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Factors Influencing Satisfaction, Perceived Disability and Handicap among Hearing Aid Users in the Turkish Population

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Abstract: Background: To examine factors influencing satisfaction, perceived disability and handicap and to investigate whether satisfaction correlates with perceived disability and handicap among hearing aid (HA) users in the Turkish population. Methods: A prospective cross-sectional study involving 133 patients using unilateral or bilateral HAs was conducted. Data on demographic factors, including age, gender, socioeconomic status, degree of hearing loss, HA experience, HA fitting side, daily HA usage, and HA style were collected. Satisfaction, perceived disability and handicap were assessed using the Abbreviated Profile of Hearing Aid Benefit and the Amsterdam Inventory for Auditory Disability and Handicap (AIADH), respectively. Multiple linear regression analysis was performed to examine factors influencing satisfaction, perceived disability and handicap. Pearson correlation test was used to assess the correlation of satisfaction with perceived disability and handicap. Results: Age, degree of hearing loss, and HA side were significant predictors of APHAB satisfaction scores, while only degree of hearing loss predicted AIADH scores ($p < 0.05$). Gender and HA experience did not consistently predict outcomes ($p > 0.05$). A weak negative correlation was obtained between APHAB satisfaction scores and the AIADH disability scores among HA users ($p < 0.05$; r: −0.390). Conclusion: The study highlights age, degree of hearing loss, and HA side as predictive factors for HA satisfaction. Furthermore,the degree of hearing loss influences perceived disability and handicap. HA satisfaction, perceived disability and handicap did not exhibit a notable relationship among HA users. These findings underscore the importance of healthcare professionals in addressing the specific needs of individuals with HA users to enhance their overall quality of life.

Keywords: Hearing Aids; Patient Satisfaction; Hearing Loss; Auditory; Disability

1. Introduction

Hearing aids (HAs) are instrumental devices to address the challenges related to hearing loss. HAs play a crucial role to enhance hearing, speech, communication, and overall quality of life [1, 2]. However, HAs do not provide equal benefits for everyone. While some users find them incredibly helpful, others may not experience as much improvement. Therefore, it's essential to investigate the factors that influence the effectiveness of HAs. Understanding what influences HAs effectiveness improves user satisfaction. Beyond technical performance, adressing patients needs is paramount [3, 4].

Previous studies examined various factors that influence the effectiveness of HA in adults such as age, gender, HA fitting, the duration of hearing loss, HA type, the degree of hearing loss, word recognition score, cognitive function, HA experience [5–10]. However, these factors can be complex and not fully understood in all aspects. For instance, it remains unclear how specific factors like age, gender, HA fitting, and degree of hearing loss precisely impact HA effectiveness. Besides, many studies investigated how HAs work for people over 60, aligning with the prevalence of age-related hearing loss. Yet, there's a significant gap about how HAs perform across various age groups. Additionally, some studies had small sample sizes (e.g., <70 patients), making them unsuitable for clinical application. Lastly, and importantly, there is no clear information available regarding whether the factors analyzed for their impact on HA satisfaction exhibit multicollinearity among each other. Multicollinearity occurs when there are strong linear relationships among the factors. This can lead to difficulties in interpreting the effects of individual factors on the HA satisfaction, perceived disability and handicap.

Assessing perceived disability and handicap in patients using HAs is crucial due to the significant and complex relationship between abovementioned factors. A previous research suggests that using HAs can reduce the perceived disability and handicap associated with hearing loss, leading to improved communication, social interaction, and overall quality of life [11]. However, the degree to which HA use alleviates disability and handicap varies among patients and can be influenced by factors such as the severity of hearing loss and individual communication needs and preferences. Additionally, challenges in adapting to amplification may hinder the reduction of perceived disability and handicap despite access to HAs.

The impact and effectiveness of HA can be assessed through various methodologies. Objective measures (e.g., HA use through data logging), and behavioural measures (e.g., HA benefit measures through speech testing with and without HAs) provide quantitative insights into the improvements achieved with HA. Additionally, subjective measures, including self-report questionnaires and patient-reported outcome measures (PROMs), offer valuable perspectives on the functional perceived benefits and satisfaction levels of patients using HA [12]. PROMs can offer a simpler alternative and enable the collection of substantial data within a short timeframe. These measures have gained increasing significance in contemporary healtcare services as they provide valuable insights into the impact of hearing loss on patient's quality of life [13].

In light of these considerations, the aim of this study is to examine factors influencing satisfaction, perceived disability and handicap and to investigate whether there is a correlation between satisfaction and perceived disability and handicap among HA users in the Turkish population. Identifying the factors that influence HA outcomes is crucial for guiding clinical fitting procedures, personalized interventions and support during the fitting and follow-up procedures.

2. Methods

2.1. Study Design

This prospective cross-sectional study adhered to the STROBE recommendations and received approval from the Ege University of Clinical Research Ethics Committee (approval no: 70198063-050.06.04/18-5/40, date 11.05.18). The authors assert that all procedures contributing to this work comply with the ethical standards of the Ege University of Clinical Research Ethics Committee, and with the Helsinki Declaration of 1975, as revised in 2008. Prior to participation, each patient received information about study details and provided informed consent.

2.2. Participants

The study recruited patients aged 20 to 80 years who experienced hearing loss between April 2018 and August 2018. Patients were recruited from an audiology clinic, where they were seeking follow-up treatment and consistently using unilateral or bilateral HA for a minimum of three months [14]. Patients were excluded from the study if they exhibited bilateral profound or total hearing loss, experienced issues with their HA, did not consistently use their HA in the two weeks prior to participate the study, had disabilities unrelated to hearing impairment, were diagnosed with psychiatric or neurological disorders, demonstrated inconsistent or incorrect usage of HA, faced challenges in cooperation, were illiterate, or failed to complete at least one questionnaire. Patients were selected using the snowball sampling method.

2.3. Procedure

All patients included in the study were equipped with digital HA. Patients were classified based on gender, age, degree of hearing loss, HA experience, HA side, socioeconomic status, and daily HA use. Age was grouped into three categories: 20–40 years, 41–60 years, and 61-80 years. The degree of hearing loss followed American Speech-Language-Hearing Association (ASHA) guidelines: moderate, moderate to severe, and severe. HA experience was divided into two groups: less than 5 years and more than 5 years. HA fitting side was noted as unilateral or bilateral, with daily use recorded with a cut-off at 8 h [15]. All patients completed the Turkish version of the Abbreviated Profile of Hearing Aid Benefit (APHAB) and the Turkish version of Amsterdam Inventory for Auditory Disability and Handicap (AIADH) questionnaires. APHAB was used to evaluate HA satisfaction outcome, whereas AIADH was used to assess perceived disability and handicap among HA users.

2.4. Outcome Measures

2.4.1. Abbreviated Profile of Hearing Aid Benefit – APHAB

The APHAB, developed by Cox and Alexander in 1995, serves as a self-assessment tool comprising 24 items [16]. It aims to evaluate communication challenges encountered in everyday life situations and HA satisfaction of patients with hearing loss. This tool is structured into four sub-categories: ease of communication, reverberation, background noise, and aversiveness. The questionnaire consists of a total of 48 question patterns, comprising 6 reverse-type and 18 straight-type question patterns, encompassing both aided and unaided versions. Patients are prompted to rate their experiences with each item using a seven-point response scale under both "Aided" and "Unaided" conditions. Within this study, in order to measure the HA satisfaction, patients completed both the Aided and Unaided versions of the APHAB questionnaire. The difference between aided and unaided subscale scores was calculated and divided by the total number of items (24 items) to assess the satisfaction of HA, referred to as the APHAB Satisfaction mean scores. Higher positive scores indicate greater satisfaction [13, 16, 17].

2.4.2. Amsterdam Inventory for Auditory Disability and Handicap – AIADH

The AIADH is a 30-item PROM that evaluates self-reported disability and handicap in daily hearing conditions [12]. This inventory is divided into two categories: auditory handicap and disability which encompass five distinct subscales: distinguishing sounds, auditory localization, intelligibility in noise, intelligibility in quiet, and detection of sounds. It includes a total of 30 items, comprising 2 reverse and 28 straight question patterns [12, 18, 19]. The response scale for each question is a 4-point Likert scale that measures how frequently the responder is able to hear clearly in a certain situation: 0 = almost always, 1 = frequently, 2 = occassionally, and 3 = almost never. Higher scores indicate higher disability and handicap.

2.5. Statistical Analysis

Data were collected from the better-hearing ear (lower unaided PTA) for participants wore HAs bilaterally. For unilateral HA users, data were collected from the ear fitted with the HA. Data were checked with detailed examination through both visual techniques (histograms and distribution plots) and statistical methodologies (Kolmogorov-Smirnov-Shapiro Wilks tests). Given the normal distribution of the data, quantitative values were represented as mean ± standard deviation (mean ± SD), while categorical parameters were delineated in terms of observation count (n) and overall percentage (%). The chi-square test was used to assess whether there was statistical differences among the variables obtained from demographic information. Our statistical analyses encompassed various preliminary assessments aimed at evaluating the reliability and precision of the regression model. Initially, the Durbin-Watson statistic was applied to examine autocorrelation within the error terms of the regression model. A value close to 2.0 for the Durbin-Watson statistic indicates negligible autocorrelation among the error terms. Subsequently, a multicollinearity analysis was conducted among the independent variables. Here, Variance Inflation Factor (VIF) and Tolerance (TOL) values were computed to assess the relationships among the independent variables. VIF values below 10 and TOL values above 0.1 indicate negligible multicollinearity among the independent variables. After that, multiple linear regression analysis was used to assess the impact of various predictors—age, and gender, degree of hearing loss, HA experience, HA side—on HA satisfaction, perceived disability and handicap.Pearson correlation analysis was applied to investigate correlation of satisfaction with perceived disability and

handicap. Statistical significance was defined as $p \leq 0.05$. All statistical analyses were conducted using the R statistical software (version 4.2.2).

3. Results

One hundred and fifty patients with HA users initially provided socio-demographic information. However, due to incorrect usage of HA (n = 4), issues with their HA (n = 2), bilateral profound or total hearing loss (n = 8), and non-voluntary participation (n = 3), the study proceeded with a total of 133 patients. Among these patients, there were 64 women and 69 men, aged between 20 and 80 years, with a mean age of 52.33 ± 20.68.

The participants were divided into various subgroups based on demographic and clinical characteristics. When categorized by age groups, 30.8% of the participants were between 20 and 40 years old (n = 41), 31.6% were between 41 and 60 years old (n = 42), and 37.6% were between 61 and 80 years old (n = 50). Based on the degree of hearing loss, 36.1% (n = 48) had moderate hearing loss, 31.6% (n = 42) had moderate to severe hearing loss, and 32.3% (n = 43) had severe hearing loss. In terms of HA experience, 54.1% of the participants (n = 72) had less than five years of HA usage, while 45.9% (n = 61) had more than five years of experience. A total of 44.4% (n = 59) used unilateral HAs, and 55.6% (n = 74) used bilateral HAs. No statistically significant differences were observed between age groups, gender, degree of hearing loss, HA experience and HA fitting side ($p > 0.05$).

Regarding socioeconomic status, 15.0% of the participants (n = 20) were classified as lower class, 41.4% (n = 55) as lower middle class, 20.3% (n = 27) as upper middle class, and 23.3% (n = 31) as upper class. Regarding daily HA usage, 16.5% (n = 22) used their HAs for less than eight hours a day, while 83.5% (n = 111) used them for more than eight hours a day. Finally, in terms of HA style, 39.8% (n = 53) used behind-the-ear HAs, 41.4% (n = 55) used receiver-in-the-canal HAs, and 18.8% (n = 25) used in-the-canal HAs. Statistically significant differences were observed between socioeconomic status, daily HA usage and HA style ($p < 0.05$) (See **Table 1**).

Table 1. Demographic information of the hearing aid (HA) users.

Variables (n = 133)		**N (%)**	**P**
Gender	Female Male	64 (48,1) 69 (51.9)	0.66
Age	Age 20–40 Age 41–60 Age 61–80	41 (30.8) 42 (31.6) 50 (37.6)	0.57
Socioeconomic Status	Lower Lower middle Upper middle Upper	20 (15.0) 55 (41.4) 27 (20.3) 31 (23.3)	<0.001
Degree of Hearing Loss	Moderate Moderate to severe Severe	48 (36.1) 42 (31.6) 43 (32.3)	0.79
HA Experience	Less than 5 years More than 5 years	72 (54.1) 61 (45.9)	0.34
HA Fitting Side	Unilateral Bilateral	59 (44.4) 74 (55.6)	0.19
Daily HA Use	Less than 8 hours a day More than 8 hours a day	22 (16.5) 111 (83.5)	<0.001
HA style	Behind the ear Receiver in the canal In the canal	53 (39.8) 55 (41.4) 25 (18.8)	0.002

As shown in **Table 1**, a total of eight factors were collected. Although socioeconomic status, HA style and daily HA use have the potential to impact HA satisfaction, disability and handicap, those were excluded from the multiple regression analysis due to significant differences among patients. Consequently, the analysis proceeded with the remaining five factors. Three different models were fitted to investigate the factors influencing the outcomes.

In all three models, *p*-values greater than 0.05 were obtained for the Durbin-Watson statistic, and the obtained

D-W statistic values were close to 2. This analysis revealed negligible autocorrelation among the error terms. Regarding the multicollinearity, all independent variables exhibited VIF values below 10 and TOL values above 0.1. This suggests negligible multicollinearity among the independent variables, indicating no significant issues that would impact the accuracy of the regression model (**Table 2**). Multiple linear regression analyses showed that age, degree of hearing loss, and HA side exhibited significant relationship with the APHAB satisfaction mean scores ($p \leq 0.05$). Furthermore, the higher degrees of hearing loss indicated higher negative impact on AIADH ($p \leq 0.05$). Gender and and HA experience did not consistently exhibit statistical significance in relation to the outcomes ($p > 0.05$). Overall, our models exhibited varying levels of fit ranging from 0.25 to 0.65, as indicated by the adjusted R-squared (R^2) values. APHAB satiscation and Amsterdam Inventory for Auditory Disability subscale exhibited moderate to high R^2 values (54% and 65%, respectively), indicating a significant explanation of the observed variance in each measure (**Table 2**).

Additionally, a weak negative correlation was found between the APHAB satisfaction mean scores and Amsterdam Inventory for Auditory disability subscale ($p < 0.05$; r: −0.390), while no correlation was obtained on handicap subscale (**Figure 1**).

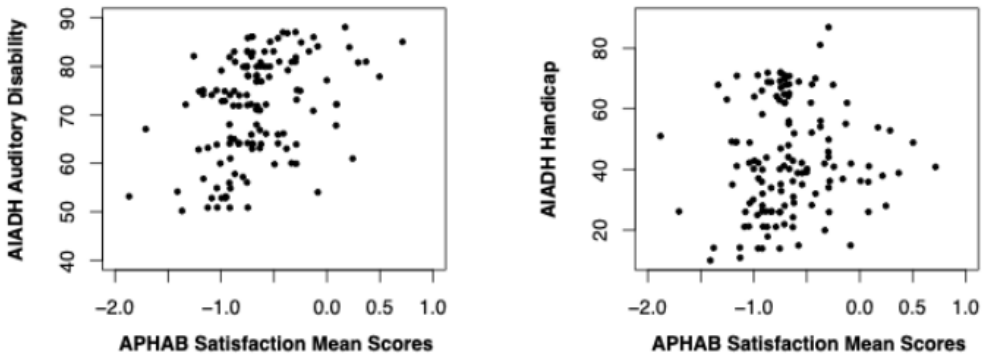

Figure 1. Scatter plot illustrating the correlation between APHAB Satisfaction Mean Scores and AIADH Auditory Disability ($p < 0.05$; r: −0.390) and AIADH Handicap ($p > 0.05$).

Table 2. Factors influencing satisfaction, perceived disability and handicap among hearing aid (HA) user.

		Statistical Models				
n = 133	**Reference Value**	**APHAB Satisfaction Mean Scores**	**AIADH Auditory Disability**	**AIADH Handicap**	**VIF**	**TOL**
Durbin-Watson		**D-W Statistic = 1.797** p **= 0.198**	**D-W Statistic = 1.888** p **= 0.392**			
(Intercept)		**0.69***** (0.16)	**57.73***** (2.95)	**24.80**** (7.59)		
Gender	**Male** Female	−0.05 (0.06)	1.43 (1.17)	3.53 (3.01)	1.083	0.923
Age	**41–60** 21–40 **61–80** 21–40	**−0.21**** (0.08) **−0.34***** (0.08)	−1.22 (1.47) 1.16 (1.49)	−4.25 (3.78) **−10.84**** (3.84)	1.131	0.884
Degree of hearing loss	**Moderate to severe hearing loss** Moderate hearing loss **Severe hearing loss** Moderate hearing loss	**−0.06**** (0.07) **−0.37***** (0.09)	**10.56***** (1.33) **20.62***** (1.58)	**10.57**** (3.42) **20.53***** (4.07)	1.137	0.879
HA experience	**More than 5 years** Less than 5 years	0.06 (0.08)	−0.05 (1.44)	2.30 (3.70)	1.312	0.761
HA Fitting	**Bilateral** Unilateral	**0.18**** (0.07)	0.90 (1.20)	3.29 (3.09)	1.092	0.914
R^2		0.38	0.67	0.29		

Table 2. *Cont.*

Statistical Models						
n = 133	**Reference Value**	**APHAB Satisfaction Mean Scores**	**AIADH Auditory Disability**	**AIADH Handicap**	**VIF**	**TOL**
Durbin-Watson		**D-W Statistic = 1.797 p = 0.198**	**D-W Statistic = 1.888 p = 0.392**			
Adj. R^2		0.54	0.65	0.25		
F statistic		10.99	35.99	7.44		

Legend: Multiple linear regression analyses were conducted, incorporating data from 133 patients. The analyses examined the effects of five different predictors on distinct models of HA satisfaction, perceived disability and handicap. Each predictor's baseline/reference value is indicated in regular font, while the values of interest for comparison are highlighted in bold. VIF: Variance Inflation Factor; TOL: Tolerance; D-W: Durbin-Watson; *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

4. Discussion

Our study demonstrated that age, degree of hearing loss, and HA side predicted APHAB satisfaction scores, while only degree of hearing loss predicted AIADH scores. Gender and HA experience did not predict any outcomes. A weak association between APHAB satisfaction scores and the AIADH disability scores was observed among HA users.

Previous studies have indicated that several factors could influence the HA satisfaction, disability and handicap such as age, degree of hearing loss, education level, HA experience, daily use of HA, HA side, age of onset of hearing loss, attitudes toward hearing loss, and expectations [5, 7–10]. Each factor included and its finding will be discussed in separate paragraphs.

In this present study, a significant negative association was observed between age and satisfaction with HAs. Namely, the benefit of using HAs in elderly patients (41–60 age group and 61–80 age group) were likely lower compared to those in younger patients (21–40 age group). It is also noteworthy to emphasize that the distribution of the number of patients per group was nearly equal and substantial in size. Age has been consistently highlighted as a crucial factor in HA satisfaction within the literature. Several studies reported that younger individuals had higher levels of HA satisfaction compared to older individuals [10, 20, 21], which is congruent with our findings. However, conflicting results were also reported in a few studies [22–24], which found no significant relationship between age and HA satisfaction. Differences in findings on age and HA satisfaction across studies may arise from variations in sample demographics, study designs, methodologies, and measures used. Factors like cultural differences, access to healthcare, and technological advancements in HA can play a role. Overall, clinicians should pay more attention and provide more assistance to elderly patients during HA fitting and follow-up.

We observed that an increase of the degree of hearing loss was associated with decreased HA satisfaction. The relationship between the degree of hearing loss and HA satisfaction have extensively been examined in previous studies [3, 5, 25]. However, findings varied. While some studies suggest that higher degrees of hearing loss correlate with lesser satisfaction with HAs, one study indicates a different trend, particularly among elderly adults [26]. This might be attributed to the fact that age ranges and hearing loss severity among population in different studies could contribute to the different findings. Therefore, fitting procedures should be tailored to each HA patient, taking into account factors such as the degree of hearing loss, type of hearing loss, age. This approach helps minimize differences and ensures optimal fitting for each patient.

Bilateral HA users was observed to report higher satisfaction scores compared to unilateral HA users. One study reported that bilateral HA users exhibited a 1.23 times higher satisfaction rate when navigating background noise compared to unilateral HA users [8]. Additionally, bilateral HA users demonstrated enhanced speech and spatial hearing scores, as well as better Speech, Spatial, and Qualities of Hearing Scale scores [25, 27] compared to unilateral HA users. Those findings might be attributed to several factors. These users may benefit from improved spatial awareness and localization abilities by using bilateral HA, leading to better understanding of speech in noisy environments and reduced auditory confusion. Besides, bilateral HA users experience enhanced signal-to-noise ratio and reduced listening effort, resulting in a more satisfying overall hearing experience. As a result, for patients exhibiting bilateral at least moderate sensorineural hearing loss, it is imperative to strongly advocate for the use of bilateral HAs.

A higher degree of hearing loss was observed to impact on both perceived disability and handicap. Numerous

studies have highlighted the substantial impact of hearing loss on disability and handicap [28–30]. Metselaar et al. showed greater disability in those with severe hearing loss [31]. Zhang et al. found higher anxiety/depression scores in tinnitus patients with more severe hearing loss [32]. Additionally, Purnami et al. noted worsening hearing loss with increasing handicap levels among the elderly [33]. This can be explained to the fact that hearing impairment can hinder effective communication especially in challenging listening environments. It can cause individuals to withdraw socially or avoid interpersonal interactions to cope with these difficulties. This social withdrawal can contribute to feelings of loneliness, isolation, and ultimately, depressive symptoms and irritability.

Gender and HA experience did not predict any outcomes. Our finding was consistent with previous findings [34, 35]. One possible explanation is that the APHAB and AIADH scores may not be sensitive enough to detect differences between male versus female or new versus experienced hearing users. Another factor contributing to these results could be the limited variability in scores, possibly due to a ceiling effect. This is because a majority of the patients expressed satisfaction with their HAs, which might have hindered the identification of gender or experience effects.

The weak association between APHAB satisfaction scores and AIADH disability scores among HA users may be attributed to various factors. Firstly, individual perceptions of satisfaction with HAs may not necessarily align directly with the extent of perceived disability and handicap. Satisfaction can be influenced by factors such as comfort, ease of use, and sound quality, while perceived disability and handicap encompass broader aspects of daily functioning and social interaction affected by hearing impairment. Additionally, subjective interpretations of disability and handicap can vary among patients, leading to discrepancies between perceived limitations and actual functional impairments. Furthermore, the complexity of other mediating variables, such as psychological factors or environmental influences, may contribute to the observed weak correlation.

Perceived disability and associated disadvantages are important to mention and deeply influenced by factors such as control, self-efficacy, social participation, and knowledge acquisition [36, 37]. Literature demonstrates that hearing loss can lead to significant challenges in communication and social interaction, often resulting in feelings of isolation and reduced quality of life [38]. For many individuals, the use of HAs can help restore a sense of control over these aspects of daily living, although this control may not fully mitigate the perceived disadvantages in all situations [36]. Social participation, a critical factor in overall well-being, often improves post-fitting; however, some users may still experience barriers due to residual stigma or maladaptive coping strategies, such as withdrawal from conversations or feigned understanding [39, 40]. The empowerment of hearing aid users through education and skill development is crucial, as it enhances their ability to manage both their hearing aids and their interactions [41, 42]. Furthermore, the acceptance of hearing aids is often a significant hurdle, particularly in cultures where hearing loss carries a social stigma . These considerations are particularly relevant in the Turkish context, where cultural norms and societal expectations may shape the experiences of hearing aid users. By drawing on insights, future research and interventions can better address the unique challenges faced by hearing aid users in Türkiye, which foster greater acceptance and empowerment within this population.

This study has several limitations that need to be addressed. Due to logistical and administrative constraints specific to our clinic, we were unable to conduct REM as part of the hearing aid fitting process. While REM procedures are not legally prohibited, the lack of availability in our clinic may have affected the precision of the fittings, which could, in turn, influence patient satisfaction and perceptions of disability. To mitigate this, we closely monitored our patients and ensured that their hearing aids were fitted as optimally as possible under the circumstances. Additionally, patients were required to respond to questions about the unaided APHAB as if they were not using HAs, which may have posed a challenge.

To conclude, our study highlights age, degree of hearing loss, and HA side as predictive factors for HA satisfaction. Specifically, older individuals, those with severe hearing impairment, and unilateral HA users may encounter greater challenges in achieving HA satisfaction. Consequently, there is a need for comprehensive explanation and follow-up during the prescription of HAs for these demographic groups. Furthermore, the degree of hearing loss influences perceived disability and handicap while gender and HA experience are not predictive factors in our analysis. HA satisfaction, perceived disability and handicap did not exhibit a notable relationship among HA users. These insights contribute to a better understanding of the factors influencing individuals' experiences with HAs and emphasize the need for personalized interventions tailored to address specific needs and challenges associated with hearing loss in the Turkish population.

Author Contributions

Conceptualization, E.Ç.K., G.K. and P.P.A.; methodology, E.Ç.K., M.K., G.K., and P.P.A.; formal analysis, E.Ç.K., M.K., and G.K.; investigation, E.Ç.K.; resources, E.Ç.K., P.P.A.; data curation, E.Ç.K; writing—original draft preparation, E.Ç.K.; writing—review and editing, M.K., G.K. and P.P.A.; visualization, M.K.; supervision, G.K. and P.P.A.; project administration, P.P.A. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of the Ege University of Clinical Research Ethics Committee (approval no: 70198063-050.06.04/18-5/40, date 11.05.18) for studies involving humans.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The data are not publicly available due to privacy or ethical restrictions.

Conflicts of Interest

This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

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