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A Study on Needs-Based Technology Selection in Digital Hearing Aids

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Abstract: To examines the factors necessary for selecting appropriate technology based on individual needs in digital hearing aids by reviewing the national and international literature. A total of 34 sources including 12 national and 22 international studies published between 1979-2026 were included in the study. The reviewed literature was analyzed under three headings in line with the study's research questions. It was observed that studies on this topic were concentrated between 2020-2026 and primarily consisted of journal articles. Overall, it was noted that international literature predominates and shapes the existing body of literature in the field. The studies indicate that hearing aids depend not only on technical specifications but also on multidimensional factors such as the user's personal needs, social life and psychosocial characteristics. To reduce hearing aid rejection and enhance users' adaptation to the technology, it is recommended thar a comprehensive needs analysis be conducted prior to device application and that local scales be developed accordingly.

Keyword: Digital hearing aids, needs assessment, user satisfaction, hearing loss

JEL Classification: I13, I28

1. Introduction

The Hearing loss is a chronic condition affecting a large number of people worldwide. According to the World Health Organization (WHO), 430 million individuals need rehabilitation to address the problems caused by hearing loss; if current demographic trends continue, this number is expected to exceed 700 million by 2050 (World Health Organization, 2024). Although interventions such as auditory rehabilitation, expert counseling, and hearing aids are available for individuals with hearing loss, improvements in device adaptation can be achieved with the need for education and proper guidance (McCormack & Fortnum, 2013; World Health Organization, 2021). It is known that individuals with hearing loss who use hearing aids have better participation in daily life and a higher quality of healthy life compared to those who do not (Ferguson et al., 2017).

Hearing aids are the most common method used in auditory rehabilitation. Hearing aids detect sounds entering the ear, process the incoming acoustic signals, and send these processed signals to the ear canal. With the advancement of technology, analog hearing aids have been replaced by digital hearing aids, which has been effective in increasing patient satisfaction. Digital hearing aids benefit the user with advanced features such as noise reduction, directional microphones, feedback control, and customizable settings. Accordingly, amplification is applied to help restore hearing ability according to the degree and frequency of hearing loss. (Kayapunar, 2021; Kemper, M., Denk, F., Husstedt, H. & Obleser, J., 2025) A recent study conducted in our country indicates that the use of hearing aids is effective in improving the quality of life of users and meeting their communication needs (Kayacık, S.N., Karabakan, R., Kıratlı, Ü., Şahin, H.B. & Biçer, O., 2026).

Although these devices have some comfortable features for users; If the device is not fitted appropriately for the individual, sufficient benefit cannot be obtained from it (Kramer & Brown, 2021). The main goal when selecting and fitting a hearing aid is to provide a comfortable device that suits the patient's lifestyle, reduces communication difficulties, and provides optimal effectiveness in various listening environments (Northern, 2011). Therefore, the fundamental question in choosing a digital hearing aid is not "Which device has the best features?" but rather "Which device solves this person's daily problem?". Accordingly, it is stated that the success of appropriate hearing aid fitting depends not only on the technical specifications of the device but also on the accurate analysis of individual needs. The user's daily living conditions, communication needs, economic situation, device usage experience, and expectations can all affect device satisfaction. (Savaş, 2023) A needs-based approach to hearing aid selection requires considering the user's communication needs, lifestyle, motivation, and expectations to provide the most suitable technology for their requirements (Jacobson, 2001; Northern, 2011). Satisfaction with hearing aids varies from person to person. Cox & Alexander (1995; 1999) developed assessment tools that show how hearing aid performance and user satisfaction differ depending on a person's daily lifestyle and personal experience (1995; 1999). This reveals that standard device selection and application procedures do not provide the same benefit for all users.

Hearing loss is considered a multifaceted health problem that not only limits an individual's auditory functions but also has a profound impact on social participation, communication skills, and overall quality of life. In this context, a 1990 study emphasized that hearing loss has significant effects on individuals' social and emotional lives (Newman, C. W., Weinstein, B. E., Jacobson, G. P. & Hug, G. A., 1990). These findings clearly demonstrate that auditory rehabilitation is not merely a technical application but also a social and psychosocial necessity. A 2018 study mentions that problems related to hearing aid amplification, use, and maintenance can negatively affect decisions regarding the use of these devices (Bennett, R. J., Laplante-Lévesque, A., Meyer, C. J. &

Eikelboom, R. H., 2018). Hearing aids with personalized amplification and regular check-ups are more effective for auditory rehabilitation. Therefore, it is important for specialists who fit hearing aids to adjust the device settings to suit individual needs and guide the user (Kayacık et al., 2026). It is stated that insufficient technical support and infrastructure, along with the need for training and psychosocial barriers, are among the factors limiting the acceptance and effective use of health technology (Kaboré et al., 2022).

A study in the literature discusses the process of receiving diagnostic and rehabilitation services and using a hearing aid for adults with hearing loss within the framework of the "patient journey" concept. According to this study, the process of purchasing a hearing aid is not a single-step clinical decision, but a multi-dimensional process that develops over time through interaction with personal perceptions, social environment, the structure of the health system, and professional guidance (Manchaiah, V. K. C., Stephens, D. & Meredith, R., 2011). This research shows that patients generally do not receive well-structured expertise in their decision-making processes.

Existing behavioral studies on hearing aid use indicate that the acceptance and continued use of hearing aids; This shows that the compatibility of the offered technology with individual needs depends on the situation (McCormack & Fortnum, 2013; Ng & Loke, 2015). Indeed, another study in the literature states that factors such as the individual's social life, daily lifestyle, and communication ability are related to the duration of device use (Yerlikaya, A. B., Kara, H. Ç. & Çögen, T., 2024; Öz & Kalkan, 2023).

In some quantitative studies in the literature, the reasons why individuals with hearing loss delay or refuse the use of hearing aids are mostly personal reasons such as amplification-related problems, economic reasons, and cosmetic concerns (Chiriboga, L. F., Couto, C. M. do & Almeida, K. de, 2022; Uriarte, M., Denzin, L., Dunstan, A., Sellars, J. & Hickson, L., 2005). In a study conducted by Kenar & Babademez (2015), it was stated that 12% of hearing aid users never used the devices they purchased, and only 58% of those who used them regularly benefited from them. They reported that this situation may be due to personal reasons of the users or a defect in the hearing aid. (2015)

Studies highlight the importance of individual lifestyle, communication needs, and environmental conditions in the benefits of hearing aid use. Accordingly, the needs-based technology selection approach has the potential to achieve more effective and sustainable results when compared with existing application methods. It is known that a large proportion of hearing aid users do not use their devices regularly or have low satisfaction with their hearing aids. McCormack & Fortnum (2013) state that a large proportion of people given devices do not use them, and that the main reason for this is the mismatch between personal needs and the technological solutions applied

(2013). This situation shows that it is important not only to have access to technology but also to choose the right technology.

In the health technology literature, it is emphasized that when devices do not meet user needs in terms of function and form, or are not properly configured, it may be difficult to fully benefit from the technology (Bertolazzi, A., Quaglia, V. & Bongelli, R., 2024). Furthermore, insufficient education and knowledge levels of users regarding technology can lead to technical and application-related problems during the usage process, negatively impacting the sustainability of technology use (Borges do Nascimento et al., 2023). However, it is noted that the need for and use of health technologies among individuals are not homogeneous, and the adoption of digital technologies may be more limited, especially in older age groups (Bertolazzi et al., 2024; Öz, 2020). The literature indicates a relationship between socioeconomic level and hearing aid satisfaction. Increased income, education, and duration of device use are said to be effective in increasing device satisfaction (Savaş, 2023).

Studies show that hearing aid efficiency and user satisfaction are largely affected by a wide variety of factors; These factors clearly demonstrate that individuals' communication needs, lifestyles, cognitive abilities, and psychosocial conditions are significant factors (Cox & Alexander, 1995; 1999; Vestergaard Knudsen, L., Öberg, M., Nielsen, C., Naylor, G. & Kramer, S. E., 2010). In the literature, some researchers have developed assessment tools to measure the impact of these factors on device satisfaction. These include the HPI (Hearing Performance Inventory), HHIE and HHIA, APHAB (Abbreviated Profile of Hearing Aid Benefit), SADL (Satisfaction with Amplification in Daily Life), and IOA-HA (International Outcome Inventory for Hearing Aids). The HPI was developed to assess hearing performance in challenging situations encountered in daily life and is effective in measuring changes in performance after hearing aid use (Giolas, T. G., Owens, E., Lamb, S. H. & Schubert, E. D., 1979). The HHIE and HHIA scales are questionnaires used to measure the impact of hearing loss on a person's social and emotional life, revealing the hearing difficulties a person experiences in daily life and the psychosocial effects of living with these difficulties (Newman et al., 1990). APHAB measures the effectiveness of hearing aids by comparing the difficulties experienced by individuals with hearing loss in different listening environments before and after using a hearing aid (Cox & Alexander, 1995). SADL measures the satisfaction a hearing aid user feels with their device in daily life (Cox & Alexander, 1999). IOA-HA evaluates factors such as effectiveness, duration of use, satisfaction, and usability in daily life. The main purpose of this scale is to allow comparison of hearing aid usage results in different countries and samples (Cox, R. M., Stephens, D. & Kramer, S.E., 2002). In 2009, the validity and reliability of the IOA-HA scale in Turkey were established (Serbetcioglu, B., Mutlu, B., Kirkim, G., 2009).

According to Kochkin (2000), the reasons for users' dissatisfaction with hearing aids vary. These include the lack of understandable benefit, complaints about fit, feedback of whistling sounds, discomfort caused by a blocked ear mold, and difficulties in understanding speech in noisy environments (2000). However, in the MrakeTrak VIII study published in 2000, Kochkin states that hearing aids have greatly benefited from the technological revolution; this situation reduces early complaints. According to Kochkin's (2010) study, the main problem is the sales systems that cause confusion for both the person selling the device and the user. (2010) In this situation, the fact that specialists make hearing aid application decisions based on personal experience leads to the inability to conduct a systematic and personalized needs analysis for patients coming to the clinic. In this context, examining the needs-based technology selection and related factors is of great importance.

The aim of this study is to examine the relevant factors in order to make needs-based appropriate technology selection in digital hearing aids by reviewing national and international literature, and to present the studies in the literature. By analyzing the current state of information obtained from past studies, it is aimed to increase the knowledge base in the field and contribute to future studies. The following questions were examined in this research:

1. What is the distribution of studies according to publication year?
2. What is the current situation in national and international literature?
3. What is the distribution of studies according to publication type?

2. Methodology

This study was prepared by reviewing the literature to investigate the needs analysis processes in digital hearing aids. The research examined national and international studies published on hearing aids and their selection, needs analysis processes, and user satisfaction. The study primarily utilized a pool of resources provided by the author, covering the years 1979-2026. A total of 34 studies were included in the research, comprising 12 national and 22 international publications. The literature review utilized Google Scholar, DergiPark, and PubMed databases. The keywords used in the search were “hearing aid”, “digital hearing aid”, “needs analysis”, “health technologies”, “device satisfaction”, and “hearing loss”.

3. Findings

In this study, the literature on the subject was reviewed, and a total of 34 studies, 12 national and 22 international, were included in the research. The findings are summarized under 3 headings in parallel with the research questions. The findings regarding the examined studies are as follows:

3.1. Distribution of Studies by Publication Year

Studies published between 1979 and 2026 were examined, and as seen in Table 1, the vast majority of studies in the literature consist of international sources. In recent years, there has been a significant increase in the number of national studies. Overall, it can be said that international sources shape the structure related to the subject and guide the studies conducted in this field.

Table 1. Distribution of Studies by Publication Year

Published in	National Studies (f)	International Studies (f)	Percentage (%)
1979-1999	0	4	%11.7
2000-2014	1	9	%29.4
2015-2019	3	3	%17.6
2020-2026	8	6	%41.1
Total	**12**	**22**	**%100**

3.2. Current Situation in National and International Literature

The factors affecting hearing aid use and satisfaction levels vary. In this process, it is widely accepted in the literature that individual, cognitive, social, and environmental variables are present together. Indeed, Vestergaard Knudsen et al. (2010), in a study they conducted, stated that many factors such as a person's motivation, cognitive ability, social life, and expectations affect the behavior of using a hearing aid (2010). This situation shows that the evaluation method with the same dimensions is insufficient for every user. Studies indicate that hearing aid use and the efficiency obtained from the device vary greatly according to personal characteristics and device usage habits. These results support the need for an individualized approach.

In the international literature, it is stated that factors such as the procurement of digital hearing aids, sustainability of use, and user satisfaction are multidimensional stages that constitute the hearing aid use processes. In this context, Vestergaard Knudsen et al. (2010), in a study they conducted, stated that hearing aid satisfaction and use; They stated that hearing aids have a multidimensional structure, influenced by various factors such as personal motivation, cognitive ability, and social life (2010). Thus, it is not enough for a hearing aid to only have technical features; for effective and sustainable auditory rehabilitation, the user's personal needs, expectations, and living conditions must be taken into consideration. When studies in the national literature are examined, it is seen that studies generally focus on the use and satisfaction results of digital hearing aids. Indeed, in a study examining the relationship between user satisfaction with hearing

aids and the duration of device use, it was stated that satisfaction increased significantly as the daily hearing aid use time increased (Yiğit & Kılıç, 2019). This finding shows that as the time to acquire the device increases, it becomes more difficult for the individual to integrate it into life; at the same time, the habit of using the device affects the level of satisfaction. The social and emotional impact of hearing loss on users shapes their perceptions and satisfaction regarding the use of the device; accordingly, Newman et al. (1990) touched upon the psychosocial aspect of this process. In another study, however; It is stated that user satisfaction cannot be explained solely by auditory performance, and that psychosocial factors play a significant role in this situation (Küçük Ceyhan & Türe, 2023). A study examining the relationship between hearing aid users' personal characteristics and device usage satisfaction revealed that these two factors are significantly related (Kaymakçı, S., Şerbetçioğlu, M. B. & Erol, İ. C., 2023). Similarly, a 2015 study showed that device use significantly affected individuals' daily lives and improved their communication skills (Kayabaşoğlu, G., Kaymaz, R., Erkorkmaz, Ü. & Güven, M., 2015). A recent study examining the relationship between hearing aid usage satisfaction, hearing loss, and perceived disability stated that these factors mutually influence each other (Karabulut, E. Ç., Karabulut, M. & Kirazlı, G., 2025). A thesis study conducted in Turkey examined the satisfaction and hearing impairment of digital hearing aid users; it was stated that hearing aid use reduced perceived disability and significantly increased satisfaction (Bulut, 2022).

3.3. Distribution of Studies by Publication Type

As seen in Table 2, the vast majority of the studies examined consist of articles published in peer-reviewed journals. It is observed that the studies are particularly focused on hearing aid satisfaction. Some of the international sources are scale development studies. The book sources in the literature provide information related to the field of audiology.

Table 2. Distribution of Studies by Publication Type

Types of Publication	Number of Studies (f)	Percentage (%)
Research Paper (Peer Rev.)	29	%85.2
Master / PhD Thesis	3	%8.8
Book/Book Chapters	2	%5.8
Total	**34**	**%100**

4. Conclusion

The literature review conducted as part of this study shows that multidimensional factors such as the personal needs, socioeconomic levels, psychosocial characteristics, duration of device use, and experiences of hearing aid users play a significant role in user satisfaction. The literature reveals that the reasons for users rejecting or leaving the device unused stem from incorrect amplification, aesthetic concerns, and inadequate needs analysis. This project is expected to make a scientifically based contribution to the digital hearing aid selection process, provide guidance to healthcare professionals and decision-makers in practice, and contribute to needs analysis processes in digital hearing aids based on the findings obtained. In this regard, it is suggested that future studies should consider the needs-based assessment system and the multidimensional examination of the needs of individuals with hearing loss. It is recommended that needs-based analysis and local scale development studies be carried out in this field in order to select devices suitable for the personal characteristics and social lives of patients. It is considered that using these scales is important for experts who fit hearing aids in order to make the correct device fit.

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