05

Accepted: 2023/08/18

ABSTRACT

The aim of this work was to investigate the qualitative characteristics of hearing aid users (satisfaction with the use of hearing aids in everyday life) and to determine if there are any differences compared to published research in the literature. The sample of respondents consisted of 50 users of hearing aids, aged from 20 to 88 years. The sample was chosen by random selection from a previously selected sample of 398 hearing aid users. A special questionnaire was constructed for the research. The first part of the questionnaire consisted of variables: gender, age, type of hearing impairment, percentage of hearing loss, degree of hearing impairment, time of hearing aid use, and brand of hearing aid. The second part consisted of variables for the assessment of satisfaction with the use of hearing aids, that is, 15 statements to which respondents had to express their views on satisfaction with the use of hearing aids. This part of the questionnaire was carried out by surveying. The results showed that the majority of hearing aid users wear the hearing aid regularly, they benefit significantly from the hearing aid and it helps them in communication. They have no significant problems when using and handling the hearing aid. The variables gender, age, and time of hearing aid use had no statistically significant correlations with the applied set of variables (claims). Attitudes of hearing aid users can be an important factor in determining benefit and satisfaction with hearing aids.

Keywords: *hearing aid, hearing aid users, usefulness and satisfaction with hearing aid*

INTRODUCTION

Research in the literature indicates that hearing-impaired people who use hearing aids are not equally satisfied with hearing aids in their everyday life. There are various factors that affect the individual response, the hearing loss, and the benefit of the hearing aid itself. The subject of this research is the subjective assessment of the use of hearing aids in people with hearing loss in Bosnia and Herzegovina. This country is a geographically

multicultural area in a monolingual community so that the respondents meet the criterion of validity of the measuring instrument - problem questions in the daily use of the hearing aid. The use of a hearing aid creates a very colorful array of disturbances for the users, and in particular, it causes disturbances to communication. The consequences that hearing impairments leave on the individual are also different and specific in psychological and social characteristics, so it can be said that people with

Correspondence to: Esad H. Mahmutovic, Center for Education and Rehabilitation of DHH Students Tuzla, Bosnia and Herzegovina
Email: esad25@yahoo.com

hearing impairments differ from hearing people in terms of their psychological, mental, and social characteristics due to the consequences of hearing impairments that have a negative impact and on cognitive and emotional development. The time we are in, with the rapid development of information technology, requires a wide range of knowledge and abilities. Decreased hearing ability prevents or inhibits the development of intonation, rhythmic and accentual speech, which are established exclusively by auditory control. Without adequate listening, there is no harmonious, melodious speech, i.e. real social speech that would enable a hearing-impaired person to integrate through spoken communication, and thus education and work in a normal hearing environment. The most common disturbance in people with hearing impairment is the inability to follow a conversation when several people are speaking at the same time and listening with background noise, which is a completely different situation from the one in which the hearing condition is tested audiometrically when determining a hearing aid. Hearing aids are an irreplaceable aid to people with hearing loss. Many people have to wear a hearing aid. The research is motivated by the need to look at the benefits as well as the hindrances that hearing aids provide to such people. It is not enough just to get a hearing aid. To use this aid optimally, it is necessary to relearn to listen, follow the conversation, and understand the spoken message. In all people, there is a connection between audibility and speech intelligibility. When speaking in normal, continuous speech that is familiar to the listener, despite reduced audibility, very good speech intelligibility is achieved. Whereas, during speech that is unknown to the listener, despite good audibility, we get worse intelligibility. Audibility is also better when listening to speech in silence than in a noisy environment, which also affects the reduced intelligibility of speech. In a noisy environment, if the noise is louder than the hearing threshold, it can affect the actual limit to be determined by the noise, and not by the hearing loss. Then the hearing threshold is masked. If the audibility in a quiet environment is 40%, most listeners will manage very well, while with a hearing-impaired person, for example at a party, the audibility can drop to 15-20% due to noise and hearing loss. In this case, speech intelligibility may fall below 50%, so the hearing impaired person has to guess what was said or disconnect from the communication. Intelligibility is very important for hearing-impaired people, which is individual and varies from person to person. Two hearing-impaired people, with similar audiograms, can have completely different

device settings because they do not have the same cognitive abilities. That is why it is necessary to adjust the device according to the user with the aim of achieving the best intelligibility results. Daily maintenance and regular servicing of the hearing aid is necessary for the proper functioning of the hearing aid. Proper maintenance of the hearing aid, as well as regular personal hygiene, are prerequisites for the good functioning of the hearing aid and its service life.

Hearing aids enable better listening quality and thus improve the quality of life of hearing impaired people. Tsakiropoulou et al. (2007) in the study *Hearing aids: Quality of life and socio-economic aspects* indicate that the average first-time hearing aid wearer is close to 65 years. Social isolation and inability to follow conversations are much more common among hearing-impaired adults aged 50 years. The impact of hearing aid use on quality of life also depends on age. Adibi et al. (2013) investigated the quality of life in adolescents and determined that there was no significant relation between the duration of hearing aid use and the improvement in the quality of life. Hearing aids were beneficial for hearing loss students regardless of the duration of the hearing aid usage based on their questionnaires score. Gallagher and Woodside (2018), in their qualitative study, chose three groups of elderly people with hearing loss: regular users of hearing aids; irregular users of hearing aids, and nonowners of hearing aids. Their criterion for the sample was 50 years of age, except for one subject who is 47 years old, but was included in the sample because of his rich experience in using hearing aids, as stated by these authors. Participants who were willing to speak about their hearing loss were contacted via telephone and asked about their hearing loss and hearing aid use to determine if they were suitable for the study, and if so, a suitable time and date was arranged for the interview. They also answered questions related to satisfaction in using the hearing aid. The results of their research indicate that age, severity of hearing loss, and length of time of owning a hearing aid were key factors in the adoption and use of hearing aids. Similar themes emerged from the qualitative analysis regarding the use of hearing aids (complexity of poor hearing aid use and attitudes toward hearing aids) despite the participants they are classified according to different degrees of use of hearing aids (regular, irregular, and nonowners). All groups reported similar benefits and challenges of hearing aids, but self-reported hearing difficulties loss appears to be a major determinant of hearing adoption and use of aids.

Zafar et al. (2020) researched the usefulness and quality of life of hearing aid users on a sample of 50 participants of both sexes who were recommended to use a hearing aid. They used a questionnaire for hearing aids to collect data, which has separate items such as daily use, benefit, residual activity limitations, satisfaction, etc. The minimum and maximum age of participants were 31 and 83 years respectively. The mean age of participants was 64.10+15.88 years. Among which 25 (50%) were males and 25 (50%) were females. These authors concluded that hearing aids have a greater impact on the quality of life and socio-economic aspects of hearing impaired people than expected. This manifests itself in communication problems, but it also affects their health, independence and quality of life in their daily routine. In our research, we did not focus on a specific age, we took a wide range of respondents' ages from 20 to 80 years old to be able to draw some general conclusion. One of our research goals is to identify problems in the use of a hearing aid, which is why we made a literature review that describes similar problems. "Uncorrected hearing loss represents an auditory disability involving reduced speech recognition ability, especially in difficult environments, and reduced ability to detect, identify and localize sounds. This affects the lives of both the hearing-impaired person and significant others. The hearing-impaired person is not always aware of all the consequences. Uncorrected hearing loss gives rise to a poorer quality of life, related to isolation, reduced social activity, a feeling of being excluded, and increased symptoms of depression" (Arlinger, 2003, p. 2S20). "The treatment of choice for auditory disability is usually a hearing aid" (Cox & Alexander, 1995, p. 182). „Hearing aids aim to reduce auditory impairment and so minimize activity limitations and participation restrictions" (Kengmana, 2015, p. 15). A hearing aid can enable a hearing impaired person to hear sound in the most effective way. „Performance with hearing aids and the benefit obtained from using them vary widely across users" (Lopez-Poveda et al., 2017, p. 1). "Thinking in terms of a journey related to amplification, one can discern a few crucial junctures. The first is the decision to seek help (*help seeking*). The next step is the decision to acquire a hearing aid (*uptake*). The third is a patient's decision to continue to use an acquired hearing aid, and finally, there is the issue of *satisfaction* with the hearing aid. These four variables (i.e., help seeking, hearing aid uptake, hearing aid use, and satisfaction) may be considered as key elements in a journey" (Knudsen et al., 2010, p. 128).

"Satisfaction and its measurement are important for public policy analysts, healthcare managers, practitioners and users. Despite problems with establishing a tangible definition of "satisfaction" and difficulties with its measurement, the concept continues to be widely used" (Crow et al., 2002). "Satisfaction is commonly described as a pleasurable emotional experience, as an outcome of product performance evaluation against expectations" (Wong, Hickson, & McPherson, 2003, p. 118). Therefore, the pleasant experiences resulting from the evaluation of the performance of the hearing aid represent satisfaction with the hearing aid. Users of hearing aid notice and intervene in case of certain inconveniences during amplification. They can recognize the best performance of the hearing aid. Their views on this are an important factor in determining satisfaction with hearing aids. "The process of selecting and fitting hearing aid devices is only effective and only bring about good outcomes if the individual makes effective use of the device. Therefore, the individuals need to be happy with the outcome" (Aurélio, et al., 2012, p. 69). "As we move towards consumer-driven healthcare, the client's point of view is becoming increasingly accepted as a valid and important indicator of the success of treatment" (Cox, 2003, p. S90). "Monitoring patient satisfaction levels and their perceptions while wearing hearing aids is an important step in the assessment of clinical procedures and care quality goals of health services" (D. P. Silva, V. B. Silva, & Aurélio, 2013, p. 539). "Knowledge of the factors related to hearing aid satisfaction is clinically useful to improve client satisfaction" (Kengmana, 2015, p. 10). In the literature, overall hearing aid satisfaction has consistently been related to the dimensions of cost, appearance, acoustic benefit, comfort, and service (Cox & Alexander, 1999; Kochkin, 2000a cited in Wong et al., 2003). In this context, various researches were done. Some studies include overall satisfaction with the hearing aid, while others combine overall satisfaction with some specific part of the satisfaction. Some studies only refer to the benefits of hearing aids, that is, the results of auditory performance with and without hearing aids. Different measuring instruments were used for different researches, which ultimately resulted in inconsistent research results. Wong et al. (2003), after reviewing 45 studies on satisfaction with hearing aids, state that: "Findings are not always consistent across studies, but in general, hearing aid satisfaction has been found to be related to experience, expectation, personality and attitude, usage, type of hearing

aids, sound quality, listening situations, and problems in hearing aid use. Inconsistent findings across studies and difficulties in evaluating the underlying relationships are probably caused by problems with the tools (eg, lack of validity) and the methods used to evaluate relationships (eg, correlation analyses evaluate association and not causal effect).” (p. 117) The various measures used in research on hearing aid satisfaction make it difficult to draw strong conclusions about overall findings. Therefore, it is important to use published standardized questionnaires which allow comparison across participants and between studies. Furthermore, it has been argued that satisfaction questionnaires with multiple questions are more robust measures than single-scale items. Single-scale measures give a general picture of satisfaction but do not indicate why a client is satisfied or dissatisfied and do not allow the clinician to identify what can be changed to enhance satisfaction (Dillon, 2012 cited in Kengmana, 2015, p. 22).

METHODS

The sample of respondents

The sample of respondents consisted of 50 hearing impaired people, users of hearing aids, of all types and degrees of hearing impairment. The respondents were between the ages of 20 and 80. The sample was selected by the random selection method. We contacted the services and from the records of users of hearing aids (registered hearing impaired persons in the researched area), randomly selected individuals who agreed to the interview.

Measuring instrument and method of conducting research

For the purposes of the research, a special measuring instrument was constructed - a questionnaire consisting of two parts. The first part consisted of moderator variables, i.e. secondary data about the respondents: gender, age, type of hearing loss, percentage of hearing loss, degree of hearing loss, time of hearing aid use, and brand of hearing aid. These data were collected in the ENT departments, where hearing tests are performed and hearing aids are recommended, and in the Health Insurance Fund, which co-finances the p

purchase of hearing aids. The second part of the questionnaire consisted of variables for assessing satisfaction with the use of a hearing aid in everyday life situations, i.e. 15 claims (one scale) to which respondents had to express their views on satisfaction with the use of hearing aids. This part of the questionnaire was conducted by surveying a sample of respondents. Respondents chose one of the offered answers for each statement offered on a five-point Likert-type scale (I completely agree, I mostly agree, I can't decide, I mostly disagree and I totally disagree). During the examination, the respondents chose their views on the offered choice of answers to our problematic questions. For a clearer insight into the response frequencies in the frequency analysis, we list them here:

1. The hearing aid helps me in communication.
2. I often feel whistling/ buzzing in my ears while wearing a hearing aid.
3. I regularly wear a hearing aid while performing various tasks
4. I have a lot of problems with my hearing aid.
5. I do not feel the benefit of wearing a hearing aid.
6. When wearing a hearing aid, I often get a rash, itch, pain, or accumulation of cerumen.
7. I have difficulties handling the hearing aid.
8. I have problems watching TV and listening to the radio.
9. I have problems when making phone calls.
10. I have to adjust the hearing aid often.
11. Sometimes I have headaches while wearing a hearing aid.
12. When I'm on the street, I can hardly tell from which direction the sound is coming.
13. In a closed room, the hearing aid serves me much better than outside.
14. Hearing aid should be worn by all people with hearing loss.
15. I feel helpless without a hearing aid.

Data processing

All data were processed by descriptive analysis. Frequencies and percentages were calculated. Spearman's rank correlation coefficient was used to determine the correlation between variables. The testing of the results was determined at the level of statistical significance of $p < .001$. The data were analyzed with the statistical package SPSS for Windows 20.

RESULTS AND DISCUSSION

The results of the research on the variables that structure the sample and can influence the results of determining the benefits and satisfaction with hearing aids

Table 1 presents the frequencies and percentages of the moderator variables, as criteria of possible influence on the results of determining the benefit and satisfaction with the hearing aid. Gender is approximately equally represented, with 54%

male and 46% female respondents. The largest percentage of respondents (34%) was between the ages of 3 and 25, followed by 46 to 65 (32%), and the least between the ages of 26 and 45 (5%). Most respondents (44%) had a hearing loss percentage of 61% to 80%. The respondents used the hearing aid for different periods of time (from 2 to 32 years), which was enough time to express their usefulness and functionality. Most respondents (58%) used a hearing aid in the period from 2 to 10 years. The largest percentage of users (68%) opted for the “Widex” brand of hearing aids.

Table 1. Frequencies and percentages of research results of moderator variables

Variable	f	%
<u>Gender</u>		
Male	27	54.0
Female	23	46.0
<u>Age</u>		
3 – 25	17	34.0
26 – 45	5	1.0
46 – 65	16	32.0
> 65	12	24.0
<u>% hearing loss according to FS</u>		
40 – 50	9	18.0
55 – 60	9	18.0
61 – 70	12	24.0
71 – 80	10	20.0
81 – 90	5	10.0
91 – 98	5	10.0
<u>Time of hearing aid use (years)</u>		
2 – 10	29	58.0
11 – 20	15	30.0
21 – 33	6	12.0
<u>Hearing aid brand</u>		
Widex	34	68.0
Bernafon	5	10.0
Unitron	3	6.0
Oticon	8	16.0

Results of answers of hearing aid users to the applied system of variables to determine the benefits and satisfaction with the use of hearing aids

Table 2 shows the frequencies and percentages of respondents' answers to the claims of assessing the benefits and satisfaction with the use of hearing aids. An effort was made to check the extent to which respondents express satisfaction with the use of personal hearing aids. With the 1st claim (The hearing aid helps me in communication.) 64% of respondents completely agree, and 26% mostly agree, which means that they agree in total in 90% of cases. According to Kochkin's research (2005), ninety percent of consumers are satisfied with the ability of their hearing instrument to improve communication in one-on-one situations, and slightly more than eight out of ten are satisfied by its performance in small groups, and according to Kochkin (2010), ninety-one percent of consumers are satisfied with the ability of their hearing aids to improve communication in one-on-one situations. More than three in four are satisfied in small groups (85%). With the 2nd claim (I often feel whistling/buzzing in my ears while wearing a hearing aid.) 34% of respondents do not agree at all, and 28% mostly disagree, which means that a total of 62% of respondents estimate that they do not experience whistling/buzzing when using a hearing aid. According to research by Kochkin (2010), seven out of ten consumers are satisfied with whistling and feedback (69%). With the 3rd claim (I regularly wear a hearing aid while performing various tasks.) 74% of respondents completely agree, and 8% mostly agree, which means that a total of 82% of users regularly wear a hearing aid. According to Kochkin (2005), nearly 9 out of 10 consumers wear their hearing aid. According to research by Kaplan-Neeman, Muchnik, Hildesheimer, and Henkin (2012), eighty-three percent used their hearing aids regularly, whereas 17% were nonusers. The purpose of the study by Bertoli et al. (2009) was to investigate the efficiency of the Swiss hearing aid dispensing system, and to determine factors contributing to successful hearing aid provision. Eighty-five percent used their device(s) regularly, 12% only occasionally and 3% never. Eighty percent were satisfied with their aids. Non-regular use of hearing aids was significantly associated with age, gender, regional language, total duration of use, type of amplification, hearing aid category, hearing loss, and dissatisfaction with and

difficulties in managing the aid. Dissatisfaction was associated with regional language, total duration of use, difficulties in managing the aid, and non-regular use. According to research by Jorbonyan, Foroughan, Momtaz, and Mehrkian (2022), the regular use of hearing aids was influenced by a variety of factors, including education level, hearing aid satisfaction, self-reported hearing impairment, perceived social support, extroversion personality trait, and emotional stability. With the 4th claim (I have a lot of problems with my hearing aid.) 38% of the respondents do not agree at all, and 46% of the respondents mostly disagree. A total of 84% of the respondents estimate that they have no significant problems when using the hearing aid. According to research by Bennett et al. (2020), almost all participants (98%) indicated that they were experiencing at least one of the hearing aid problems. The three most reported problems were related to difficulty hearing in noisy environments, hearing in windy environments, and understanding certain voices. Participants who reported experiencing a greater number of hearing aid problems also reported lower levels of hearing aid benefit, and satisfaction with their hearing aids. Also, according to a study by Bennett et al. (2021), although consumers indicated high levels of hearing aid performance/benefit when responding to multiple choice questions on the website, they described numerous problems limiting their success with hearing aids. Hearing healthcare clinicians must look beyond simply asking whether their clients are satisfied, and instead employ a patient centered approach to audiological rehabilitation, asking clients to demonstrate their skills and knowledge (Bennett et al., 2018b) and probing into the wide range of hearing aid problems that can occur (Bennett et al., 2020) to ensure that each client's individual needs are met. With the 5th claim (I do not feel the benefit of wearing a hearing aid.) 54% do not agree at all, and 26% mostly disagree, which means that a total of 80% of the respondents estimate that they have significant benefits from the hearing aid. According to Kochkin (2010), approximately three out of four consumers are satisfied with the clearness of tone and the sound of their hearing aids (77%) and the sound of their voice (73%). Seven out of ten are satisfied with directionality (71%), the naturalness of the sound (71%), ability to hear soft sounds (69%), and sound fidelity (68%). Two out of three are satisfied with their comfort with loud sounds (67%) and the sound of chewing and swallowing (64%). According to research by Bannon, Picou, Bailey, and Manchaiah (2023), hearing

aid sound quality, fit and comfort, and battery life were related to both benefit and satisfaction. With the 6th claim (When wearing a hearing aid, I often get a rash, itch, pain, or accumulation of cerumen.) 40% of respondents do not agree at all, and the same percentage mostly disagree. A total of 80% of respondents estimate that they do not have the listed side effects. Bertoli et al. (2009) in 18.5 % of cases cited unpleasant side effects (e.g., rashes, itching, pain, builds up wax) as the reason for not wearing a hearing aid.

With the 7th claim (I have difficulties handling the hearing aid.) 48% of the respondents do not agree at all, and 36% mostly disagree, that is, a total of 84% of the respondents estimate that they have no difficulties when handling the hearing aid. According to Bennett, Meyer, Eikelboom, and Atlas (2018), hearing aid management is an area of difficulty for the majority of hearing aid owners, indicating the need for clinicians to improve the efficacy of hearing aid management training delivered. With the 8th claim (I have problems watching TV and listening to the radio.) 28% of the respondents do not agree at all, and 34% mostly disagree. A total of 62% of respondents estimate that they have no problems watching TV and listening to the radio. According to Kochkin (2005), slightly more than eight out of ten consumers are satisfied by its performance while watching television, and according to Kochkin (2010), more than three in four are satisfied while watching television (80%). With the 9th claim (I have problems when making phone calls.) 14% of respondents do not agree at all, and 34% mostly disagree. A total of 48% of respondents estimate that they have no problems when making phone calls. It is indicative that 38% of respondents are undecided and that 14% have a problem with calling. This indicates that the problems are still significantly present. According to Kochkin (2005), seven out of ten are satisfied with their hearing aids on the telephone, and according to Kochkin (2010), about three out of four consumers (73%). With the 10th claim (I have to adjust the hearing aid often.) 24% of the respondents do not agree at all, and 36% mostly disagree, which is a total of 60% of the respondents who estimate that they do not need to adjust the hearing aid often.

With the 11th claim (Sometimes I have headaches while wearing a hearing aid) 40% of respondents do not agree at all, and 30% mostly disagree, that is, a total of 70% of respondents estimate that they do not have headaches while wearing a hearing aid. With the 12th claim (When I'm on the street, I can hardly tell from which direction the sound is coming.) 4% of respondents do not agree at all, and 34% mostly disagree. This means that 38% of respondents estimate that they do not have a problem with sound orientation, but 36% of respondents are undecided and 26% have these problems. According to Kochkin (2005) about three of four consumers are satisfied with their instruments outdoors, while participating in leisure activities, and in the car. According to Kochkin (2010), seven out of ten are satisfied with the directionality of the sound (71%). With the 13th claim (In a closed room, the hearing aid serves me much better than outside.) 12% of the respondents completely agree, and 36% mostly agree, which is a total of 48% of respondents who evaluate the better functionality of hearing aids in a closed room. Also, 32% of undecided respondents point to doubts about the good functionality of hearing aids in an open space. According to Kochkin (2005) half of the consumers are satisfied with wind noise and their instruments in noisy situations), while according to Kochkin (2010), about six in ten consumers are satisfied with use of their hearing aid in noisy situations (61%) and wind noise (58%). Bertoli et al. (2009) in 52.0 % of cases cited noisy disturbing situations as the reason for not wearing a hearing aid. Kim et al. (2022), in hearing aid satisfaction, observed that the most satisfactory factors were clarity of sound (53.5%), people's trust in their hearing aid (61.7%), and listening from a quiet environment (72.8%) in the domains of sound quality, hearing aid features, and listening environments, respectively. With the 14th claim (Hearing aid should be worn by all people with hearing loss.) 72% of respondents completely agree, and 18% mostly agree, which is a total of 90% of respondents who evaluate the usefulness of a hearing aid. With the 15th claim (I feel helpless without a hearing aid.) 52% of respondents completely agree, and 20% mostly agree, that is, a total of 72% of respondents consider the need to use a hearing aid to be extremely important.

Table 2. Frequencies and percentages of respondents' answers to the claims

Claims	I completely agree		I mostly agree		I can't decide		I mostly disagree		Do not agree at all	
	f	%	f	%	f	%	f	%	f	%
1.	32	64.0	13	26.0	2	4.0	1	2.0	2	4.0
2.	3	6.0	7	14.0	9	18.0	14	28.0	17	34.0
3.	37	74.0	4	8.0	1	2.0	3	6.0	5	10.0
4.	2	4.0	2	4.0	4	8.0	23	46.0	19	38.0
5.	1	2.0	1	2.0	8	16.0	13	26.0	27	54.0
6.	2	4.0	3	6.0	5	10.0	20	40.0	20	40.0
7.	3	6.0	0	0.0	5	10.0	18	36.0	24	48.0
8.	3	6.0	2	4.0	14	28.0	17	34.0	14	28.0
9.	2	4.0	5	10.0	19	38.0	17	34.0	7	14.0
10.	3	6.0	3	6.0	14	28.0	18	36.0	12	24.0
11.	1	2.0	5	10.0	9	18.0	15	30.0	20	40.0
12.	3	6.0	10	20.0	18	36.0	17	34.0	2	4.0
13.	6	12.0	18	36.0	16	32.0	8	16.0	2	4.0
14.	36	72.0	9	18.0	3	6.0	1	2.0	1	2.0
15.	26	52.0	10	20.0	8	16.0	4	8.0	2	4.0

Results of correlation analysis

Correlation analysis was performed to test the association of moderator variables with the total set of respondents' answers to the claim about satisfaction with hearing aid use. Variables "gender", "age" and "time of hearing aid use" in our research did not have statistically significant correlations with the applied set of variables (claims), which can be concluded that they do not affect the assessment of satisfaction in the measurement space of variables. According to the study by Aurélio, et al. (2012), it was found that the subjects were very happy with the use of hearing aids, although satisfaction was not related to the variables: age, gender, time of use and device type. In general, participants with higher daily use are happier. According to research by Mondelli, Rocha, and Honório, (2013), no significant differences were evident between hearing aid satisfaction and sex. The importance placed on services/costs and personal image varied between age groups. According to research by Kaplan-Neeman et al. (2012), of the users, 92% were satisfied to some degree with their hearing aids. Background variables that were significantly associated with satisfaction

ratings were hours of hearing aid use per day, fitting mode (binaural vs. monaural), age, and degree of hearing loss. In the study by Kim et al. (2022), it was found that age, level of education, hearing aid purchase price, bilateral amplification, wearing time, and hearing aid fitting and fine tuning on a regular basis significantly influenced hearing aid satisfaction. According to Bannon et al. (2023), satisfaction was related to age. Younger respondents, those who were students, reported more satisfaction. Also, hearing aid users with more hearing aid experience reported more benefit. The variable "Time of hearing aid use" in our research had a positive correlation with the variable "Percentage hearing loss according to FS" ($r = .402$). The variable "Percentage hearing loss according to FS" had a statistically negative correlation with the variable "I often feel ringing in my ears while wearing a hearing aid." ($r = -.508$) and with the variable "I have a lot of problems with my hearing aid." ($r = -.390$). It can be concluded that different percent hearing loss affects the fact that the respondents feel ringing in their ears while wearing a hearing aid and that they have a lot of problems with their hearing aid. According to Kochkin (2005), with respect to listening situations, satisfaction was related

to severity of hearing loss in 13 of 15 listening situations, and according to Kochkin, (2010) the more severe the hearing loss the greater the difficulty of achieving utility in many listening situations. According to Mondelli, Rocha, and Honório (2013), correlation was evident at all levels between user satisfaction and amplification. Decreased satisfaction was observed in individuals with severe and/or profound hearing loss. Satisfaction of hearing aid is decreasing inversely proportional with increasing of hearing loss (slight- profound degree) (Turan, Unsal, & Kurtaran, 2019). According to Bannon et al. (2023), hearing aid users with greater self-perceived hearing loss reported more benefit. The variable "Hearing aid brand" in our research has a statistically significant correlation with the variable "I have to adjust hearing aid often" ($r = -.374$), i.e. respondents express displeasure with frequent adjustment of their hearing aid. According to a US-based national survey by Kochkin (2003), about three out of four consumers are satisfied with the ability of hearing instruments to "improve their hearing". When it comes time to repurchase, roughly half of all hearing instruments are "fired," meaning the consumer switches brands or attempts to switch brands with the hope of increasing the utility (benefit relative to price) derived from their hearing instrument. According to Kochkin (2005), only 44% indicate they would repurchase their current brand of hearing instrument next time around; a large percentage (43%) indicated they were unsure what they would do when it came time to replace their instruments, and according to Kochkin (2010), 48% of consumers would repurchase their current brand of hearing aid. Brand loyalty between 1991-2008 increased by 4%, which still indicates that when it is time for wearers to replace their current brand of hearing aids, they are very likely to shop for something better than what they have. "It appears that hearing aid consumers somewhat attribute their ongoing hearing aid problems to the brand or model of device that they own" (Bennett et al., 2021. p. 9). According to research by US-based MarkeTrak, satisfaction with hearing aids is high. The rate of satisfaction with hearing aids increased from 74% in 2008 to 81% in 2014 and 83% in 2019 (Powers & Rogin, 2019). EuroTrak data are similar, i.e. satisfaction with

hearing aids at 70% (Bisgaard & Ruf, 2017). Data from the MarkeTrak 2022 survey indicate most hearing aid owners report regular quality-of-life benefits from hearing aids, even more than in previous surveys. The increased likelihood of hearing aid benefits might be attributable to modern hearing aid features advancements. Hearing aid satisfaction rates have been relatively stable over the years, indicating that more than 80% of hearing aid owners are satisfied with their devices. Hearing aid satisfaction rates do not appreciably vary by fitting channel; hearing aid owners fitted in person, fitted remotely, or self-fit are similarly likely to report high satisfaction with their device (Picou, 2022).

CONCLUSION

The results of the research showed that the majority of hearing aid users regularly wear a hearing aid, that they benefit significantly from the hearing aid, and that it helps them communicate. They have no significant problems when using and handling the hearing aid. A smaller percentage of users have no problems with telephone calls and have better functionality of hearing aids in a closed room and have no problems with sound orientation. The variables gender, age, and time of hearing aid use did not have statistically significant correlations with the applied set of variables (claims). Attitudes of hearing aid users can be an important factor in determining satisfaction with hearing aids. Users of hearing aids can directly influence the actions of experts (persons dealing with diagnostics, selection of hearing aids, and rehabilitators) with their experiences. This mutual interaction contributes to experts encouraging users to use hearing aids regularly. A high level of satisfaction can be achieved with regular use of hearing aids. The level of individual satisfaction in everyday communication affects the acceptance of hearing aids. In the results of the research, we did not determine the existence of a difference compared to published research in the literature. We did not find any significant correlations in the moderator variables we used with the satisfaction of use. However, in a qualitative sense, research that will monitor the consequences on social behavior and the general quality of living with a hearing aid is desirable.

REFERENCES

- Adibi, S. M., Chen, N. R., Azmir, N. A., Solahan, N., Ismail, A., Anuar, A. Z., & Abdullah, A. b (2013). The quality of life in hearing impaired adolescents after hearing aid application. *The Medical Journal of Malaysia*, 68(4), 315-322.
- Arlinger, S. (2003). Negative consequences of uncorrected hearing loss – a review. *International Journal of Audiology*, 42 Suppl 2, 2S17-2S20. <https://doi.org/10.3109/14992020309074639>
- Aurélio, F. S., Silva, S. P., Rodrigues, L. B., Kuniyoshi, I. C., & Botelho, M. S. (2012). Satisfaction of patients fit with a hearing aid in a high complexity clinic. *Brazilian Journal of Otorhinolaryngology*, 78(5), 69-77. <https://doi.org/10.5935/1808-8694.20120011>
- Bannon, L., Picou, E. M., Bailey, A., & Manchaiah, V. (2023). Consumer Survey on Hearing Aid Benefit and Satisfaction. *Journal of Speech, Language, and Hearing Research*. https://doi.org/10.1044/2022_JSLHR-22-00066
- Bennett, R. J., Meyer, C. J., Eikelboom, R. H., & Atlas, M. D. (2018). Evaluating Hearing Aid Management: Development of the Hearing Aid Skills and Knowledge Inventory (HASKI). *American Journal of Audiology*, 27(3), 333-348. https://doi.org/10.1044/2018_AJA-18-0050
- Bennett, R. J., Kosovich, E. M., Stegeman, I., Ebrahimi-Madiseh, A., Tegg-Quinn, S., & Eikelboom, R. H. (2020). Investigating the prevalence and impact of device-related problems associated with hearing aid use. *International Journal of Audiology*, 59(8), 615-623. <https://doi.org/10.1080/14992027.2020.1731615>
- Bennett, R. J., Swanepoel, W., Ratinaud, P., Bailey, A., Pennebaker, J. W., & Manchaiah, V. (2021). Hearing aid acquisition and ownership: what can we learn from online consumer reviews? *International Journal of Audiology*, 60(11), 917-926. <https://doi.org/10.1080/14992027.2021.1931487>
- Bertoli, S., Staehelin, K., Zemp, E., Schindler, C., Bodmer, D., & Probst, R. (2009). Survey on hearing aid use and satisfaction in Switzerland and their determinants. *Int J Audiol*. 48(4), 183-195. doi: 10.1080/14992020802572627
- Bisgaard, N., & Ruf, S. (2017). Findings from EuroTrak surveys from 2009 to 2015: Hearing loss prevalence, hearing aid adoption, and benefits of hearing aid use. *American Journal of Audiology*, 26(3S), 451-461.
- Cox, R. M., & Alexander, G. C. (1995). The abbreviated profile of hearing aid benefit. *Ear and hearing*, 16(2), 176-186. <https://doi.org/10.1097/00003446-199504000-00005>
- Cox, R. M. (2003). Assessment of subjective outcome of hearing aid fitting: getting the client's point of view. *International Journal of Audiology*, 42(S1), 90-96. doi: 10.3109/14992020309074629
- Crow, R., Gage, H., Hampson, S., Hart, J., Kimber, A., Storey, L., et al. (2002). The measurement of satisfaction with healthcare: implications for practice from a systematic review of the literature. *Health Technol Assess*, 6(32):1-244.
- Gallagher, N. E., & Woodside, J. V. (2018). Factors Affecting Hearing Aid Adoption and Use: A Qualitative Study. *Journal of the American Academy of Audiology*, 29(4), 300-312. <https://doi.org/10.3766/jaaa.16148>
- Jorbonyan, J., Foroughan, M., Momtaz, Y. A. & Mehrkian, S. (2022). Determinants of regular use of hearing aids among older adults in Tehran (Iran). *Educational Gerontology*. <https://doi.org/10.1080/03601277.2022.2143082>
- Kaplan-Neeman, R., Muchnik, C., Hildesheimer, M., & Henkin, Y. (2012). Hearing aid satisfaction and use in the advanced digital era. *The Laryngoscope*, 122(9), 2029-2036. <https://doi.org/10.1002/lary.23404>
- Kengmana, C. (2015). Hearing aid satisfaction among adults with hearing impairment in New Zealand. Graduation thesis. University of Canterbury.
- Kim, G. Y., Cho, Y. S., Byun, H. M., Seol, H. Y., Lim, J., Park, J. G., & Moon, I. J. (2022). Factors Influencing Hearing Aid Satisfaction in South Korea. *Yonsei medical journal*, 63(6), 570-577. <https://doi.org/10.3349/ymj.2022.63.6.570>
- Kochkin, S. (2003). MarkeTrak VI: On the issue of value: Hearing aid benefit, price, satisfaction, and repurchase rates. *Hearing Review*, 10(2), 12-29.
- Kochkin, S. (2005). MarkeTrak VII: Customer satisfaction with hearing instruments in the digital age. *The Hearing Journal* 58(9):30,32-34,38-40,42-43. doi: 10.1097/01.HJ.0000286545.33961.e7
- Kochkin, S. (2010). MarkeTrak VIII: Consumer satisfaction with hearing aids is slowly increasing. *The Hearing Journal* 63(1):19-20,22,24,26,28,30-32. doi: 10.1097/01.HJ.0000366912.40173.76
- Knudsen, L. V., Oberg, M., Nielsen, C., Naylor, G., & Kramer, S. E. (2010). Factors influencing help seeking, hearing aid uptake, hearing aid use, and satisfaction with hearing aids: a review of the literature. *Trends in amplification*, 14(3), 127-154. <https://doi.org/10.1177/1084713810385712>
- Lopez-Poveda, E. A., Johannesen, P. T., Pérez-González, P., Blanco, J. L., Kalluri, S., & Edwards, B. (2017). Predictors of Hearing-Aid Outcomes. *Trends in hearing*, 21, 2331216517730526. <https://doi.org/10.1177/2331216517730526>

- Mondelli, M. F., Rocha, A. V., & Honório, H. M. (2013). Degree of satisfaction among hearing aid users. *International archives of otorhinolaryngology*, 17(1), 51-56. <https://doi.org/10.7162/S1809-97772013000100009>
- Picou E. M. (2022). Hearing Aid Benefit and Satisfaction Results from the MarkeTrak 2022 Survey: Importance of Features and Hearing Care Professionals. *Seminars in hearing*, 43(4), 301-316. <https://doi.org/10.1055/s-0042-1758375>
- Powers, T. A., & Rogin, C. M. (2019). MarkeTrak 10: Hearing Aids in an Era of Disruption and DTC/OTC Devices. *Hearing Review*, 26(8), 12-20.
- Silva, D. P., Silva, V. B., & Aurélio, F. S. (2013). Auditory satisfaction of patients fitted with hearing aids in the Brazilian Public Health Service and benefits offered by the hearing aids. *Brazilian Journal of otorhinolaryngology*, 79(5), 538-545. <https://doi.org/10.5935/1808-8694.20130098>
- Tsakiropoulou, E., Konstantinidis, I., Vital, I., Konstantinidou, S., & Kotsani, A. (2007). Hearing aids: quality of life and socio-economic aspects. *Hippokratia*, 11(4), 183-186.
- Turan, S., Unsal, S., & Kurtaran, H. (2019). Satisfaction assessment with Abbreviated Profile of Hearing Aid Benefit (APHAB) questionnaire on people using hearing aid having Real Ear Measurement (REM) eligibility. *The international tinnitus journal*, 23(2), 97-102. <https://doi.org/10.5935/0946-5448.20190017>
- Wong, L. L., Hickson, L., & McPherson, B. (2003). Hearing aid satisfaction: what does research from the past 20 years say?. *Trends in amplification*, 7(4), 117-161. <https://doi.org/10.1177/108471380300700402>
- Zafar, F., Usama Basheer, H. M., Hassan, A., Zaib, W., & Waheed, T. (2020). The Impact of Hearing Aids on Quality of Life of Hearing Impaired Individuals: Impact of hearing aids on QoL. *Pakistan BioMedical Journal*, 3(2), 42-46. <https://doi.org/10.52229/pbmj.v3i2.13>