# Examination of Previously Published Data to Identify Patterns in the Social Representation of 'Hearing Aids' Across Countries

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**Background and Objectives**: Societal factors seem to exercise a strong influence on hearing aid uptake, use, and satisfaction. In particular, knowledge, perception, and attitude of people will have bearing towards their and others health behavior and decisions. The current study aimed at understanding the perception of hearing aids by adults belonging to the general population in different countries. **Subjects and Methods**: The study employed a cross-sectional design. A sample of 404 adults from India, Iran, Portugal, and the United Kingdom were recruited by relying on a convenience sampling. Previously published data was re-analyzed but it was applied for different approach. Free association task was used to collect the data. They were asked to provide up to five words or phrases that come to mind when thinking about "hearing aids." The data was initially analyzed based on qualitative content analysis. This was followed by quantitative cluster analysis and chi square analysis. **Results**: The content analysis suggested 39 main categories of responses related to hearing aids. The cluster analysis resulted in five main clusters, namely: 1) positive attitude, 2) external factors, 3) hearing aid use and satisfaction, 4) etiology, and 5) benefits and limitations of technology. A few demographic factors (i.e., education, occupation type, country) showed association with different clusters, although country of origin seemed to be associated with most clusters. **Conclusions**: The study provides us with unique insights into the perception of hearing aids by the general public, and additionally, the way demographic variables may influence these perceptions. **J Audiol Otol 2018;22(2):96-104**

**KEY WORDS**: Hearing aids · Hearing loss · Attitudes · Social representation · Social context · Societal factors.

## Introduction

Hearing aids are the most frequently used option for addressing hearing loss. For many people with hearing loss, the use of hearing aids has resulted in a noticeable improvement of communication and quality of life [1]. However, despite the potential benefits of the use of hearing aids regarding hearing loss, it is estimated that only 20−25% of adults who could benefit from an appropriate version of a hearing aid use one [2]. This low uptake has been attributed to a number of reasons, including low perceived hearing disability, limited perceived benefit, and cost [3]. Pioneering research on technology from the perspective of the humanities and the social sciences carried out through the interdisciplinary field of study known as science and technology studies (or science, technology, society) has further shown that hearing loss, just like every other disability, may be better addressed by adjusting technology to the needs and preferences of their users. The

realization of the potential of hearing aids and all kinds of technologies that are described as "assistive" should not be sought in some inherently superior technical design, but in embedding the design of technologies tailored to the perspectives of their users [4]. Taking users into account while pursuing the wider use of hearing aids points to a pressing need for research on the perception of hearing aids by users. The study presented here was undertaken as a response to this pressing research need in understanding the interaction between "society (i.e., perception of general public)" and "technology (i.e., hearing aid)."

## Social context and hearing aids

Investigations on hearing aid adoption, use, and satisfaction have so far focused on individual factors associated with hearing aid use [3]. As a result, there is not enough knowledge on the influence of societal factors (e.g., perceptions and attitudes of general public about hearing loss or hearing aids) associated with hearing rehabilitation, particularly hearing aids. However, a few recent studies have suggested links among social context and hearing aid adoption and satisfaction from hearing aid use [5,6]. A recent study by Hickson, et al. [7] identified factors that differentiate successful from unsuccessful users of hearing aids. Its authors found that availability of social support was the factor that played the biggest role in differentiating between successful and unsuccessful use of hearing aids. In the study by Singh, et al. [5], availability of social support best predicted hearing aid satisfaction when compared to other factors such as hearing aid style, reported benefit from hearing aid use, and personality. A number of studies have looked into the effect of significant others' support and understanding towards hearing aid rehabilitation outcome [8,9]. The literature generally supports the idea that significant others significantly contribute to help seeking, hearing aid uptake, hearing aid use and its satisfaction [10,11]. While social support is reported to be the most important predictor of psychological adjustment in people with hearing loss [12], it is surprising that the literature in this area is limited. Considering the importance of social support in realizing the potential of hearing aids, it would be very useful to know if people actually perceive it as important.

## Social representation of hearing loss and hearing aids

The focus on perceptions is an integral part of the social representation theory (SRT), which refers to the stock of values, ideas, metaphors, beliefs, and practices that are shared among members of groups and communities [13]. The theory finds its place in social psychology and deals with our beliefs about the world, or our everyday knowledge, which involves built-in social interaction with others. Social representations can be perceived as a set of "cognitive elements" relative to a social object. This set is collectively produced through communication, and is socially useful in allowing individuals to understand and interpret their social environment [14]. According to SRT, a social group develops a comprehensible understanding of different aspects of reality, which leads to individuals perceiving the surrounding world in a group-characteristic way. Representations make the unfamiliar familiar by placing objects and events in a familiar context and guide meaningful interaction [15].

Studies have shown that there is a weak association between attitudes and actual behavior, and an individual's attitude alone cannot explain his or her behavior [16]. Within SRT, the attitudes are understood as part of a representation, focusing on individual cognition rather than social knowledge [17]. Hence, the proponents of this theory believe that social representations are more fundamental, which influences attitude. A focus on common knowledge and its role as a guide for our behavior makes SRT well suited to study how the public in different countries perceives hearing aids and the implications of these representations.

In a recent interdisciplinary and international multi-center research project, we explored the social representations about 'hearing loss' and 'hearing aids' in different countries [18,19]. Experts from audiology and social science worked together. Data was gathered from adults from four countries (India Iran, Portugal, and the United Kingdom). The result shows that for hearing loss, the most important aspects reported by persons with no hearing loss were: assessment and management; causes of hearing loss; communication difficulties; disability; hearing ability or disability; hearing instruments; negative mental state; the attitudes of others; and sound and acoustics of the environment. For hearing aids, the significant aspects were: disability and aging; appearance and design; cost; hearing instruments; and improved hearing and communication. Preliminary examination of the data across countries suggested some cross-cultural differences in the respondents' social representations of hearing loss and hearing aids. Furthermore, it was expected that this knowledge could lead to more effective strategies and solutions that would further develop public health strategies that would lead to improving help-seeking, use of technical aids, being satisfied with the rehabilitation, and ultimately improving the quality of life of people with hearing disabilities.

In our previous publications we have presented detailed analysis of each country's results regarding social representation of 'hearing loss' and 'hearing aids' [18,19]. While the previously published reports give insights about what were

the common perceptions in general public about 'hearing loss' and 'hearing aids' across different countries, they failed to address if the perceptions of participants would vary based on their demographic characteristics. In other words, there is a lack of understanding about any variation in perceptions among participants and also if there are any groups of participants with common types of perceptions about 'hearing loss' and 'hearing aids.' Hence, using the same data set of the social representation of hearing aids study [18], we wanted to explore: 1) patterns in the perception of hearing aids reported by adults in the general population in different countries; and 2) demographic variables that may be related to the patterns involved in the perception of hearing aids.

## Subjects and Methods

### Study design and participants

The study involved a cross-sectional survey design. Ethical approval was obtained for each country from local Institutional Ethical Boards prior to data collection (the ethical committee approval included: India 24.07.2013; Iran 14/60; Portugal 4433/2013; and the United Kingdom FST/FREP/12/325). The four countries were selected to represent the Eastern (i.e., India and Iran) and Western (i.e., Portugal and United Kingdom) cultures. The selection of countries was based on ease of data collection as the primary researcher (V.M) had collaborators in those countries. Participants were given detailed study information prior to data collection. Completing and returning the questionnaire was considered as providing consent.

The study sample included 404 adults (18 years or older) from the general population of four countries. Table 1 provides the demographic characteristics of participants.

### Data collection

The data were collected using a questionnaire using a free association task. This method has been used access the semantic content of social representation [20-22]. In this task the participants are required to report up to five words or phrases that immediately come to mind while thinking about hearing aids. In the next step, they were then asked to indicate whether each word or phrase they had reported had positive, neutral, or negative connotations. In addition, some demographic information (i.e., age, gender, education, profession, and family history of hearing loss) was also recorded.

The original version of the questionnaire was in English and used in the United Kingdom. The questionnaires were translated into Kannada, Farsi, and Portuguese languages, to be used in India, Iran, and Portugal respectively using a well-accepted method of forward and back-translation [23]. However, after the data collection the responses from participants were translated back into English, shared with the primary researcher (V.M) who were conducting the analysis. The primary researcher consulted the researcher in each country with specific knowledge about the local language when needed clarification about specific responses.

### Data analysis

The data were analyzed using various qualitative and quantitative analyses. For the purpose of this manuscript, data from all the four countries were analyzed together treating it as one data set. However, analysis of individual country data, which presents some similarities and differences in responses across countries, has been presented in our recent publication [18].

In the first instance, the responses from the free association task were analyzed using the qualitative content analysis [24]. This was followed by cluster analysis made with the Reinert's method used for textual data analysis [25-27]. This

**Table 1.** Demographic details of participants

| | All countries (n=404) | India (n=101) | Iran (n=100) | Portugal (n=103) | United Kingdom (n=100) |
|---|---|---|---|---|---|
| Age in years (Mean±SD) | 41.14±16.8 | 42.82±14.6 | 41.47±14.8 | 38.70±19.6 | 41.62±17.5 |
| Gender (% male) | 50.2 | 46.6 | 51 | 49.5 | 54 |
| Education (%) | | | | | |
| Compulsory | 17.4 | 24.8 | 7 | 29.1 | 8 |
| Secondary | 24.4 | 7.9 | 11 | 44.7 | 33 |
| Tertiary | 58.2 | 67.3 | 82 | 26.2 | 59 |
| Profession (%) | | | | | |
| Non-manual | 46.3 | 49.5 | 53 | 19.4 | 64 |
| Manual | 16.6 | 16.8 | 27 | 13.6 | 9 |
| No occupation | 37.1 | 33.7 | 20 | 67.0 | 27 |
| Family history of hearing loss (% yes) | 40.1 | 29.7 | 31 | 49.5 | 50 |

SD: standard deviation

method is a hierarchical divisive clustering based on a series of bi-partition. Each partition is made with a correspondent analysis. This cluster analysis groups the respondents based on similarities in their responses. Each of the built clusters aim to be homogeneous (regrouping individuals with a common pattern of answers). Also clusters have to be as heterogeneous as possible between them (i.e., the pattern of answers between groups should be as different as possible). Finally, chi square analysis is done to look at which of the primary (i.e., main categories identified from content analysis) and secondary (i.e., demographic details) variables had significant association with each of the clusters. The computation of the chi square analysis follows the same logic as in the lexical analysis: one evaluates the over- or under-representation of categories in the clusters versus the rest of the sample. The presence of a category in the profile of a cluster thus in-

**Table 2.** Percentage of categories reported in different countries [18] and the percentage of respondents mentioning each category

| Categories | % of responses | % of respondents mentioning this category |
| --- | --- | --- |
| Acceptance of hearing loss | 0.3 | 1.5 |
| Activity limitations | 0.76 | 3.7 |
| Ageing | 4.74 | 22.5 |
| Alternative modes of communication | 0.25 | 1.3 |
| Appearance and design | 9.73 | 39.6 |
| Assessment and management | 7.11 | 27.5 |
| Assistive listening device | 1 | 4.95 |
| Attitude of the individual | 1.7 | 8.4 |
| Beneficial | 3.23 | 14.4 |
| Body structure | 2.07 | 9.2 |
| Causes of hearing loss | 1 | 4.2 |
| Communication difficulties | 0.71 | 3.2 |
| Coping strategies | 0.15 | 0.8 |
| Cost | 6.51 | 30.9 |
| Dependency | 0.71 | 3.0 |
| Disability | 6.2 | 26 |
| Disturbance and dissatisfaction | 2.57 | 11.6 |
| Ease or difficulty in using | 5.7 | 23.5 |
| Education, employment, and career issues | 0.2 | 1.0 |
| Empowerment and compensation | 2.57 | 11.9 |
| Enhancing sound | 1.21 | 6.0 |
| Friends and family members | 0.81 | 3.7 |
| Hearing instruments | 11.45 | 39.6 |
| Improved hearing and communication | 8.22 | 32.9 |
| Improved life condition | 4.44 | 16.4 |
| Isolation | 0.15 | 0.8 |
| Need for support | 1.41 | 6.7 |
| Negative mental state | 2 | 9.4 |
| Not well understood | 1.82 | 7.7 |
| Other listening devices | 0.66 | 3.0 |
| Attitudes of others | 2.57 | 12.4 |
| Positive mental state | 1.21 | 5.0 |
| Prosthesis | 0.5 | 2.3 |
| Satisfaction | 0.61 | 2.7 |
| Sound and acoustics of the environment | 1.92 | 8.9 |
| Stress and exhaustion | 0.15 | 0.8 |
| Symptoms of hearing loss | 0.30 | 1.0 |
| Technology | 2.12 | 10.2 |
| Voice and speech functions | 1.06 | 5.2 |

Adapted from Manchaiah, et al. Clin Interv Aging 2015;10:1601-15. [18]

dicates a proportion of individuals carrying this category in the cluster significantly higher than the proportion found in the rest of the sample. Iramuteq software (http://www.iramuteq.org/) was used to perform both cluster analysis and chi square analysis [28, 29]. Iramuteq is an open-source text pattern analysis software that is based on R. It is important to note that the clusters were created using the cluster analysis, whereas the chi square analysis was performed to understand what categories were most common in each cluster and also participants with what demographic factors were likely to be in each cluster.

# Results

The content analysis resulted in 39 categories, which has been reported in detail elsewhere [18]. Table 2 presents the main categories of responses. Table 2 also includes details about the percentage of responses for each category and the percentage of respondents mentioning each category at least one time.

The cluster analysis was performed using the Iramuteq software, which included all the 404 respondents (i.e., 100% -no outliers were found), and resulted in five clusters (Fig. 1).

A total of 67 of the 404 respondents (i.e., 16.6%) belonged to cluster 1, which was characterized by a central social dimension of the outcome of using hearing aids, hence the cluster is labeled as social aspects (Table 3). The cluster includes both positive and negative aspects of the hearing aids.

The categories more likely to be responded to by respondents from this cluster include: improved life condition, empowerment and compensation, improved hearing and communication, positive mental state, isolation, benefits, and reduced ability. Chi-square analysis suggested that participants from Portugal ($\chi^2$=27.18; $p$=0.0008) are significantly more likely to be in this cluster.

Cluster 2 had a total of 62 of 404 respondents (i.e., 15.3%), which was characterized mainly by more factors that may influence hearing aid uptake and use; hence, it was termed as external factors (Table 4). The categories more likely to be responded to by respondents from this cluster include: attitude of the individual, not well understood, benefits, appearance and design, cost, communication difficulties, and need for support. The participants from India ($\chi^2$=4.28; $p$=0.03826),
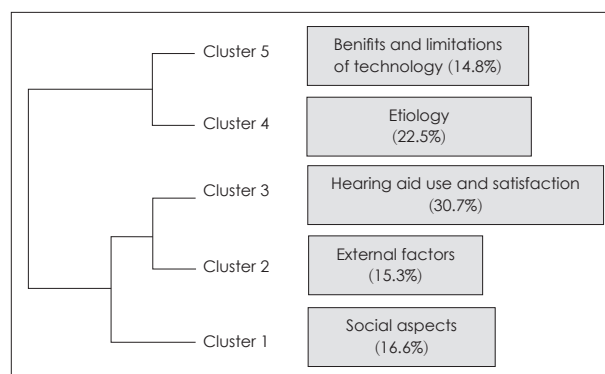


**Fig. 1.** Cluster analysis of hearing aids social representation.

**Table 3.** Social aspects (cluster 1)

| No | Variables | Frequency in the cluster | Total frequency | % of variable within this cluster | chi-square | p-value |
|---|---|---|---|---|---|---|
| 1 | Improved life condition | 47 | 66 | 71.21 | 170.18 | ≤0.0001 |
| 2 | Empowerment and compensation | 28 | 48 | 58.33 | 68.63 | ≤0.0001 |
| 3 | Improved hearing and communication | 41 | 133 | 30.83 | 29.07 | ≤0.0001 |
| 4 | Positive mental state | 12 | 30 | 40.00 | 12.84 | 0.00033 |
| 5 | Isolation | 22 | 73 | 30.14 | 11.83 | 0.00058 |
| 6 | Benefits | 17 | 58 | 29.31 | 7.93 | 0.00486 |
| 7 | Reduced ability | 9 | 30 | 30.00 | 4.22 | 0.04003 |

**Table 4.** External factors (cluster 2)

| No | Variables | Frequency in the cluster | Total frequency | % of variable within this cluster | chi-square | p-value |
|---|---|---|---|---|---|---|
| 1 | Attitude of the individual | 29 | 49 | 58.18 | 82.49 | ≤0.0001 |
| 2 | Not well understood | 22 | 49 | 44.90 | 37.48 | ≤0.0001 |
| 3 | Benefits | 22 | 58 | 37.93 | 26.59 | ≤0.0001 |
| 4 | Appearance and design | 40 | 160 | 25.00 | 19.00 | ≤0.0001 |
| 5 | Cost | 31 | 125 | 24.80 | 12.45 | 0.00041 |
| 6 | Communication difficulties | 34 | 143 | 23.78 | 12.11 | 0.00050 |
| 7 | Need for support | 16 | 55 | 29.09 | 9.26 | 0.00234 |

and also those with compulsory education ($\chi^2$=13.99; $p$= 0.00018), are significantly more likely to be in this cluster.

Cluster 3 is the biggest of all, and included 124 of the 404 of the respondents (i.e., 30.69%). This cluster was characterized mainly by factors related to hearing aid use and satisfaction and hence was termed as hearing aid use and satisfaction (Table 5). The categories more likely to be responded to by respondents from this cluster include: ease or difficulty in using, appearance and design, assessment and management, disturbance and dissatisfaction, cost, hearing ability or disability, hearing instruments, and improved hearing and communication. The participants from India ($\chi^2$=48.65; $p$≤0.0001),

and also from United Kingdom ($\chi^2$=4.31; $p$=0.03786) are significantly more likely to be in this cluster.

A total of 91 of the 404 respondents (i.e., 22.52%) belonged to cluster 4, which was characterized mainly by more causes of hearing loss and hence termed as etiology (Table 6). The categories more likely to be responded to by respondents from this cluster include: ageing, disability, body structure, voice and speech functions, other listening devices, sound and acoustics of the environment, and causes of hearing loss. The participants from Iran ($\chi^2$=49.42; $p$≤0.0001), those with secondary education ($\chi^2$=4.85; $p$=0.02765), and those with manual profession ($\chi^2$=4.89; $p$=0.02695) are sig-

**Table 5.** Hearing aid use and satisfaction (cluster 3)

| No | Variables | Frequency in the cluster | Total frequency | % of variable within this cluster | chi-square | $p$-value |
|---|---|---|---|---|---|---|
| 1 | Ease or difficulty in using | 64 | 95 | 67.37 | 78.54 | ≤0.0001 |
| 2 | Appearance and design | 75 | 160 | 46.88 | 32.61 | ≤0.0001 |
| 3 | Assessment and management | 70 | 159 | 44.03 | 21.91 | ≤0.0001 |
| 4 | Disturbance and dissatisfaction | 26 | 47 | 55.32 | 15.16 | ≤0.0001 |
| 5 | Cost | 53 | 125 | 42.40 | 11.66 | 0.00063 |
| 6 | Hearing ability or disability | 35 | 81 | 43.21 | 7.46 | 0.00630 |
| 7 | Hearing instruments | 84 | 234 | 35.90 | 7.08 | 0.00779 |
| 8 | Improved hearing and communication | 51 | 133 | 38.35 | 5.46 | 0.01947 |

**Table 6.** Etiology (cluster 4)

| No | Variables | Frequency in the cluster | Total frequency | % of variable within this cluster | chi-square | $p$-value |
|---|---|---|---|---|---|---|
| 1 | Ageing | 70 | 124 | 56.45 | 118.01 | ≤0.0001 |
| 2 | Disability | 77 | 208 | 37.02 | 51.61 | ≤0.0001 |
| 3 | Body structure | 32 | 74 | 43.24 | 22.28 | ≤0.0001 |
| 4 | Voice and speech functions | 27 | 62 | 43.55 | 18.55 | ≤0.0001 |
| 5 | Other listening devices | 8 | 12 | 66.67 | 13.81 | 0.00020 |
| 6 | Sound and acoustics of the environment | 27 | 78 | 34.62 | 8.10 | 0.00443 |
| 7 | Causes of hearing loss | 35 | 121 | 28.93 | 4.06 | 0.04402 |

**Table 7.** Benefits and limitations of technology (cluster 5)

| No | Variables | Frequency in the cluster | Total frequency | % of variable within this cluster | chi-square | $p$-value |
|---|---|---|---|---|---|---|
| 1 | Assistive listening devices | 19 | 20 | 95.00 | 106.89 | ≤0.0001 |
| 2 | Technology | 22 | 41 | 53.66 | 54.34 | ≤0.0001 |
| 3 | Prosthesis | 8 | 9 | 88.89 | 39.90 | ≤0.0001 |
| 4 | Dependency | 8 | 10 | 80.00 | 34.41 | ≤0.0001 |
| 5 | Satisfaction | 8 | 11 | 72.73 | 29.95 | ≤0.0001 |
| 6 | Enhancing sound | 12 | 23 | 52.17 | 26.86 | ≤0.0001 |
| 7 | Positive mental state | 14 | 30 | 46.67 | 25.94 | ≤0.0001 |
| 8 | Body structure | 23 | 74 | 31.08 | 18.87 | ≤0.0001 |
| 9 | Disability | 46 | 208 | 22.12 | 17.89 | ≤0.0001 |
| 10 | Empower and compensation | 14 | 48 | 29.17 | 8.83 | 0.00296 |
| 11 | Activity limitations | 15 | 60 | 25.00 | 5.74 | 0.01659 |

nificantly more likely to be in this cluster.

Cluster 5 is the smallest of all and included 60 of the 404 of the respondents (i.e., 14.85%). This cluster was characterized by discussing the advantages and limitations of hearing aids and is hence termed as benefits and limitations of technology (Table 7). The categories more likely to be responded to by respondents from this cluster include: assistive listening devices, technology, prosthesis, dependency, satisfaction, enhancing sound, positive mental state, body structure, disability, empower and compensation, and activity limitations. The participants from Iran ($\chi^2$=83.27; $p \leq 0.0001$), and those with secondary education ($\chi^2$=5.75; $p$=0.01651), are significantly more likely to be in this cluster.

## Discussion

The current interdisciplinary and international study explored patterns in the social representation of hearing aids reported by adults in the general population. The qualitative content analysis of responses to free association task resulted in 39 categories (Table 2). These results were further analysed using the cluster analysis, which resulted in five clusters (Fig. 1). However, the five clusters fell into two cluster groups. The first cluster group included three clusters: positive attitude, external factors, and hearing aid use and satisfaction. The second cluster group included the remaining two clusters: etiology and benefits and limitations of technology.

The first cluster group of people describe themselves as using these devices, what they do, and the consequences of these uses. In this cluster group, there is over representation of people from India (clusters 2 and 3), Portugal (cluster 1) and the United Kingdom (cluster 3). The cluster indicates that it is mainly positive aspects of using hearing aids that came into the respondents' minds. This indicates that there is a universal understanding of hearing aids as an important beneficial technological device for persons with hearing loss. We do not know from our study if this involves mainly a positive view of hearing aids as an outcome of respondents' experiences from persons with hearing loss, or as an outcome of e.g., advertisements from hearing aid companies. In such advertisements, the benefits of using hearing aids are highlighted, and this might result in an expectation that hearing aids are the solution for persons with hearing loss. However, research shows that hearing aids are one part of hearing loss rehabilitation [30]. Another aspect of the mainly positive character of the cluster is that to some extent it contradicts the outcome of many studies that report how people using hearing aids are stigmatized due to the use of these devices [31,32].

The content in the second cluster group focuses on the rea-son to use such devices and what they are (i.e., definition). In this cluster group there is over representation of people from Iran (clusters 4 and 5). From these observations, we can hypothesize that there is less "proximity" to the object in Iran than in the three other samples. When thinking of "hearing aids," respondents relate to hearing loss (and "causes of hearing loss") as shown in this cluster. Here we also find the category "Disability"-probably often caused by "Ageing." This is especially prominent in Iran. These observations suggest that people from cluster four do not have representation regarding the object of study (i.e., hearing aids), and they would rather focus on other aspects, suggesting that this group may be distinct when compared to other groups of people. In cluster 5, although some positive aspects occur here, the main focus is on disability, limitations, and also on dependency.

The demographic factors seem to have some influence on patterns of responses. Education is related to clusters 2, 4 and 5, whereas the factor occupation type is related to cluster 4. However, it is interesting to note that country of origin is significantly related to all the five clusters with people from a particular country, which is likely to be over represented in each cluster. These findings suggest cross-cultural differences in the perception of people towards hearing aids. These findings also strengthen the need for cross-cultural research in hearing healthcare [33].

### Implications of the study

Several societal factors (e.g., societal attitudes, social norms, practices, and ideologies) are reported to influence the help-seeking and rehabilitation uptake (e.g., hearing aids) in people with hearing loss [34,35]. However, in the current century globalization has resulted in a multi-cultural society. Hence, understanding how the societal factors influence the attitudes and behaviors of people with disabilities is crucial in providing more directed and tailored rehabilitation for individuals. The study may shed some light on the perception of people from different socio-cultural backgrounds regarding hearing aids, which may possibly influence the behavior of people with hearing loss towards rehabilitation uptake and use. Therefore, clinicians must be aware of such cultural factors while counseling and developing rehabilitation plans for individuals with hearing loss. Moreover, it is important to choose the culturally and linguistically appropriate messages and materials while developing health promotion materials [36]. We believe that the current study results may be useful while developing public health campaigns about hearing aids, and also in the promotion of hearing instruments within retail settings, particularly in prioritizing what messages may be appropriate for different groups of individuals in terms of

hearing aids.

## Strengths and limitations of the study

The main strength of the current study is the interdisciplinary approach and the cross-cultural data collection. However, the study has some limitations. First, the study used convenience-sampling method, which may have resulted in a sampling bias. Second, the data were gathered in local languages and translation was previously done. This may have introduced some bias due to various translation elements. Third, the responses in the free association task were words and/or phrases, some of which on their own may have provided a limited context for researchers while conducting a qualitative content analysis. However, this was addressed to some degree as the main researcher communicated with researchers from each country in order to check and ensure that the content analysis remained appropriate.

## Conflicts of interest

The authors have no financial conflicts of interest.

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