UNIVERSITY OF CAPE TOWN

Ideal characteristics of a listening device

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DECLARATION

I, Alexia Maria Elly Chappel, hereby declare that the work on which this dissertation/thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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Abstract

Background:

Hearing impairment constitutes a significant global health challenge, affecting millions, particularly within the elderly demographic. It is expected that without intervention, the number of individuals with hearing impairment will surge to 630 million by 2030 (WHO, 2018). Despite its adverse effects on well-being, including mental health issues such as depression and anxiety, hearing loss is often insufficiently addressed, resulting in low adoption rates for hearing aids (HAs) (McCormack & Fortnum, 2013). Over-the-counter listening devices (OTCLDs) have emerged as a potential solution to enhance accessibility and affordability, although they are met with professional reservations (Manchaiah et al., 2023). A listening device (LD) is used to improve overall communication of individuals with hearing difficulties as well as enhance speech signals through amplification equipment within the device (Kim & Kim, 2014). Research focusing on patient preferences for HAs underscores the importance of attributes like comfort, feedback reduction, and cost-effectiveness (Bridges et al., 2012). Due to the low utilisation of LDs, there has been growing interest in the users' preferences for LDs and what their ideal LD would consist of in order to promote usage for mild to moderate sensorineural hearing losses (SNHL) (Urbanski Dana et al., 2021). In summary, prioritising the expansion of innovative hearing technologies should be a central policy concern to comprehensively address untreated hearing loss.

Aim:

The aim was to determine what factors could influence the overall uptake of listening devices (LDs) for future potential users over the age of 18.

Objectives:

Determine individuals preferred characteristics of LDs.
Explore factors that influence uptake of LDs.
Determine individuals’ views on LDs.

Research design:

This study employed a mixed-methods approach, incorporating both quantitative and qualitative research methods. Quantitative data were collected through descriptive Likert scale questionnaires (LSQs), while qualitative insights were obtained through descriptive semi-structured interviews (SSIs). Employing a convergent mixed-methods approach was appropriate for the study as it allowed for the exploration and integration of data from various aspects of the methodology (Fetters, Curry, & Creswell, 2013). Data analysis included quantitative methods using descriptive statistics and chi-square tests, as well as qualitative techniques, including content analysis.

Methodology:

Participant recruitment: Participants were recruited through various social media platforms which include the researcher's personal profile on LinkedIn and Facebook as well as Facebook Community groups. Flyers (Appendix A, B, C & D) were sent out to companies and put-up all-over South Africa (Appendix E) (coffee shops and businesses).

Sampling: The study used purposive snowball sampling, selecting participants based on predefined criteria (Taherdoost, 2016). Both research designs employed non-probability sampling, which reduced time and costs (Palys, 2008; Kar & Ramalingam, 2013). Snowball sampling was used for the LSQ, with participants sharing study information and the questionnaire. However, its limitation restricted generalising findings to the broader South African population (Naderifar et al., 2017). This approach intentionally selected individuals with specific characteristics relevant to the study (Creswell, 2014; Etikan, 2016). The estimated sample size was 159 participants for the LSQ, as determined using the G-power calculator, and six to eight participants for the SSIs. Purposive sampling techniques were employed to select participants for the SSIs. Individuals who expressed their willingness to participate were included in the study. The estimated sample size for the SSIs was six to eight participants.

Results:

A total number of 159 participants took part in the LSQ part of the study and 7 of those participants took part in the SSIs. The study sample was predominantly female, with 70% of participants identifying as such, highlighting a notable predominance of female representation. No participants identified with other sex categories or chose not to disclose their sex, suggesting that all participants were either comfortable sharing this information or did not consider it pertinent to the study. The age distribution of participants is as follows: 34% are 18-

29 years old, 26% are 30-44 years old, 28% are 45-59 years old, and 12% are 60 years or older. This shows a diverse range of ages, with a concentration in younger to middle-aged adults. Data shows a strong preference for rechargeable OTCLDs, with 71% of users choosing this option due to its convenience, environmental benefits, and improved battery technology (Johnson, 2017). Sex significantly influenced recommendations based on positive experiences (X^2 (3, N =159) = 3, p = .008), with females more likely to strongly agree and males more likely to agree. Comfort was deemed crucial by participants aged 30-44 (85.7%) and 45-59 (82.6%) compared to those aged 18-29 (60.7%) and 60+ (68.4%) (χ^2 = (3, N = 159) = 10.27, *p* = .016). Older adults (60+) were more likely to endorse training programs for increasing device uptake (χ^2 = (9, N = 159) = 18.25, p = .032), but also more likely to disagree about their effectiveness (21.1% vs. 5.4% for ages 18-29). A trend suggested that age impacts perceptions of LD benefits (χ^2 = (6, N = 159) = 12.19, *p* = .058). Males showed a preference for rechargeable devices, and age was associated with valuing comfort, with those aged 30-59 valuing it more than younger and older participants. The most valued features were cost, comfort, style, and battery life, while noisy/quiet environments and water/sweat resistance were less important. To improve uptake, cost, education, and comfort were highlighted as key factors, while high cost, discomfort, and stigma were identified as barriers.

Conclusion:

In conclusion, this thesis effectively develops and applies the Likert scale questionnaire (LSQ) to uncover critical factors influencing the adoption of listening devices (LDs). The LSQ highlights that users prioritise comfort, battery life, and connectivity/Bluetooth as essential features, emphasising the need for ergonomically designed devices with extended battery life and reliable connectivity. Supplementary interview data reveal key adoption barriers, with education emerging as the most significant factor, followed by cost, with awareness of hearing impairment and stigma playing lesser roles. By comparing these findings, the research offers a comprehensive view of both the desirable features and challenges faced in LD adoption. For increased usage, it is crucial for manufacturers to focus on enhancing product design and for stakeholders to address educational needs, affordability, and awareness. This integrated approach promises to improve user satisfaction and adoption rates, aiding individuals in overcoming hearing difficulties and enhancing their quality of life.

Keywords: Hearing impairment, over the counter listening devices (OTCLDs), Hearing aids (HAs), Listening devices (LDs), Sensorineural hearing loss (SNHL), Likert scale questionnaire (LSQ)

Abbreviations

ASHA: American Speech and Hearing Association

FHS: Faculty of Health Science

HREC: Human Research Ethics Committee

LD: Listening device

LSQ: Likert scale questionnaire

HA: Hearing aids

OTC: Over the counter

OTCHA: Over the counter hearing aid

OTCLD: Over the counter listening device

SNHL: Sensorineural hearing loss

SSI: Semi structured interview

WHO: World Health Organisation

WMA: World Medical Association

Definitons

LD: A **listening device** broadly refers to any electronic tool designed to enhance sound perception. These devices can assist individuals with hearing difficulties by amplifying sounds, but they are not always classified as medical devices (U.S. Food and Drug Administration [FDA], 2023a).

OTHA: An **over-the-counter (OTC) hearing aid** is a type of sound amplification device that adults with self-perceived mild to moderate hearing loss can purchase without a prescription. These devices are regulated by the FDA and are intended to improve hearing and communication in everyday situations (FDA, 2023b).

OTCLD: An **over-the-counter listening device** includes any sound-enhancing product that can be bought without professional consultation. This category may include OTC hearing aids as well as personal sound amplification products (PSAPs), which are not intended for individuals with hearing loss but for general use in specific listening environments (FDA, 2023c).

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Introduction

Hearing loss stands among the top five causes of global disability, impacting millions (WHO, 2018). Hearing loss involves a partial or complete reduction in the ability to hear. It can be caused by issues with the outer, middle, or inner ear, the vestibulocochlear nerve (cranial nerve eight or CN VIII), or the auditory system. Hearing loss is defined as an audiologic condition where hearing thresholds fall outside the normal range (ASHA, 2024). Hearing loss is associated with a decline in various quality of life indicators, such as social well-being cognitive function (Lin, 2011), and the risk of dementia (Livingston et al., 2020; Lin, Niparko & Ferrucci., 2011; & Bott & Saunders, 2021). Moreover, hearing loss places a significant burden on healthcare systems through additional medical expenses. The prevalence is rapidly rising due to aging populations, estimated at 466 million affected globally in 2018, projected to reach 630 million by 2030 if unaddressed (WHO, 2018). In the United States, about 27.7 million people (8.5%) are affected by hearing loss (Hoffman, Dobie, Losonczy, Themann, & Flamme, 2017). Conversely, Sub-Saharan Africa has higher estimated rates, ranging between 11.4% and 20.3% for disabling hearing loss (WHO, 2018). Developing countries like South Africa face a high prevalence of hearing loss with limited resources (Emmett & West, 2015; Lukama, Kalinda & Aldous, 2019).

Hearing loss significantly affects an individuals' quality of life, contributing to poorer overall health, mood disorders such as depression and anxiety, and increased mortality risk (McCormack & Fortnum, 2013). It restricts information flow, causing loneliness, dependence, frustration, and communication difficulties. Effective management becomes crucial for hearing losses that are more permanent (Ciorba et al., 2012). Individuals with significant hearing impairment benefit from rehabilitative interventions led by audiologists, mainly involving the provision of HAs (Zuriekat et al., 2021).

Wearing HAs offers substantial benefits, including enhanced quality of life with improved communication, emotional stability, a sense of control, and better mental and physical well-being (McCormack & Fortnum, 2013). Conversely, neglecting HAs usage can negatively impact the individual and their community, increasing the risk of health decline and experiencing depression or anxiety (McCormack & Fortnum, 2013). HAs provide considerable benefits for those with hearing loss, enabling improved hearing ability. However, the extent to which previously unheard sounds can be regained largely depends on the severity of the individual's hearing loss (Aazh, Knipper, Mazurek, & Moore, 2022). HAs offer improved communication opportunities. By aiding hearing, individuals can more effectively engage in conversations across different environments, reducing frustration and the risk of social isolation (Lockey,

Jennings & Shaw, 2010). HAs play a crucial role in preventing auditory deprivation—a condition caused by prolonged lack of sound stimulation, which can lead to atrophy in the auditory cortex and reorganization of brain regions involved in hearing. These neural changes may impair speech perception and cognitive function, even if amplification is introduced later (Karawani et al., 2022). Seeking early assistance for hearing difficulties is therefore essential, as delayed intervention can reduce the potential benefits of HAs (Lin et al., 2023). HAs alleviate auditory fatigue by improving the processing of information for the brain. When hearing loss distorts incoming information, it becomes difficult to distinguish relevant sounds, leading to mental exhaustion (Kamil & Lin 2015). Though HAs are proven to enhance users' quality of life, their adoption remains limited, with utilisation rates varying from 4% to 33% among individuals with hearing impairment. Furthermore, people with hearing loss typically delay seeking assistance for an average of ten years (McCormack & Fortnum, 2013).

Despite technological advancements, the utilisation of hearing aids (HAs) remains poor, particularly among older adults (McCormack & Fortnum, 2013). Several factors contribute to the low usage, such as insufficient understanding of the device's benefits, management difficulties, and discomfort when wearing the aids (Dillon et al., 2010). Low adoption rates are often linked to delayed help-seeking behaviour, lack of awareness about hearing loss, and limited access to hearing healthcare services, especially in rural or underserved areas. Inconsistent results with hearing aids may arise from improper fitting, lack of follow-up care, unrealistic expectations, or varying degrees of user commitment and adaptation to the device. Additionally, low adoption rates and inconsistent results are influenced by psychosocial concerns, financial constraints, perceived lack of necessity, and the stigma associated with HAs (Almufarrij et al., 2019).

Due to the underutilisation of HAs, alternative rehabilitation models such as listening devices (LDs) are being explored to enhance patient choice and accessibility, particularly for individuals unable to access hearing aids (HAs) (Maidment et al., 2018). The introduction of over-the-counter listening devices (OTCLDs) is aimed at addressing issues related to accessibility and affordability (Manchaiah et al., 2023). Listening devices (LDs) encompass a range of amplification devices tailored to enhance communication for individuals experiencing hearing difficulties, particularly when standard HAs alone may not suffice (Kim & Kim, 2014). Over-the-counter hearing aids (OTCHAs) are devices designed to amplify sound for individuals experiencing mild to moderate hearing difficulties and who are aged 18 and older. These devices can be purchased directly by consumers without the need for a personalised prescription from a healthcare professional (Chan & McPherson, 2015). These devices aim to improve access to speech signals in challenging environments where factors like noise, distance, and reverberation can impact the clarity of sound (Kim & Kim, 2014). OTCLD’s can

offer basic sound amplification that may help mask tinnitus symptoms or provide general sound enrichment, especially for individuals with mild hearing difficulties (Henry, Zaugg, Myers, & Kendall, 2015). However, these devices often lack the ability to be precisely adjusted to the user's specific hearing loss. In contrast, prescription hearing aids are tailored to the individual's audiological profile, delivering targeted amplification that can more effectively diminish the perception of tinnitus by enhancing overall auditory input. Many prescription devices also feature integrated sound therapy options, such as personalised noise generators, which provide more specialised relief for tinnitus (Henry, Zaugg, Myers, & Kendall, 2015). Although listening devices may provide some relief for tinnitus, prescription hearing aids are generally more effective due to their personalized fitting and advanced features. That said, OTC devices offer a more affordable alternative, particularly for those with mild to moderate hearing loss (Aazh, Knipper, Mazurek, & Moore, 2022). Licensed audiologists or HA dispensers are crucial in programming and fitting LDs in many countries (Almufarrij et al., 2019). Local research conducted in South Africa identified the three most delivered audiological services by audiologists as the fitting of hearing aids, training in communication techniques to support listening and interaction, and the provision of educational counselling to help individuals better understand and manage their hearing loss (Almufarrij, 2019). This suggests that primary focus on hearing loss by audiologists in South Africa focus on amplification, communication education and device management (Makhoba & Joseph, 2016).

Individuals with milder hearing loss are less likely to seek HAs due to fewer acoustic limitations which may include difficult listening environments, reduced ability to localise sound or struggling with electronic devices (Turner, 2006). Reluctance towards the adoption of HAs is driven by negative attitudes and a lack of knowledge about hearing loss and HAs. Additionally, individuals facing prejudice and lacking confidence in using HAs are less inclined to use them (Zheng et al., 2022). Adapting to HAs encompasses psychological and practical challenges along with adjusting to the HAs input (Dawes et al., 2014).

Research areas identified for improving hearing healthcare include the development of self-testing and self-fitting HAs (De Sousa et al., 2023). The President's Council of Advisors on Science and Technology, in coordination with the National Academies of Sciences, Engineering, and Medicine, have highlighted the potential of over the counter (OTC) HAs to bridge accessibility gaps. To tackle accessibility and cost concerns, the U.S. Congress enacted the OTCHA Act in 2017, directing the U.S. Food and Drug Administration (FDA) to establish a new classification for OTC hearing aids (U.S. Congress, 2017). The FDA's official decision on August 16, 2022, permits OTCHAs to be marketed directly to consumers without the involvement of hearing healthcare professionals (HHPs) starting from October 17, 2022, in the United States (FDA, 2022). This will encompass pre-programmed and self-fitting

OTCLD, available at significantly reduced costs compared to prescription aids (De Sousa et al., 2023).

These devices are self-fitted and operated independently by users, eliminating the need for a hearing specialist, software, or internet connectivity (Convery; Dillon & Hartley et al., 2011). Developed over approximately ten years, self-fitting HAs share three primary characteristics: an automated fitting process, user-adjustable settings through available software/controls, and precision in assessing pure tone thresholds and prescription gain parameters (De Sousa et al., 2023). Multiple studies have confirmed the accuracy of these devices in evaluating hearing thresholds and allowing users to select their preferred settings (De Sousa et al., 2023).

Hearing loss profoundly impacts social, psychological, and physical well-being (Tran & Manchaiah, 2018). Amplification technologies have the potential to improve hearing, communication, and social life. However, only 1 in 4 hearing-impaired individuals in the West utilise assistive technology due to issues such as accessibility and affordability. The introduction of various LD in the last decade has the potential to enhance service accessibility and affordability without requiring expert guidance (Tran & Manchaiah, 2018). The global production of HAs meets less than 10% of the demand, primarily due to a shortage of healthcare professionals and high costs (Zhu et al., 2020). To address this gap, utilising LDs for milder hearing losses can expand the reach of aid, as they don't require rehabilitation by a professional, making them more accessible (Urbanski Dana et al., 2021). HAs amplify all sounds, including background noise and unwanted sounds. Adjusting to the settings may take time, particularly with severe hearing loss and prolonged auditory deprivation (Warren & Grassley, 2017). The main limitation of HAs is their high cost, making them inaccessible, especially for those who require bilateral fitting and lack insurance coverage for HAs (FDA, 2022).

OTCLDs have limitations, not suited for severe hearing loss or specific medical conditions, lacking customization due to self-fitting, and having fewer features compared to prescription aids. They also don't typically require follow-up sessions and have shorter warranties (Everett, 2023). OTCLDs offer cost savings compared to professional aids and provide smartphone app controls for adjusting volume and settings (Everett, 2023). For OTCLDs to be effective, they must possess suitable gain parameters designed for the target market with mild to moderate age-related hearing loss. Inadequate gain might result in poor audibility and unfavourable outcomes (Urbanski Dana et al., 2021).

The low adoption of HAs in the elderly contributes to untreated hearing loss, leading to negative impacts on physical and psychological health. Individuals may isolate themselves, experience self-pity, face higher unemployment rates, and suffer unfavourable health effects

(Zhu et al., 2020). Providing amplification can improve well-being by enhancing daily activities, social engagement, and reducing healthcare costs.

Hearing loss significantly impacts the brain's neural activity, affecting complex auditory functions beyond simple amplification (Zhu et al., 2020). OTCLDs studies have primarily focused on individuals with mild to moderate sensorineural hearing loss (Sabin et al., 2020). The lack of standardisation in HAs leads to difficulty in comparing prices, and audiologists' service packages might not align with the individual's needs (Warren & Grassley, 2017). This limitation also applies to OTCLDs, but a lack of standardisation makes it easier for consumers to compare products without accounting for additional costs related to testing and follow-ups (Warren & Grassley, 2017).

The introduction of OTCLDs aimed to improve accessibility to affordable hearing healthcare (Manchaiah et al., 2023). However, recent research reveals that hearing health professionals (HHPs) have notable reservations about OTCLD, concerning safety, correct management, and counselling. Subgroup analysis indicates strong opposition among more than half of the HHPs toward OTCLD (Manchaiah et al., 2023). A study suggests that pharmacists could play a significant role in ensuring the secure and efficient use of OTCLD (Berenbrok & Mormer, 2023). Community pharmacies could provide guidance to individuals interested in OTCLD. Collaborative partnerships between pharmacists and audiologists could address the challenges, including territorial issues and geographic distance, and lead to a positive impact on nationwide hearing healthcare (Berenbrok & Mormer, 2023). There's a pressing need for thorough investigation and regulation on OTCLD. Research on the impact and preferences of OTCLDs for those with mild-to-moderate hearing loss is limited. Comprehensive and impartial research is crucial to supplement the evidence provided by OTCLD manufacturers for regulatory approval (Manchaiah, Swanepoel & Sharma, 2023). Studying users' preferences and ideal features in HAs is vital to encouraging their utilisation and overcoming the barriers in OTCLD adoption (Manchaiah, Swanepoel & Sharma, 2023).

A study conducted extensive qualitative analysis to identify the preferred attributes of a HA for consumers (Bridges et al., 2012). This involved in-depth interviews and analysis of seven attributes: HA performance in quiet and noisy settings, comfort, feedback, water resistance, battery life, and cost. Some attributes, like cleaning, fitted trial periods with follow-up care, and device style, were considered irrelevant for analysis by the researchers (Bridges et al., 2012). These attributes, deemed important by patients, will be employed in our study based on the research findings.

The American Speech and Hearing Association (ASHA) guidelines advise counselling from the initial appointment through the process of HA fitting or treatment options (ASHA, 2023). Counselling helps manage psychological and social factors, facilitating better communication with improved device amplification. It equips individuals with skills to overcome listening challenges and adapt to hearing loss or amplification. Research indicates that greater acceptance of hearing loss leads to increased uptake and use of amplification devices (Knudsen et al., 2010).

Lack of knowledge about HAs and hearing itself contributes to stigma and low uptake. Understanding the consequences of hearing loss and the benefits of HAs, which stimulate the auditory nerve and prevent further deterioration is crucial (Santos et al., 2014). Delaying intervention accelerates nerve weakening and hearing loss, making speech comprehension more difficult. Increased awareness of hearing loss and its implications can reduce stigma and encourage early intervention, benefiting patient-centred care and stimulating the auditory nerve in the brain (Santos et al., 2014). Studies indicate that consistent exposure to acoustic stimulation improves both brain neural functions and acoustic abilities (Santos et al., 2014; Song et al., 2012).

The consequences of untreated hearing loss range from communication challenges to increased risks of dementia, falls, loneliness, and depression. Improving the accessibility of affordable, innovative hearing technologies should be a key part of addressing untreated hearing loss (Warren & Grassley, 2017). Gathering patient input on their needs can enhance patient-centred care and encourage the use of LDs by individuals facing different barriers in the adoption process (Zheng; Wong & Hickson, 2022).

There is limited research available on OTCLDs when compared to studies focusing on prescription HAs as it is quite a new alternative for HAs. This gap persists despite the increasing availability and usage of OTCLDs by individuals seeking cost-effective hearing assistance outside of traditional healthcare routes (Manchaiah et al., 2023). Important areas that require further investigation include the effectiveness of these devices in diverse hearing environments, user satisfaction levels, patterns of long-term usage, and their impact on overall hearing health outcomes (Berenbrok & Mormer, 2023). Addressing these research gaps could offer valuable insights into the advantages and limitations of OTCLDs relative to prescribed alternatives (Knudsen et al., 2010). Further research is needed to explore how these findings apply to various types and levels of hearing impairments, including those with prior HA experience (Sabin et al., 2020). The study by Bridges et al. (2012) focused solely on HA features and involved end-users but overlooked pre- and post-fitting aspects. Everett's study (2023) targeted audiologists and geriatric care experts, while OTCLDs are designed for middle-aged individuals with mild to moderate hearing losses, not just for geriatric patients.

Knudsen et al.'s research (2010) spans several decades and may not fully represent contemporary perspectives and needs, especially with the emergence of OTCLDs, which could influence people's perceptions. This research aims to assist manufacturers in identifying consumer preferences for OTCLDs, thereby enhancing user satisfaction. This, in turn, is expected to increase the adoption of these devices, potentially leading to higher acceptance of prescription HAs once OTCLDs no longer meet users' needs.

This study aims to explore the key attributes of LDs preferred by individuals, intending to enhance overall device utilisation and decrease HA stigma. It will concentrate on the entire fitting process, encompassing both pre- and post-fitting stages, and will engage diverse target populations suited for OTCLD.

Methodology

Aims and objectives

Research aim

The aim is to determine what factors could influence the overall uptake of Listening Devices (LDs) for future potential users over the age of 18.

Objectives

The objectives of the study are to:

1. Determine individuals preferred characteristics of LDs.
2. Explore factors that influence uptake of LDs.
3. Determine individuals' views on LDs.

Research question

What factors would influence individuals to have a higher uptake of a LD?

Research design

The study will feature a convergent mixed methodology design employing qualitative semi-structured interviews (SSI) in conjunction with a descriptive quantitative Likert-scale questionnaire (LSQ). This research design merges both types of data to offer a comprehensive understanding of the research topic (Figure 1). This approach is well-suited for the research as it enables simultaneous data collection, facilitating a comprehensive investigation of each specified study objective (Fetters, Curry, & Creswell, 2013). It is particularly fitting for the study as it involves integrating data from multiple dimensions being both quantitative and qualitative (Orsmond & Cohn, 2015).

Quantitative design

The design of a cross-sectional study intends to depict the population at a certain period of time, focusing on responses relevant to the objectives of this research (Levin, 2006). It allows for simultaneous exploration of various responses, offering a comprehensive view of the characteristics that will influence the uptake of a listening device (Wang & Cheng, 2020).

Despite its strengths, this design has limitations. It does not establish causation and may be influenced by biases from confounding variables, recall, and nonresponse (Wang & Cheng, 2020; Trochim, 2023). The primary focus is to examine the current state of observed occurrences,

highlighting specific population characteristics without inferring causal connections (Polit & Beck, 2004; Trochim, 2023). This descriptive approach aims to gather a substantial amount of data on an issue without establishing causal relationships (Polit & Beck, 2004).

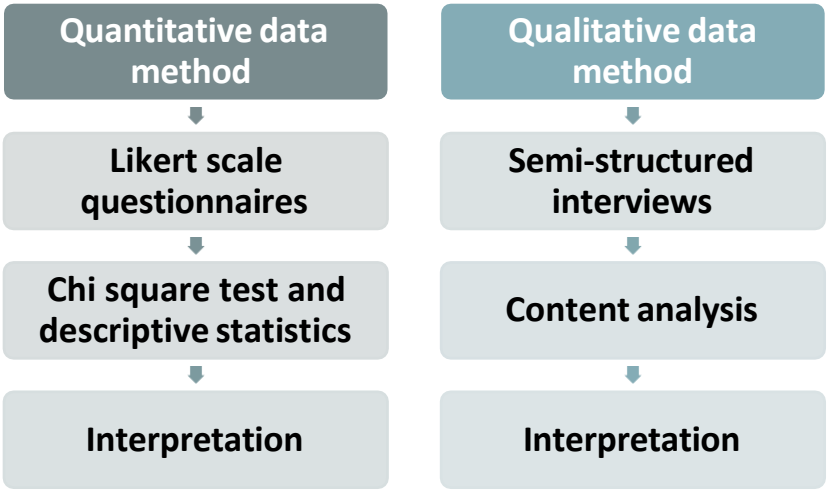
Qualitative design

A qualitative descriptive methodology was employed to investigate the perspectives of individuals aged 18 and above regarding the attributes of listening devices. This approach, increasingly utilised in practical research (O'Brien et al., 2019; Chan et al., 2017), offers a straightforward depiction. Its merit lies in its capacity to furnish a comprehensive account of individuals' experiences, enhancing our understanding of the subject (O'Brien et al., 2019).

This study employed a qualitative descriptive research design to explore factors affecting individuals' adoption of LDs, considering their experiences. However, this approach may have limitations in fully representing the entire population's experiences through qualitative information. Yet, focusing on common patterns in the qualitative data remains vital to understand individual perspectives, aligning with the study's focus. Participants were required to read through the information letter and accept the terms of the informed consent letter before they were able to partake in the LSQ or SSI.

Figure 1

Overview of Research Methods and Analysis



Participants

Inclusion criteria

To qualify for participation in the study, individuals must fulfil the subsequent criteria:

- Individuals over the age of 18 who have no experience with Listening Devices (LDs).
- Individuals proficient in English, Afrikaans, IsiZulu or Xhosa (self-identified).
- Access to Wi-Fi or data for the LSQ.
- Access to Microsoft teams for the SSI.

Using individuals with normal hearing in studies on LDs helped set performance benchmarks, evaluate device functionality in optimal conditions, establish standards, ensure safety, refine product design, and address ethical considerations. This approach provided insights into the preferences of new users without being influenced by prior experiences with LDs or HAs. Inclusion criteria encompassed non-experienced users, delineating a focus on prospective rather than current listening device users. The study aimed to elucidate the preferences of individuals devoid of prior experience in utilising such devices, thereby discerning features that would potentially render a listening device desirable for future adoption.

Exclusion criteria

Exclusion criteria included individuals aged 18 and under, as FDA guidelines for over-the-counter hearing aids (OTCHAs) were intended solely for adults (FDA, 2022). Participants with previous experience using a HA or LD were excluded from this study. This exclusion ensured that the research focused on potential future users rather than those with existing expectations shaped by prior device use, which often involved higher costs and more advanced features. This exclusion ensured that participants' responses were not influenced by familiarity with devices that may include advanced or prescription-based features. Excluding experienced users helped to avoid biased perceptions, such as preconceived expectations regarding performance, comfort, or usability based on past device usage. It also prevented comparative responses that could detract from the study’s aim to explore first-time user perspectives. Moreover, this criterion-maintained consistency in participant background, which was essential for evaluating the appeal and potential adoption of LDs among new users.

Sample size

Using G*Power 3.1.9.7 (Faul, Erdfelder, Buchner, & Lang, 2009), the power analysis for f-test (ANOVA: fixed effects, omnibus, one-way) calculated a total sample size of 159 participants. This size was based on an expected effect size of 0.25, a 0.05 error probability, a power probability of 0.8, and the presence of three groups based on their sex (male, female, other, and prefer not to say). Past research by Mozaffari et al. in 2010 and Pemmaiah and Srinivas in 2011 utilised sample sizes ranging from 80 to 220 participants, which were considered to have adequate statistical power. The calculated sample size for the quantitative arm of the study was 159 participants, fitting within the range to achieve adequate statistical power. Data saturation for the SSIs required six to eight participant contributions (Adams, 2015; Fusch & Ness, 2015; Guest, Bunce, & Johnson, 2006).

Table 1

Sample size calculation

Analysis	*Required sample size*	
Input	Effect size f	0.25
	Error probability	0.05
	Power probability	0.8
	Number of groups	3
Output	Noncentrality parameter	9.9375000
	Critical F	3.0540042
	Numerator df	2
	Denominator df	156
	Total sample size	159
	Actual power	0.8048873

Recruitment

Once ethics approval was obtained from the Faculty of Health Sciences Human Research Ethics Committee, flyers were posted on social media platforms to recruit participants (see Appendix A, B, C & D). The researcher used their personal Facebook and Instagram accounts to distribute the study, with seven individuals from varied age groups and backgrounds also sharing the post. This approach expanded the study's reach across diverse social networks, promoting greater demographic variation among participants. By tapping into these extended and heterogeneous networks, we were able to reduce sampling bias commonly associated with convenience sampling on social media platforms. Flyers were also put up at various companies and shops to widen the recruitment strategy (Appendix E). The companies involved in the study included KOLOK, IBM, and Old Mutual, all of which operate nationally, as well as Imaging Resources and Unitron SA, which are based in Gauteng. These large corporate organisations demonstrate considerable diversity among their staff in terms of age, race, gender, and socio-economic status. Additionally, a selection of coffee shops and restaurants participated in the study. These comprised Siggi's Restaurant in KwaZulu-Natal; The Daily Coffee and Billi B in Gauteng; and Gum Treez and Galito's in Mpumalanga. The ease of online engagement was likely to contribute to enhanced recruitment. Participants who were interested in participating in the online interview indicated this on the LSQ, and the researcher contacted them with more information.

Participants were recruited through online platforms and self-selected, which may have introduced sampling bias and limited the generalisability of the findings. Individuals who volunteered were more likely to have had favourable interactions with hearing-related content or interventions, potentially resulting in a skewed sample. Furthermore, those with normal hearing may not have had any direct experience with hearing aids or hearing services, which could influence the depth and relevance of their responses. Factors such as advert fatigue, scepticism toward sponsored content, and the difficulty of accurately targeting specific audiences reduced both the inclusiveness and effectiveness of recruitment efforts. Additionally, user behaviours—such as brief attention spans, habitual engagement with digital media, and heightened concerns about online privacy—presented further challenges to meaningful engagement (Arsath, 2018; Nadaraia & Yazdanifard, 2013). To address these limitations and enhance the diversity of the participant pool, physical flyers were also distributed.

By supplying contact information upon completing the full questionnaire, participants became eligible to win a R500 Takealot voucher as a token of appreciation for their participation. **Please note that only one questionnaire submission was permitted per person to maintain data integrity.**

Sampling method

Utilising purposive sampling involved deliberately selecting participants who met specific criteria relevant to the research objectives (Taherdoost, 2016). This approach was favoured for its efficiency and cost-effectiveness in exploratory studies, where researchers aimed to gain insights into specific traits, behaviours, or experiences. However, the method was criticised for its inherent subjectivity, as researchers' judgment played a crucial role in participant selection, potentially introducing bias (Palys, 2008). Purposive sampling was particularly useful when studying rare populations or phenomena where accessing relevant individuals through other sampling methods was impractical. It allowed researchers to target participants who could provide rich, in-depth information aligned with the study's focus, thereby enhancing the depth of qualitative insights (Creswell, 2014; Etikan, 2016). Despite these advantages, purposive sampling lacked the random selection component seen in probability-based methods, such as random sampling or stratified sampling. This limitation affected the generalisability of findings beyond the specific sample studied, as the sample might not have represented the broader population accurately (Kar & Ramalingam, 2013). Researchers employing purposive sampling had to carefully justify their selection criteria and acknowledge potential biases to ensure transparency and rigor in their study design and interpretation of results.

Snowball sampling was part of the methodology, as participants received information about the study and were encouraged to share it with their peers and individuals who met the inclusion criteria. Limitations of these sampling methods included their potential to restrict the generalisation of findings to the broader population of South Africa (Naderifar, Goli & Ghaljaie, 2017). Snowball sampling across diverse countries with multiple languages presented several challenges. Participants recruited via snowball sampling often exhibited similar traits or belonged to comparable social networks, leading to homophily (similarity bias) that might have skewed the sample towards specific demographic or social groups (Naderifar, Goli & Ghaljaie, 2017). This method also encountered challenges due to language barriers and cultural differences which hindered the inclusion of participants from diverse linguistic and cultural backgrounds and limited the generalisability of research findings (Naderifar, Goli & Ghaljaie, 2017). Moreover, snowball sampling's reliance on initial contacts for participant referrals led to non-representative samples that failed to capture the full diversity of the population being studied (Naderifar, Goli & Ghaljaie, 2017).

Pilot study

A pilot study was conducted to refine the research procedures and tools ahead of the main study. It involved 10 participants completing the Listening Situation Questionnaire (LSQ) and three participants taking part in semi-structured interviews (SSI), which were conducted in English. The purpose was to evaluate the clarity, usability, and overall effectiveness of the LSQ and SSI, as well as to assess the practicality of the data collection process (Kar & Ramalingam, 2013).

The pilot study played a critical role in highlighting potential improvements to the data collection instruments. It helped identify ambiguities, guided adjustments to question wording, and confirmed that the tools were suitable for first-time users of listening devices. Participants were asked for feedback after completing the LSQ and SSI, and their responses informed any necessary changes (see Appendix F and G). After the pilot, minor revisions were made, and data collection for the main study commenced immediately.

A pilot study is typically defined as a small-scale version of a larger study, conducted to test procedures, instruments, and protocols prior to full implementation (Hulley, 2007). In this case, the pilot allowed the researcher to assess the feasibility of the study design, including the structure and content of both the LSQ and SSI (Leedy, 2001).

Aim (pilot study): To assess the quality of the LSQ in terms of the structure and wording (Lancaster, 2004).

Objectives:

1. To identify any unclear questions/instructions.
2. To establish the average time to complete the LSQ.
3. To assess if anything needs to be added or removed from the LSQ.

Participants for the pilot study

Inclusion criteria Participants aged 18 and older, with no previous experience using aided listening devices, and proficient in English, Afrikaans, isiZulu, or Xhosa.

Exclusion criteria: Individuals under 18 were excluded, in line with FDA guidelines limiting over-the-counter listening devices (OTCLDs) to adults (FDA, 2022). Those with previous experience using hearing aids or listening devices were also excluded to avoid bias from prior exposure. Participants were required to complete the questionnaire independently to ensure their responses reflected personal, uninfluenced perspectives (Georgoudisa, Oldham, & Watson, 2001).

Pilot study sample size

Although pilot studies do not require a specific sample size, it is important that participants reflect the characteristics of the target population (Thabane et al., 2010). This pilot included 10 participants for the LSQ and three for the SSI, in line with recommendations for small-scale pretesting (Johanson & Brooks, 2009).

Pilot study procedure

The LSQ was distributed via social media platforms to reach a diverse sample. All 10 participants completed the LSQ and responded to follow-up questions evaluating its clarity. Three participants also volunteered for the SSI, where they shared feedback on both the interview and the questionnaire process. Insights gained during these sessions guided small refinements to the tools.

Results from the pilot study

The pilot study results indicated that the existing protocols were effective and that no major changes were necessary. Data collected during the pilot were therefore included in the main study's analysis. The average LSQ completion time was 11 minutes and 33 seconds. Participants found the questionnaire easy to follow, with no misunderstood items reported. One participant noted that Question 27 could be difficult for less tech-savvy individuals; however, 90% of participants had no issue with it. In response, clearer instructions were added to support future respondents.

The LSQ was rated 97% for overall clarity. No participants recommended removing questions. Some suggested including a photo of a listening device, but due to the wide variation in device types and the potential for bias, this was not implemented. Another suggestion was to provide information on device lifespan, but this was considered too variable due to individual factors like use habits, cleaning, and charging routines.

Data Collection

Instrumentation

The research proposal included the Likert scale questionnaire (LSQ) (Appendix H, I, J and K) and Semi-structured interview (SSI) topic guide (Appendix L). The LSQ was a four-point scale consisting of 25 questions with response options ranging from Strongly Disagree to Strongly Agree. A four-point scale was used instead of a five-point scale, as research had shown that the results between the two were minimal and intercepts were all equal for mean, variances, and covariances (Adelson & McCoach, 2010). This allowed the researcher to choose four points without a neutral option. Using an even-numbered Likert scale compelled respondents to select a specific option, resulting in more definitive answers (Ghurman, 2010; Polit & Beck, 2008). The questions used in the LSQ were adapted and revised from existing research and questionnaires based on factors that influenced the uptake of listening devices (Bridges et al., 2012; McCormack & Fortnum, 2013; Zhu et al., 2020; Knudsen et al., 2010). The LSQ was made available through Google Forms for participants to access at any time using the QR code or link provided via email or flyers. The LSQ was accessible in four distinct languages should participants express a preference. The LSQ was translated through both forward and back translation, as these processes played vital roles in cross-cultural research, ensuring the precision, cultural appropriateness, reliability, validity, and ethical soundness of research tools and outcomes (Ozolins et al., 2020; Gjersing, Caplehorn & Clausen, 2010).

The SSI involved approximately 11 questions using the tool of the interview guide, which was subject to change based on participant responses, with the possibility of using probing questions. The SSI was available only in English. The set of 11 questions had been derived from the LSQ, which, in turn, had been derived from pre-existing research.

The questionnaire was accessible online to ensure participants' anonymity from their peers, which potentially contributed to improved recruitment. In healthcare, data validation often required a 95% accuracy threshold (Tejani & Wasdell, 2010). Participants willing to engage in SSIs were contacted for interviews. Moreover, adjustments, such as adding open-ended questions or deeper probing, could have been made after the initial questionnaire drafting to address crucial inquiries effectively or tackle persistent complex issues identified in LSQ or SSI findings.

Procedure

1. The initial steps involved securing ethics approval from the Faculty of Health Sciences Human Research Ethics Committee at the University of Cape Town.
2. Following ethical clearance, participant recruitment occurred through various channels such as social media platforms (Facebook, LinkedIn) and flyers (Appendix A, B, C, D), requiring participant consent (Appendix M, N, O and P).
3. Pilot study: The first 10 participants underwent a trial to refine the questionnaire/interview process and data management, following methods suggested by Kar & Ramalingam (2013). Pilot study data did not contribute to the primary study. Main study data collection began after the pilot study.
4. LSQs: Participants needed to answer all questions, and in cases where one or more questions were not answered, the questionnaires were deemed incomplete, and those participants were excluded from the study. Eligibility to participate was determined through self-identification. LSQs took around 20-30 minutes to complete online on Google Forms; however, no time limit was imposed. LSQs were accessible online with no interview or case history necessary and included participation in the SSIs. Participants had the opportunity to specify their preference for receiving updates on the study's findings. Upon their request, the researcher sent a summary of the results via email.
5. SSIs: The individual interviews took place for participants who were willing to be interviewed and indicated this at the bottom of the LSQ. A date and time were established for availability for both parties. SSIs took around 30 minutes and involved open-ended questions conducted through Microsoft Teams.

Reliability and validity

Research validity was essential for the accurate measurement of intended concepts (Heale & Twycross, 2015). Zamanzadeh (2015), characterised face validity as an initial evaluation to determine if a questionnaire adequately captured its intended dimensions. The study involved four professionals to assess the translation and evaluate the face validity of the questionnaire. In 2018, more than 64% of South Africans spoke one of the four predominant languages. These languages constituted the majority and were among the most widely used in the country, which reduced selection bias compared to using only one or two languages (Cowling, 2023). However, it was important to note that 36% of the population did not have one of these languages as their first language, indicating some linguistic diversity but highlighting the prevalence of these four languages in South Africa (Cowling, 2023). This represented a weaker form of validity and advocated for combining it with other validity measures (Hall et al., 2017). Convergent validity was achieved through clear questions, aiming to enhance reliability. To reduce selection bias, questionnaires were available in four languages (IsiXhosa, IsiZulu, Afrikaans, and English) for inclusive representation of the study's demographics, ensuring that individuals were not excluded from participating in the study due to internal (e.g., language) barriers, thereby obtaining a more representative sample of the study population (Smith & Noble, 2014). For cross-linguistic validation, the questionnaire was offered in four languages. Translator bias occurred when a translator's personal views, cultural background, or subjective preferences influenced the translation, causing systematic errors or distortions. This led to translations that did not accurately represent the original text, potentially resulting in misinterpretations or misunderstandings. In research, this type of bias compromised the validity and reliability of translated materials by introducing unintended nuances or omitting important information (Layton & Clarke, 2016). To reduce translator bias, the SSI was only available in English and was conducted and transcribed by the researcher.

Internal validity examined causal relationships free from confounding variables, while external validity assessed applicability across populations, settings, and timeframes (Sürücü & Maslakci, 2020). To ensure diversity in responses, the age range was large, including anyone over 18, which established multiple facets of validity. The ongoing validation process demanded continuous assessment and refinement (Sürücü & Maslakci, 2020). Internal validity in interviews focused on whether questions accurately measured intended constructs, achieved through clear questioning and consistent interviewing practices (McDermott, 2011). Regarding questionnaires, internal validity ensured that questions aligned with intended constructs, incorporating techniques such as pilot testing conducted prior to data collection

and reliability checks through re-entering 10% of the data to ensure accuracy and minimise errors. External validity in interviews examined whether findings extended beyond the interview context, influenced by sample representation and the relevance of the context (McDermott, 2011). External validity of questionnaires assessed the generalisability of findings to other populations or contexts, supported by diverse sampling and cross-cultural validation, including administering the LSQ in four different languages to ensure inclusivity across demographics.

To minimise biases in data collection, the researchers strictly followed a well-designed research protocol (Smith & Noble, 2014). Reliability was ensured by using identical questionnaires and interviews, aiming to verify data consistency among multiple participants. Piloting the instrument helped identify and improve measurement errors (Kimberlin & Winterstein, 2008).

Assessing test-retest reliability involved a group of six to eight SSI participants completing the same questionnaire and then repeating the LSQ before participating in the SSI to ensure result reliability (Adams, 2015). Internal consistency was evaluated using Cronbach's alpha, aiming for improved consistency (Price et al., 2015), and assessed item consistency, with higher values indicating better reliability. This was evaluated by rephrasing identical questions to determine consistency in outcomes.

Ensuring trustworthiness involved rigorously assessing the accuracy, consistency of findings across different contexts, and the applicability of information, which collectively enhanced confidence in the reliability and credibility of the research findings or information being examined (Elo & Kyngäs, 2008). The researcher, under mentor supervision, ensured accurate data analysis and categorisation of results. The study's credibility was established through the design of the LSQ and SSI frameworks, ensuring clarity and conciseness (Shufutinsky, 2020). Careful selection of questions, each tailored with specific purposes, was conducted. Participants received detailed explanations of questions if needed during the SSI sessions, and any additional remarks made by the researcher were incorporated into the analysis. The audio-visual recordings utilised in the SSI were of high quality, ensuring the accurate capture of all data, as emphasised (Shufutinsky, 2020).

Data management

Data was stored securely in password-protected files on an external hard drive and a duplicate copy was kept on OneDrive, an online platform. The researcher used Windows Defender and antivirus software on their laptop for added security. The external hard drive was kept in a locked drawer at the researcher's residence. Data was exported to an Excel spreadsheet to minimise errors. All data and field notes underwent systematic organisation and review to ensure consistency with the interviews, and both sets of questionnaires from SSI participants were compared. The researcher transcribed spoken audio content verbatim, capturing verbal dialogue for participant anonymity using codes as necessary (Sutton & Austin, 2015). For data accuracy assurance, a random 10% subset was chosen and re-entered (Barchard & Verenikina, 2013). A minimum accuracy of 99.7% was essential to derive reliable conclusions (Macdonald, 2018). If the sampled data fell short of this standard, all entries underwent re-evaluation. Access to raw data and participant information was restricted solely to authorised personnel involved in the study.

Completed questionnaires, electronic data, and SSI recordings will be retained for a period of five years, after which it will be deleted by the supervisor in accordance with the UCT data management policy. To uphold the study's integrity, access to raw data and participant information will be limited to authorised research project members, both currently and in the future.

Data analysis

In the analysis of the Likert scale questionnaire (LSQ), the standard method involved calculating descriptive statistics, including mean, standard deviation, and minimum/maximum values, to characterize interval data (Nick, 2007). Chi-square tests were used for analysing ordinal data derived from Likert scales (Sullivan & Artino, 2013). Inferential statistics were used to assess the strength of associations between participant-specific factors (such as age and sex) and the characteristics they deemed most important, with chi-square tests applied. Analyses were completed using SPSS Version 28, with the threshold for statistical significance set at $p = 0.05$.

Content analysis was the methodical approach for analysing qualitative data in a systematic and reliable manner (Haggarty, 2009). Summative content analysis involves counting specific words or phrases within the data and examining their context to understand their broader significance. This method allows researchers to quantify themes while reflecting on their meanings (Hsieh & Shannon, 2005). The aim of this analysis is to quantify and analyse

the frequency of terms within a text while also considering their contextual meanings (Rapport, 2010). By tallying the occurrences of certain words or themes and analysing their context, this approach effectively integrates both quantitative and qualitative methods (Hsieh & Shannon, 2005). It is particularly beneficial in studies where researchers wish to explore not just frequency, but also the context in which specific terms or concepts are communicated. This technique enables researchers to draw generalisations about the data based on the categories being examined (Haggarty, 2009). For each SSI question, the researcher followed these steps during the summative content analysis (Hsieh & Shannon, 2005):

Step 1: Define Research Objectives
Clearly articulate the research questions and objectives to guide the focus of the analysis.

Step 2: Select and Prepare Data Sources
Organise and format the qualitative data from SSI transcripts for analysis.

Step 3: Identify Key Terms and Develop a Coding Scheme

Determine relevant keywords or phrases for analysis and create a coding scheme that categorises these terms to ensure consistency.

Step 4: Conduct Frequency Counts and Contextual Analysis
Count the occurrences of the identified terms and analyse the context within the data, combining quantitative insights with qualitative understanding to provide a comprehensive analysis of themes

The SSI recordings were transcribed, and the researcher meticulously reviewed the data multiple times to understand the participants' experiences, guiding subsequent discussions and relevant inquiries. Data collection and analysis occurred concurrently (Creswell, 2014; Sutton & Austin, 2015; Fusch & Ness, 2015). Employing coding techniques, the researcher manually labelled sentences, actions, processes, or topics within the conversations (Sutton & Austin, 2015).

In this context, research integration involved concurrently utilising both quantitative (LSQ) and qualitative (SSI) methods in the study to enhance the comprehensive understanding of the research topic and determine if there were any correlations between the two methods (Ivankova, Creswell & Stick, 2006).

During data collection, integration involved linking the outcomes of the initial phase (quantitative LSQ) to guide the subsequent phase's data collection (qualitative SSI). This ensured that the qualitative phase was rooted in the findings of the quantitative phase, enhancing the overall coherence of the study (Ivankova et al., 2006).

Integration occurred during the analysis stage, where both phases were interpreted sequentially, enabling the researcher to amalgamate findings from each phase, resulting in a more comprehensive understanding of the research. This approach presented a more holistic depiction of the results by examining findings from both phases of the research (Ivankova et al., 2006). Through the mixed-method design, the integration of both quantitative and qualitative methods allowed researchers to gain a deeper understanding by leveraging the strengths of each phase and analysing the collected data sequentially (Ivankova et al., 2006).

Ethical considerations

The study obtained ethical clearance from FHS HREC and adhered to the ethical standards outlined in the Declaration of Helsinki (2013) to ensure transparency, data integrity, and participant dignity and well-being (Krleža-Jerić & Lemmens, 2009; World Medical Association, 2013). It also upheld ethical norms, ensuring respect, beneficence, and justice in human research (Irving, 2013).

Autonomy (informed consent)

Participants received comprehensive information in the information letter, ensuring their full understanding of the research. They provided voluntary consent by signing the consent form and could withdraw at any time without consequences (Appendix M, N, O and P). They had the freedom to withdraw from the study at any point before submitting their questionnaire without facing adverse consequences.

Confidentiality

Participant identifying information was electronically stored in a manner that guaranteed confidentiality. This was achieved by removing all identifying details from transcripts and securely storing them in a password-protected folder, with each transcript assigned a number for correlation within the respective folder. The researcher prioritised and maintained strict confidentiality during participant assessments. No participant identities or responses were disclosed in the research report.

Anonymity

Stringent measures secured exclusive researcher access to participant data, relying on participants' informed consent for study involvement. All collected data was stored in a password-protected Excel spreadsheet on a dedicated computer accessible only to the researcher. When sharing research outcomes, only authorised assessment results were included, omitting participant names or identifiable details. LSQ participants remained anonymous unless they opted in for a Takealot voucher. Interview participants were not kept anonymous during the study; however, all their details, including audio recordings, were treated with strict confidentiality, and were not revealed in the publication of the study results.

Beneficence

Researchers were obligated to prioritise participants' well-being, guided by the principle of beneficence (Irving, 2013). An online LSQ randomly awarded a R500 Takealot voucher to a participant if they opted to share their information (optional). Participation in Semi-structured interviews (SSIs) offered another chance to win a R500 Takealot voucher, and data was available for those participating in the SSIs. The participant benefited indirectly through the future of the service delivery, which may have affected them.

Non-maleficence

The research posed no potential harm to participants, aligning with the Helsinki principle of beneficence to safeguard against study-related risks (Irving, 2013; Rhodes, 2010). Completing the LSQ involved a low level of risk.

Justice

Justice ensured the fair distribution of benefits and drawbacks among a community's relevant individuals (Irving, 2013; Rhodes, 2010). This study included every willing participant who met the specified criteria, in accordance with the fairness principle outlined in the Helsinki Declaration (WMA, 2013). Eligibility for participation was open to all who met the inclusion criteria. Based on principles of distributive justice, participants' responses informed service delivery and helped identify the pros and cons of preferred characteristics of listening devices (Irving, 2013). Both LSQ research and SSI administration adhered to ethical guidelines. Researchers conducting LSQ surveys prioritised participant well-being, informed consent, and data privacy. Similarly, SSI administrators ensured ethical eligibility decisions based on accurate information and the best interests of applicants (Rhodes, 2010)

Results

Introduction

This chapter will outline the results of the study in relation to its aims and objectives. It begins with participant description. Thereafter the preferred characteristics and features of Listening devices (LDs) are presented, followed by an overview of the findings from the Likert scale questionnaire (LSQ), focusing on the participants' views on the ideal characteristics and features of LDs. The chapter will then present a content analysis of the participants' responses from the Semi-structured interview (SSI).

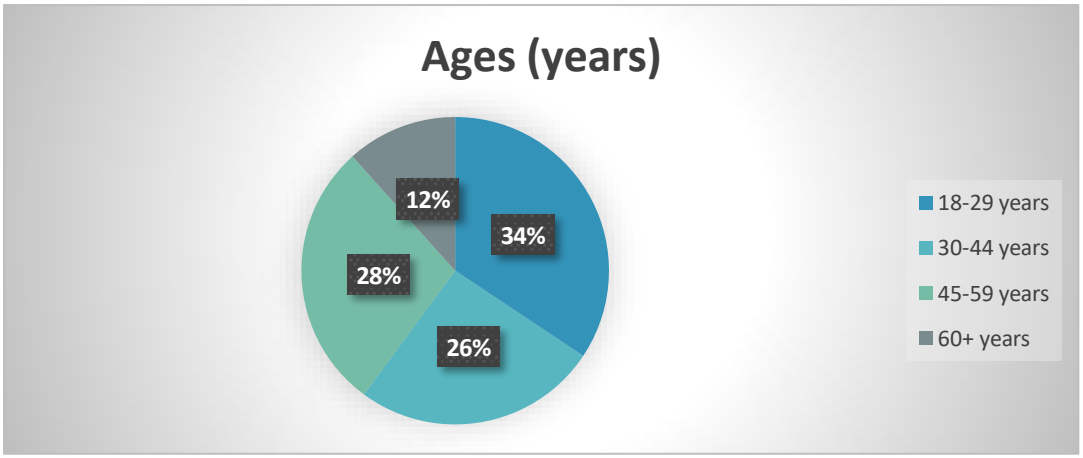
Participant description

A total of 185 individuals consented to participate in this study. However, 26 individuals who had previously used LDs were excluded as they did not meet the inclusion criteria. Consequently, the final study sample comprised 159 participants for the LSQ and seven participants for the SSI.

Most of the participants identified as female, comprising 70% of the sample. This indicates a significant predominance of female representation in the study. There were no participants who identified as other sex categories or who wished not to disclose as *other* sex categories or who wished not to disclose their sex implies that all participants were comfortable providing their sex information or felt it was not relevant to the study.

Figure 2

Distribution of Participants by Age

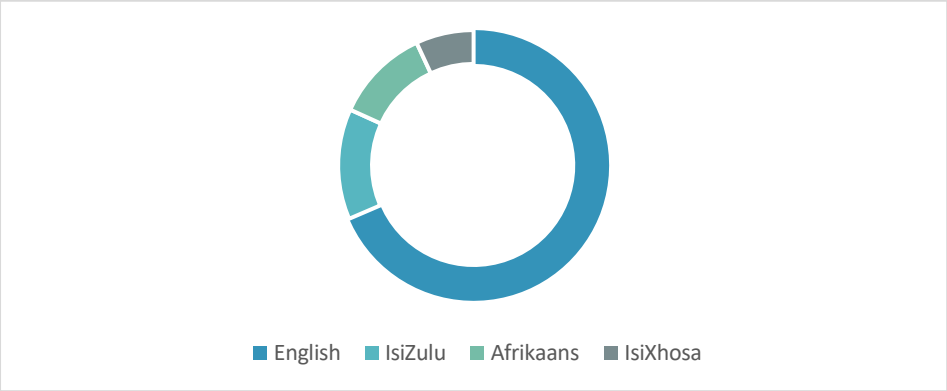


The participants in this study were distributed across various age groups as follows: 54 participants were between the ages of 18 and 29, making this the largest age group in the sample. Individuals aged 30 to 44 years comprised 42 participants, reflecting a notable representation of early to mid-career adults. There were 44 participants aged 45 to 59 years, indicating a significant presence of late-career adults who may be approaching retirement age. Finally, 19 participants were 60 years or older, representing the smallest age group. This distribution illustrated a diverse range of ages, with a concentration in younger to middle-aged adults (see figure 2). The analysis of the age distribution among participants yielded the following statistical results: The mean age was 39.75 years, indicating the average age of the sample. The standard deviation was 12.7 years, reflecting the extent of variability in ages within the sample. These results demonstrate a diverse age range among participants, with a notable spread around the central age values.

In analysing the LSQ responses, we received data from four language groups: English (109 participants), Afrikaans (21 participants), isiZulu (18 participants), and isiXhosa (11 participants) (see figure 3). Upon review, there were no notable differences in responses attributable to language. Consequently, the combined data was analysed rather than segregating the results by language group. This approach ensured a comprehensive and unified interpretation of the findings.

Figure 3

Participant Distribution by Language



Aim: The aim is to determine what factors could influence the overall uptake of listening devices (LDs) for future potential users over the age of 18.

Objective 1: Determine individuals preferred characteristics of LDs.

Summary of the scores per question in the LSQ

Figure 4 illustrates the distribution of participants' responses to the question about the cost of the devices. The results showed that the majority of participants (96.9%) believed that the cost would influence the use of a LD.

Figure 4

The Cost of Listening Devices will Affect their Usage

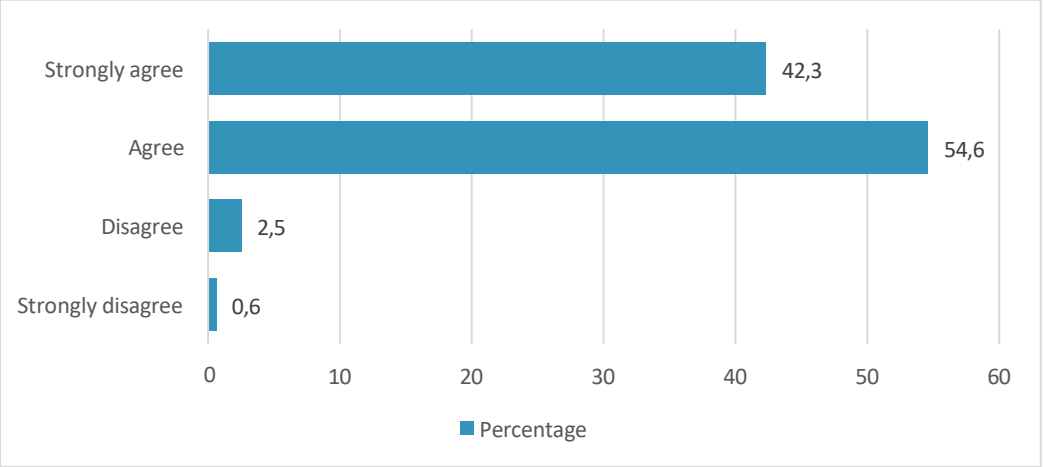


Figure 5 depicts the distribution of responses concerning the impact of knowledge on the use of the devices. The findings revealed that most of the participants (96.3%) thought that having more knowledge would positively affect the usage of a LD.

Figure 5

Having Better Knowledge about Listening Devices will Increase their Usage

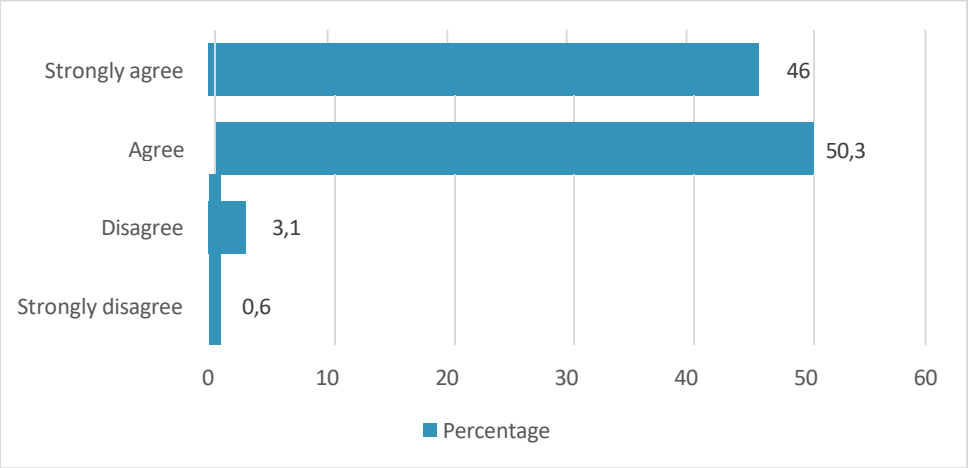


Figure 6 shows the distribution of responses regarding recommendations to others. The results indicated that almost all the participants (98.8%) believed that positive recommendations will enhance the usage of a LD.

Figure 6

Inclination to Recommend Listening Devices Based on Positive Experiences

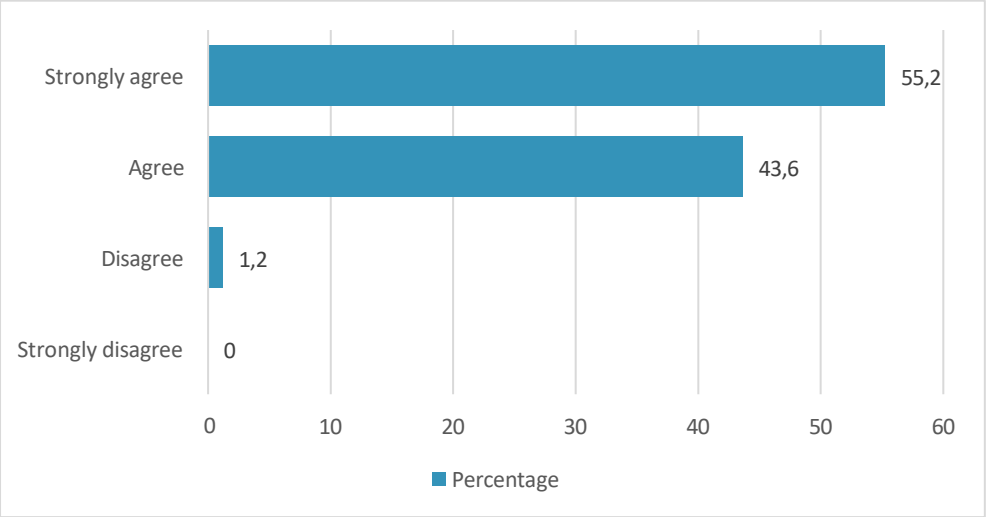


Figure 7 presents the distribution of responses concerning the accessibility of LDs. The results demonstrated that a substantial majority of participants (96.3%) believed that better access will lead to increased usage of these devices.

Figure 7

Improved Access to Listening Devices Impact their Usage

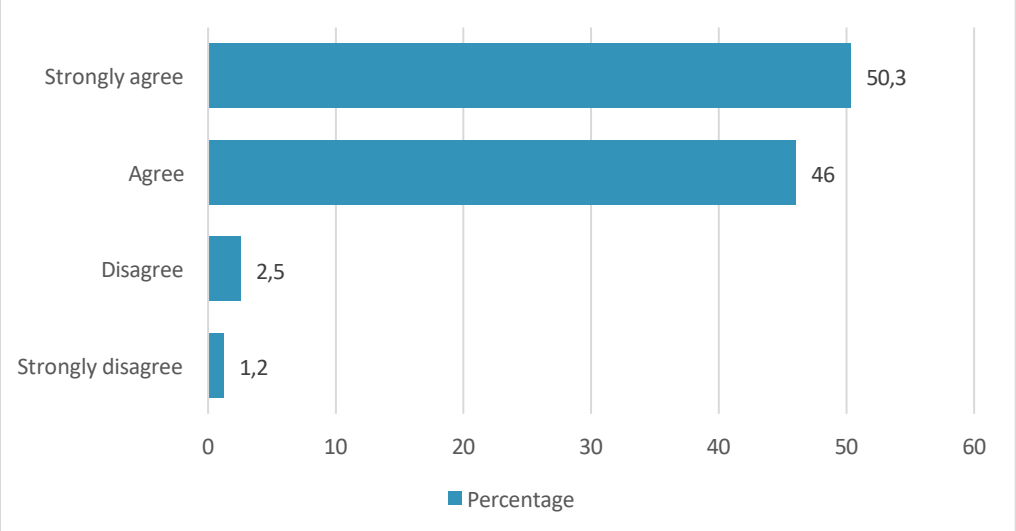


Figure 8 illustrates the distribution of responses related to the comfort of LDs. The data revealed that every participant (100%) viewed comfort as a crucial factor for the adoption of these devices.

Figure 8

Comfort is important when considering using listening devices

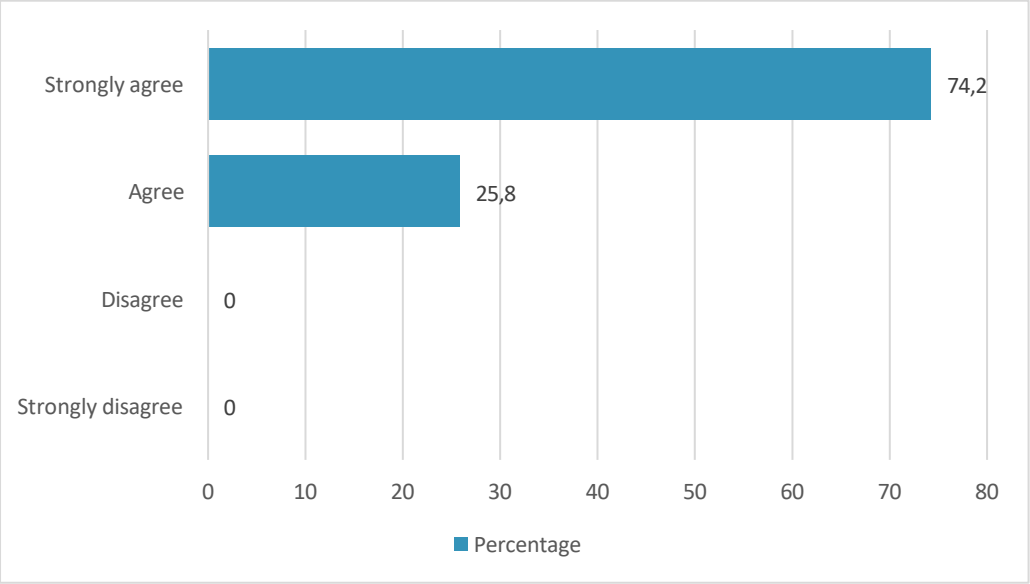


Figure 9 shows the distribution of responses regarding the impact of training programs on the adoption of LDs. The results indicated that many participants (92.7%) considered training programs to be essential for increasing the uptake of these devices.

Figure 9

Training programs for potential users of listening devices will improve the uptake

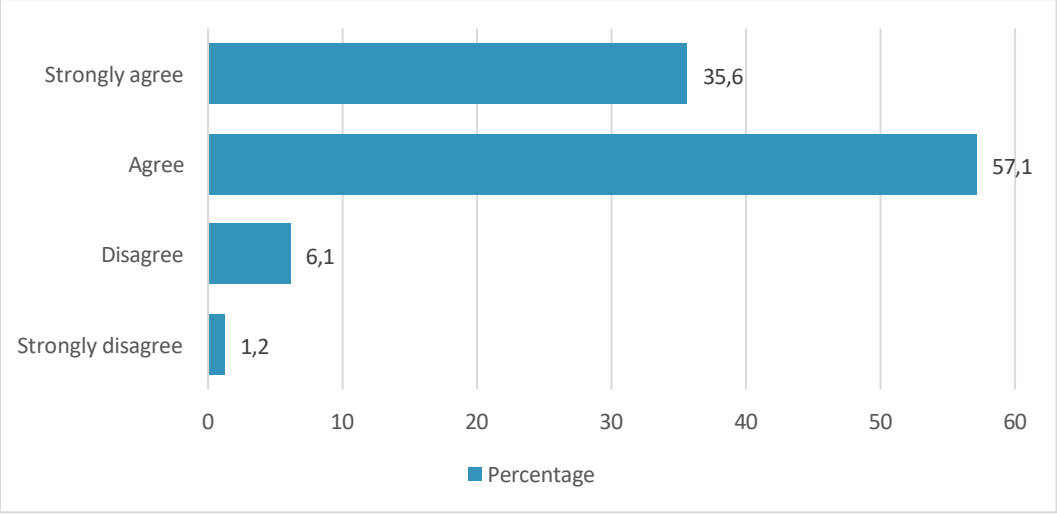


Figure 10 displays the distribution of responses regarding the advanced features of LDs. The findings revealed that most participants (93.3%) viewed advanced features as crucial for boosting the adoption of these devices.

Figure 10

Advanced features like noise cancellation and Bluetooth will improve the uptake of listening devices

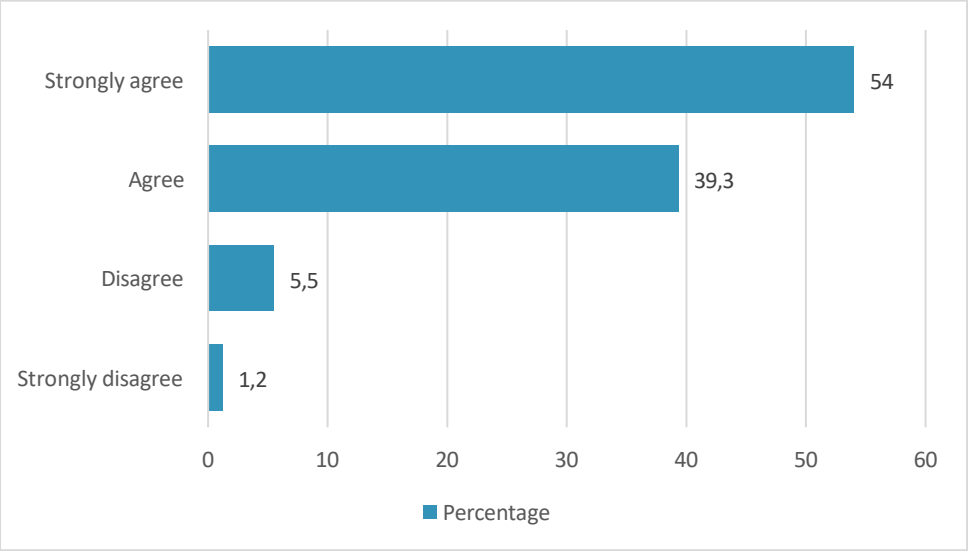


Figure 11 illustrates the distribution of responses concerning the stigma associated with LDs. The results showed a range of opinions, with 77.3% of participants agreeing and 22.7% disagreeing.

Figure 11

Stigma of wearing listening devices impacts their use

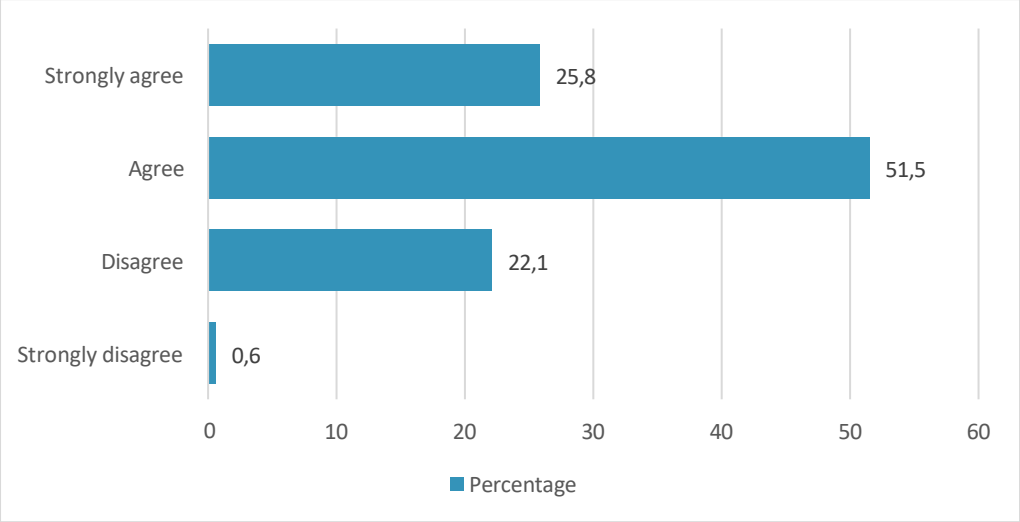


Figure 12 presents the distribution of responses on how different styles affect the adoption of LDs. The results suggested that many of the participants (92%) viewed style as a key factor in enhancing the uptake of these devices.

Figure 12

Having different styles of listening devices will encouraging their use

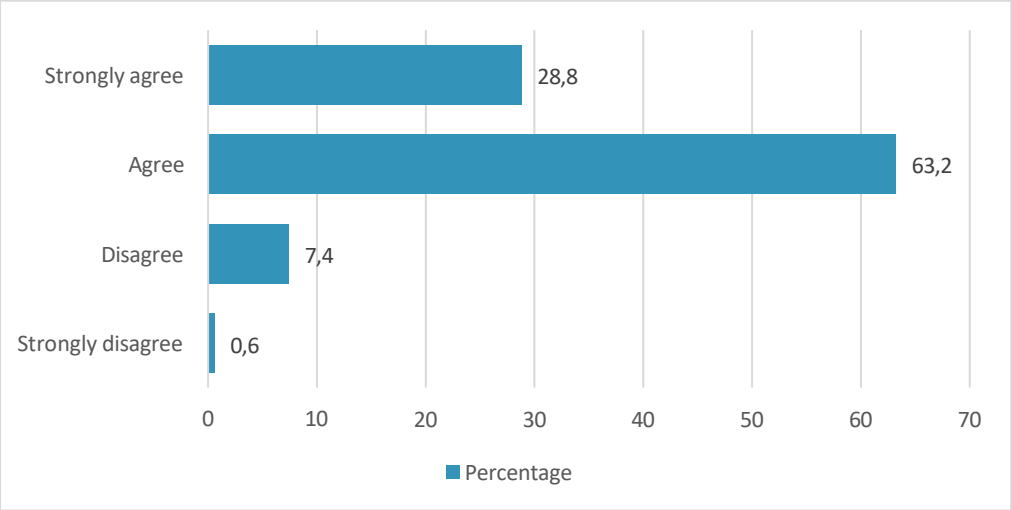


Figure 13 displays the distribution of responses regarding the influence of reviews and testimonials on the adoption of LDs. The results indicated that most participants (94.5%) considered word of mouth to be a crucial factor in boosting the uptake of these devices.

Figure 13

Reviews and testimonials will influence the use of listening devices

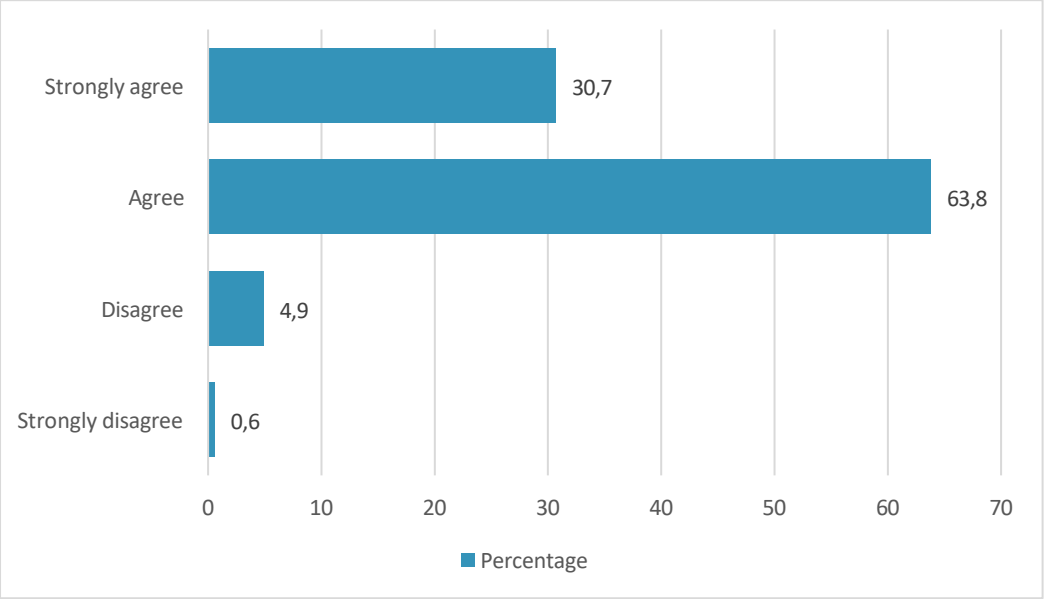


Figure 14 illustrates the distribution of responses concerning the role of healthcare professional recommendations in the adoption of LDs. The findings revealed that most participants (95.9%) regarded professional endorsements as a vital factor in increasing the uptake of these devices.

Figure 14

Recommendations made by a healthcare professional will improve uptake of a listening device

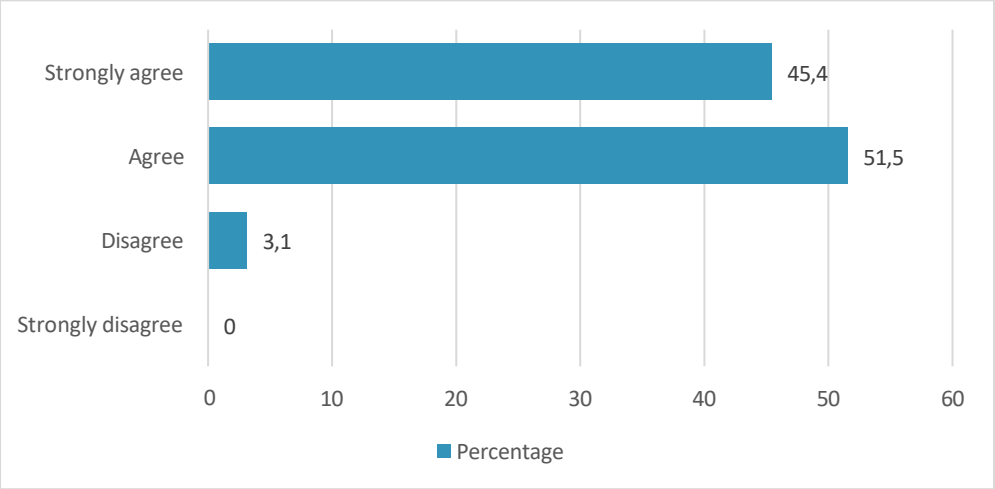


Figure 15 depicts the distribution of responses related to the impact of improved battery life and ease of charging on the adoption of LDs. The results showed that almost all of the participants (98.8%) viewed enhanced battery performance and convenient charging as essential for boosting the use of these devices.

Figure 15

Improved battery life and charging ease will increase listening device use

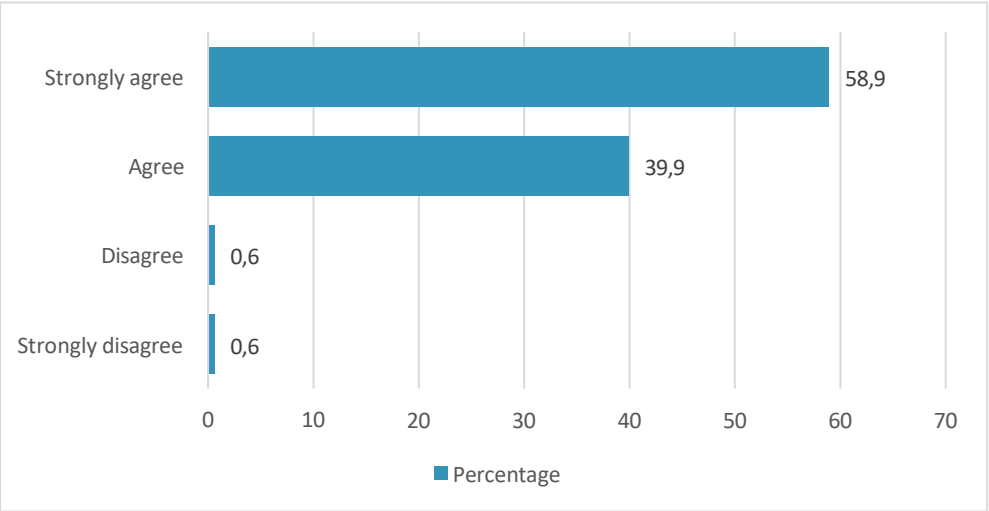


Figure 16 illustrates the distribution of responses regarding how personalised fittings by a professional may affect the adoption of LDs. The results indicated that many participants (90.8%) considered personalised fittings to be a significant factor in enhancing the use of these devices.

Figure 16

Personalised fitting by a health care practitioner will influence the likelihood of using a listening device

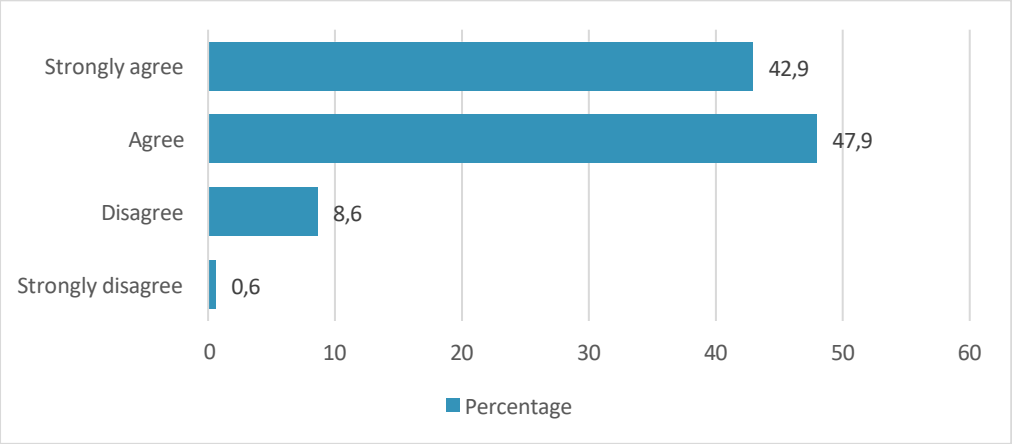


Figure 17 illustrates the distribution of responses on how the seamless integration of devices might influence the adoption of LDs. The findings showed that a substantial majority of participants (93.2%) viewed the integration of technological devices as a key factor in increasing the usage of these devices.

Figure 17

A listening device that seamlessly integrates with other technology will improve uptake (eg: TV Connector)

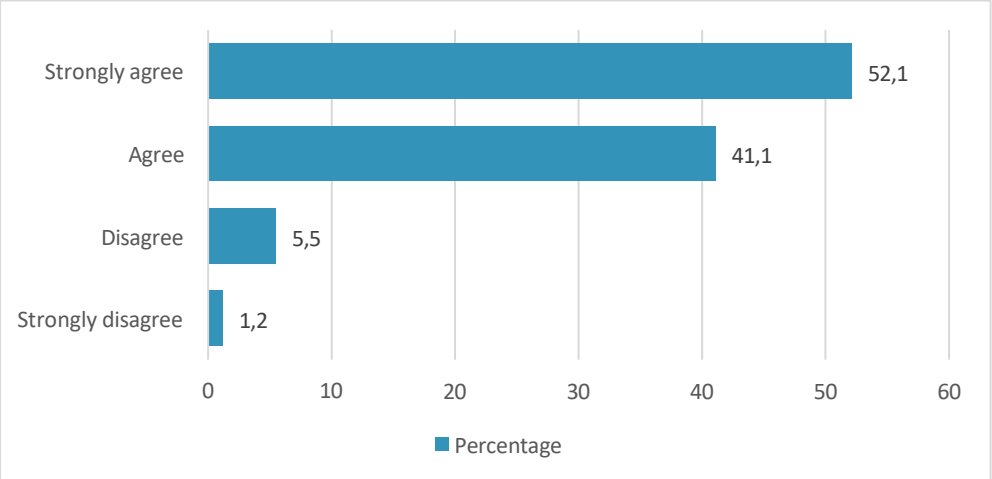


Figure 18 depicts the distribution of responses regarding the impact of cost and insurance on the adoption of LDs. The results revealed that the majority of participants (96.4%) believed that financial factors will influence the use of these devices.

Figure 18

Cost and insurance coverage play a crucial role in using listening devices

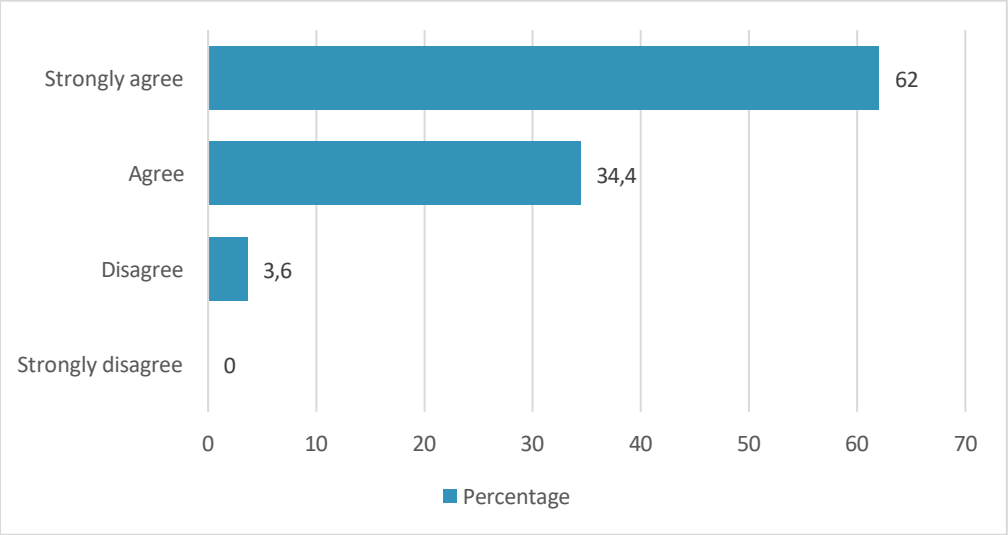


Figure 19 shows the distribution of responses concerning how educational campaigns affect the adoption of LDs. The findings indicated that many participants (90.2%) believed that educational efforts will impact the usage of these devices.

Figure 19

Educational campaigns influence the adoption of listening devices

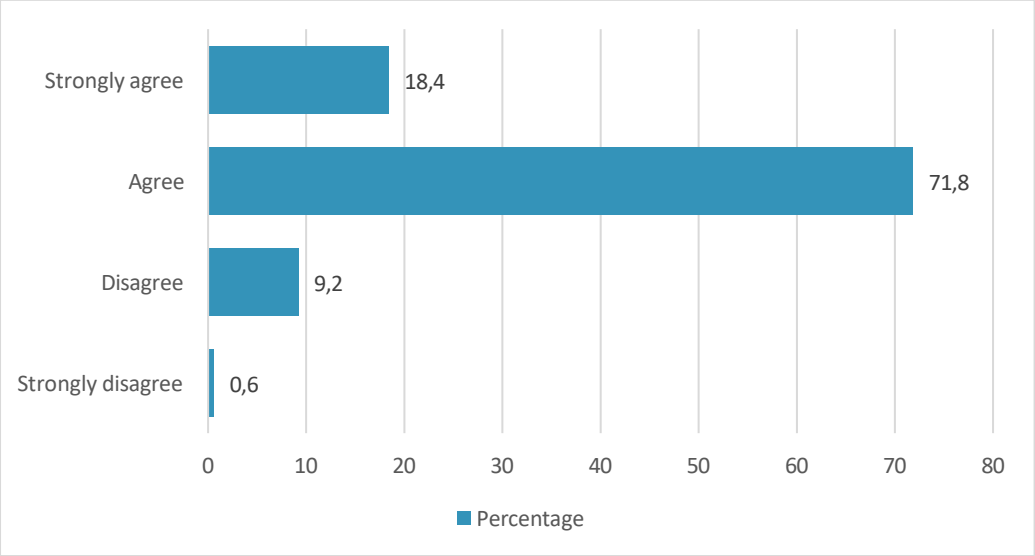


Figure 20 illustrated the distribution of responses regarding the influence of societal attitudes on the adoption of LDs. The results revealed a range of opinions, with 66.3% of participants agreeing that societal attitudes would impact the adoption of these devices, while 33.7% disagreed. This variation in opinions suggested that, while societal attitudes might influence the adoption of LDs, the effect was not deemed significant by the participants in this study.

Figure 20

Societal attitudes affect your willingness to use listening devices

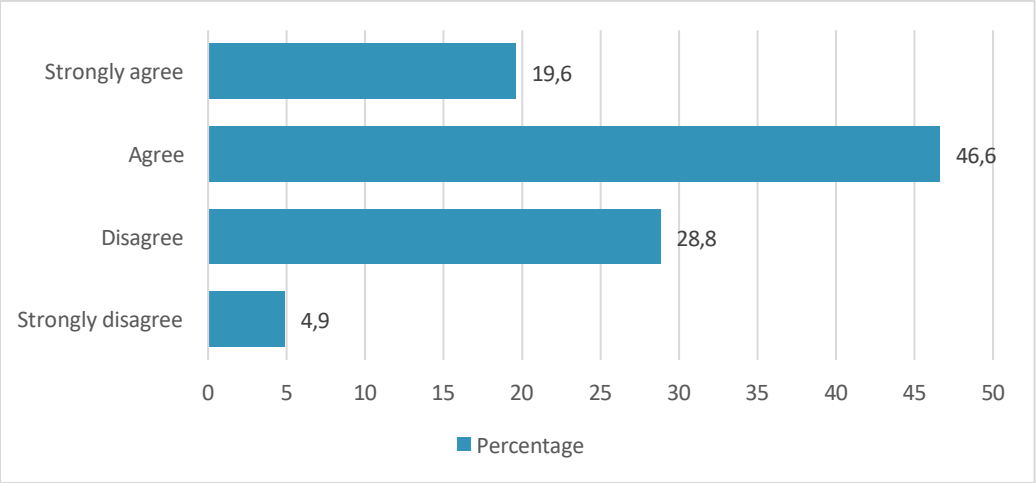


Figure 21 displays the distribution of responses regarding the effect of perceived benefits on the adoption of LDs. The results indicated that the majority of participants (93.8%) believed that perceived benefits will influence the usage of these devices.

Figure 21

Perceived benefits of listening devices impact your decision to use them

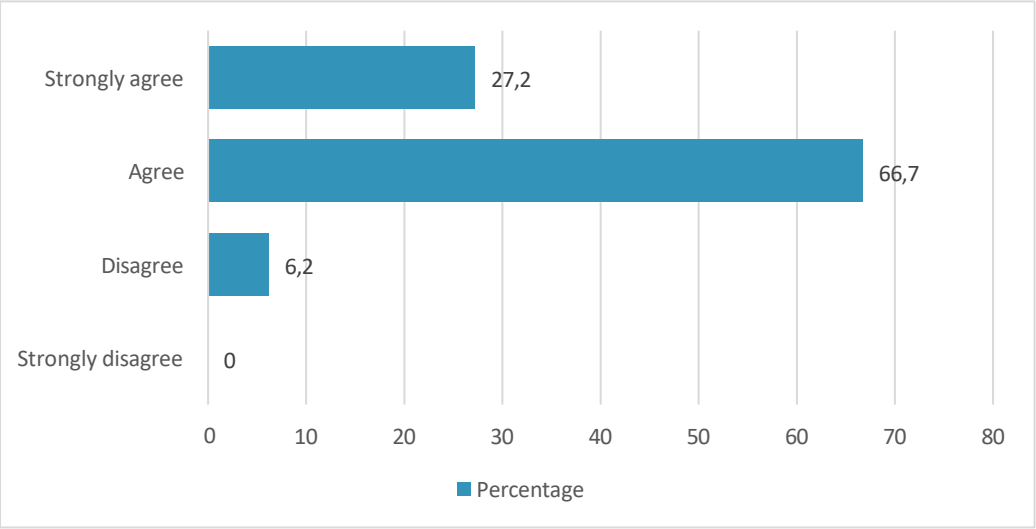


Figure 22 presents the distribution of responses related to the impact of recommendations from friends and family on the adoption of LDs. The results showed that many participants (88.4%) believed that testimonials will affect the usage of these devices.

Figure 22

Recommendations from friends and family will influence your decision to use listening devices

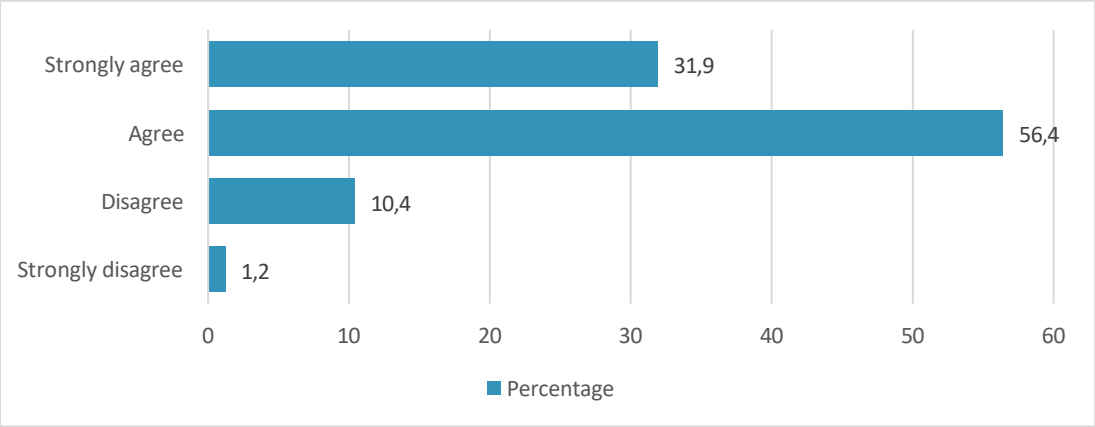
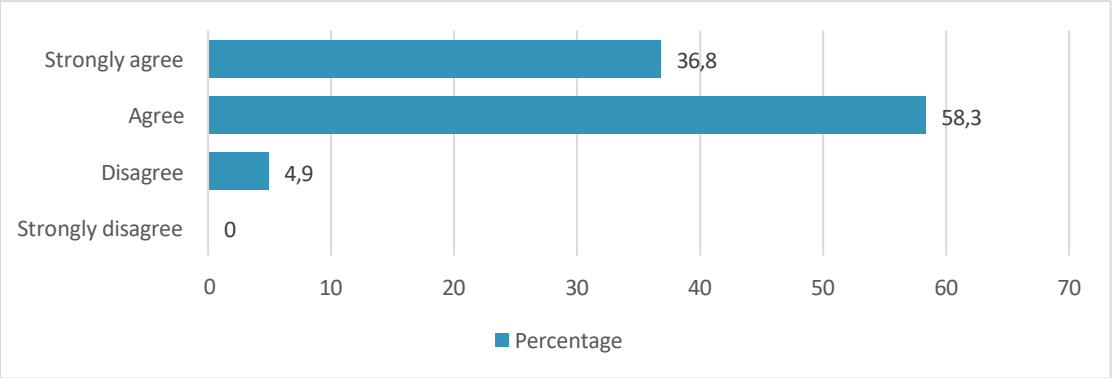


Figure 23 illustrates the distribution of responses concerning how awareness of hearing loss impacts the adoption of LDs. The findings showed that almost all (95.1%) believed that having knowledge about hearing loss will affect the use of these devices.

Figure 23

Your knowledge of hearing loss and listening devices will impact your decision to use them



The LSQ results reveal several key findings regarding the most important features. Comfort received unanimous agreement at 100%, followed by improved battery life and positive recommendations based on personal experiences, both with 98.8% agreement. Cost was highly emphasised, with 96.9% agreement, and insurance considerations were also notably important, with 96.3% agreement. Enhanced access and having sufficient knowledge each received 96.3% agreement. However, there were notable discrepancies in responses

concerning societal attitudes and stigma. Specifically, 77.3% agreed that stigma is a significant factor, whereas 22.7% disagreed. Conversely, 66.2% agreed that societal attitudes affect uptake, while 33.8% disagreed.

The data reveals a strong preference for rechargeable LDs, with 71% of users selecting this technology. This significant proportion highlights a clear trend towards the adoption of rechargeable options.

Associations between age, sex, and preferred characteristics

Female participants were generally more inclined to strongly agree with the questions (63.2%) compared to males (36.7%), whereas males (61.2%) were more likely to agree compared to females (36%). With the chi square test, there was a significant association between sex and being inclined to recommend LDs to others based on a positive experience (X^2 (3, N =159) = 3, p = .008). Male participants (85.7%) were more likely to choose a rechargeable device compared to females (64.9%). There was a significant association between sex and rechargeable/battery LDs (X^2 = (1, N = 159) = 7.23, p = .007).

Participants who were 30-44 years of age (85.7%) and 45-59 years of age (82.6%) were more likely to strongly agree compared to participants aged 18-29 years (60.7%) and 60 years and older (68.45). There was a significant association between age and comfort being important when considering using listening devices (χ^2 = (3, N = 159) = 10.27, p = .016). Participants over 60 years of age (52.6%) were significantly more likely to strongly agree than those 19-29 years (25%), 30-44 years (40.5%) and 45-59 years (37%). There was a significant association between age and training programs for potential users of listening devices improving the uptake (χ^2 = (9, N = 159) = 18.25, p = .032).

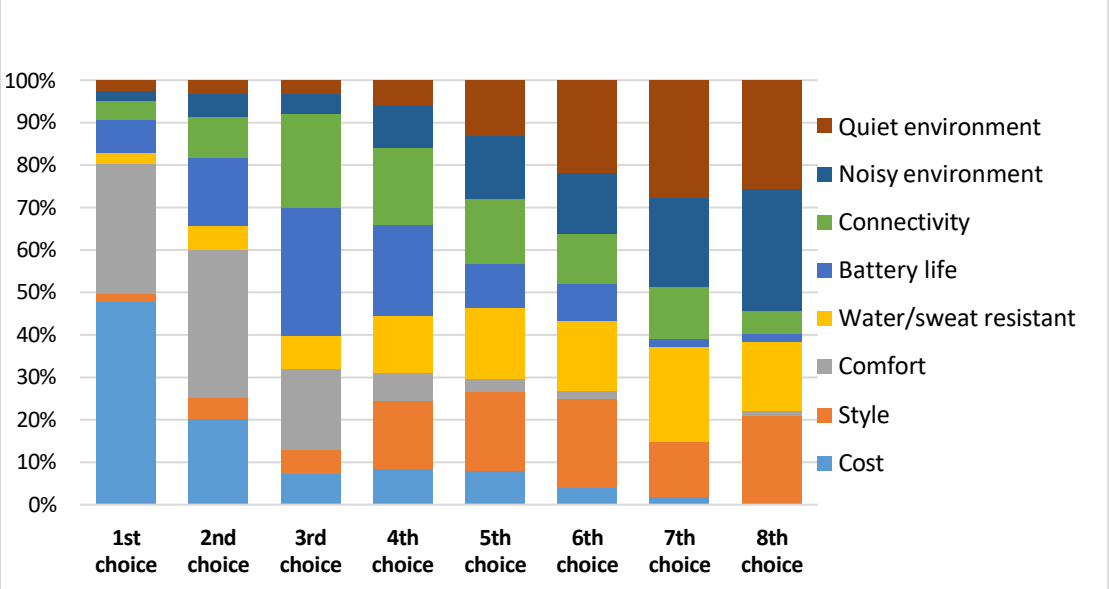
Participants older than 60 years (21.1%) were more likely to disagree than those ages 18-29 years (5.4%), 30-44 years (0%) and 45-59 years (6.7%). There was also a trend towards a significant association between age and perceived benefits of listening devices impacting their decision to use them (χ^2 = (6, N = 159) = 12.19, p = .058).

Objective 2: Explore factors that influence uptake of LDs.

Figure 24 illustrates that among the eight features provided to participants for evaluating listening devices, the most valued were cost, comfort, style, and battery life. In contrast, the least prioritised features were performance in noisy or quiet environments and water/sweat resistance. There were no associations between age and sex noted in figure 24.

Figure 24

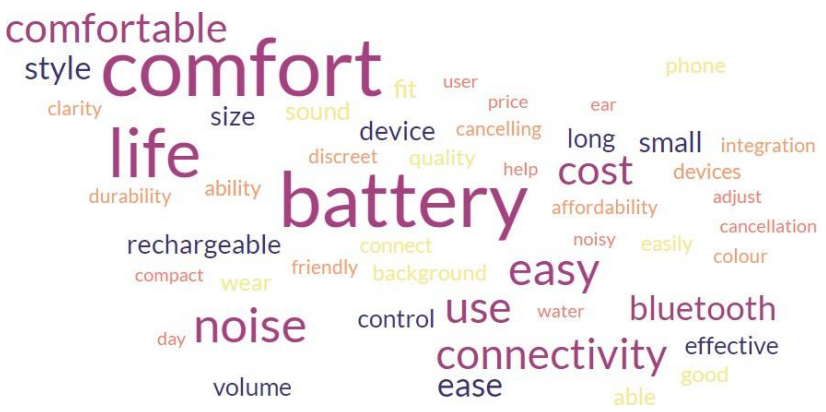
Rating features from most to least important



A word cloud visually represents text data, with larger words indicating higher frequency or importance which will be seen below. The most important features that participants identified for a listening device, based on their own preferences, were comfort, battery life, and connectivity/Bluetooth (see figure 25).

Figure 25

Most important features on a listening device



To enhance adoption, participants identified cost, education, and comfort as the most critical factors, reflecting their personal preferences and experiences. These factors emerged

as central themes in the analysis, underscoring their importance in influencing the decision to adopt Listening Devices (see Figure 26).

Figure 26

What would improve uptake of listening devices?

To reduce uptake, participants highlighted high cost, uncomfortable devices, and stigma as the primary deterrents based on their personal experiences and choices. These factors were consistently cited as significant barriers, revealing how they impact individuals' willingness to adopt Listening Devices (see Figure 27).

Figure 27

What would reduce uptake of listening devices?

Objective 3: Determine individuals' views on LDs.

Question three stated: "Reflecting on your knowledge prior to completing the questionnaire, what information did you have about OTCLDs?" The responses from the seven participants revealed that all had only minimal understanding of the concept of OTCLD. This lack of familiarity underscores the novelty of the concept and highlights the scarcity of available information on the topic.

Table 2

Quotes from participants on their prior knowledge of OTCLDs

Response 1: "Not very much".
Response 2: "I did not know it was possible to buy OTCLDs".
Response 3: "No specific knowledge about OTCLDs"
Response 4: "Not much in terms of OTC"
Response 5: "Limited experience with OTCLD"
Response 6: "I didn't even know that you could get OTCLDs"
Response 7: "I had no idea what OTCLDs were!"

Question four stated: "From your observations, what do you believe are the most significant factors influencing individuals' decisions to adopt hearing aids or listening devices?".

The analysis of factors affecting the adoption of OTCLDs reveals several key influences based on participant responses. Out of the seven participants, three identified costs as a significant factor, indicating that financial considerations play a crucial role in their decision-making process. Stigma was mentioned by two participants, suggesting that societal perceptions may also impact individuals' willingness to adopt these devices. Education emerged as a prominent factor, with four participants highlighting the importance of awareness and knowledge about OTCLDs in influencing their decision. Accessibility was noted by one participant, pointing to potential challenges in obtaining these devices. Additionally, three participants expressed concerns related to hearing impairment, reflecting a concern for the adequacy of the devices

in addressing their specific needs. These insights collectively illustrate the multifaceted nature of the decision-making process for adopting OTCLDs, emphasising the need for addressing cost, education, and social perceptions to enhance adoption rates.

Table 3

Participant quotes on the most significant factors influencing adoption of HAs/LDs

Response 1: “If a person’s hearing is significantly impaired to the point that everyday tasks become difficult”
Response 2: “Stigma”, “accessibility”, “education”.
Response 3: “Has being large and visible as well as cost.”
Response 4: “I would say the two things are cost and social stigma.”
Response 5: “Cost is one of the most important significant factors influencing the decision to adopt OTCLDs”. “Effective education and awareness campaigns are needed to help people make informed decisions”.
Response 6: “You can lose basic abilities with hearing loss which could be a large reason for people wanting to use OTCLDs”.
Response 7: “The lack of knowledge people have about the ear and their hearing is huge!”. “Getting a referral from a doctor/ENT would also raise concerns and impact my decision to adopt a LD”.

Question five stated: “What do you think are the reasons for low uptake of listening devices?”.

The analysis of participant responses identifies several key factors contributing to the low uptake of listening devices. Cost was unanimously cited as a primary barrier by all seven participants, indicating that financial constraints significantly hinder access to these devices. Additionally, stigma and lack of education were noted by four participants each, suggesting that negative societal perceptions and insufficient knowledge about listening devices also play a role in discouraging their use. Furthermore, two participants reported being in denial about their hearing issues, which implies that personal acceptance of the need for listening devices also affects their adoption.

Table 4

Participant Quotes on Reasons for Low Uptake of Listening Devices

Response 1: “High cost”, “Social judgement”.
Response 2: “Cost”, “stigma”.
Response 3: “Cost and maybe education”.
Response 4: “primarily cost”, “they are just in denial”, “perceive themselves as old”.
Response 5: “lack of awareness”, “may not realise how significantly their quality-of-life couple improve”, “high cost”.
Response 6: “financial circumstances or lack of finances”, “if hearing loss is not found”.
Response 7: “education”, “negative connotations to HAs”, “price of HAs”.

Question six stated: “If you were struggling to hear, how would you go about getting assistance? What steps would you take?” Based on the responses, the following health professionals were mentioned as those they would consult and the steps they would take.

Table 5

Participant Quotes on Steps in Obtaining Assistance with Listening Devices

Response 1: “GP”, “audiologist”.
Response 2: “professional audiologist”.
Response 3: “GP to refer me to the correct doctor”
Response 4: “my local audiologist”
Response 5: “highly rated audiologist”
Response 6: “ENT”, “GP to send me to get a hearing test”
Response 7: “GP to see what steps I need to take to maybe get a hearing test”

Question seven stated: “After completing the questionnaire, what insights/learnings did you take away from the experience?”

The analysis of participant feedback provides valuable insights into the factors affecting the adoption of listening devices. Five out of seven participants highlighted stigma as a significant barrier, suggesting that societal attitudes and perceptions play a crucial role in influencing individuals' willingness to use these devices. Cost was identified by two participants as an important consideration, indicating that financial constraints continue to impact accessibility. Four participants noted the importance of features, pointing to the need for devices that meet specific user needs and preferences. Additionally, three participants emphasised the role of education, underlining the necessity for increased awareness and understanding of listening devices to facilitate their adoption. These insights reveal that addressing stigma, enhancing device features, providing financial support, and improving educational efforts are essential to overcoming barriers and encouraging the use of listening devices.

Table 6

Participant Quotes on Learnings Taken Away from the Experience

Response 1: “Stigma those with hearing devices could experience”, “The price of LDs”.
Response 2: “All the different features hadn’t occurred to me”, “with the right education to the public and an appropriate cost model”.
Response 3: “There are a lot more features of a LD that should be taken into consideration when choosing a device”.
Response 4: “LDs are a lot more involved than I realised”, “different perceptions and different types of advice that one needs to consider”.
Response 5: “Completing the LSQ provided valuable insights into the importance of various features in LDs”, “different functionalities can impact the user’s experience”, “user satisfaction of the devices”, “understanding LDs can help make more informed decisions”.
Response 6: “there are so many factors that I hadn’t even considered!”
Response 7: “My knowledge of the topic was poor to say the least”, “no proof for me to know that it is something I am struggling with on a day-to-day basis.

Question eight stated: “Can you identify any specific barriers or improvements in accessibility that come to mind?”

The feedback from participants highlights several barriers and potential improvements in the accessibility of listening devices. Cost was identified as a significant barrier by five out of seven participants, emphasising that financial limitations are a major obstacle to accessing these devices. Education emerged as another critical factor, with four participants indicating that a lack of information and awareness contributes to accessibility issues. Two participants mentioned the need for improved features and self-help resources, suggesting that enhancements in these areas could facilitate better access. Accessibility itself was noted by three participants, pointing to the importance of making devices more readily available and user-friendly. Additionally, two participants highlighted the need for easier access to hearing tests, which are essential for determining the appropriate device. Addressing these barriers—by reducing costs, improving educational outreach, enhancing device features, and increasing availability—can significantly improve access to listening devices and support better hearing health outcomes.

Table 7

Participant Quotes on Specific Barriers or Improvements in Accessibility of Listening Devices

Response 1: “high price”, “improvement to be suggested for this barrier is more public education”.
Response 2: “Cost”, “self-help”.
Response 3: “More advertising on where to go or who to see”
Response 4: “I think cost is a barrier”, “more audiologists in the area”.
Response 5: “lack of awareness and accessibility”, “Improving access to information through educational campaigns and easy-to-understand resources”, “more affordable devices and providing financial assistance or insurance”, “enhance accessibility”.
Response 6: “I would recommend hearing tests be mandatory for children and certain ages”, “make hearing tests part of the medical aid for the health check”.
Response 7: “displayed and advertised and pharmacies could help with accessibility”, “see whether you get improvement before paying a lot of money for a problem you are not sure like a trialling period”, “making hearing tests more accessible”.

Question nine stated: “Can you explain why and give more information as to why these features are particularly important” (refer to questions 29 and 30). Based on the responses, the following barriers were mentioned by participants.

Table 8

Participant Quotes on which Features are Important in a Listening Device

Response 1: “Definitely connectivity as I am in sales and work on the phone all day”
Response 2: “Bluetooth capabilities associated with them to help further improve their adoption”.
Response 3: “A positive experience or perceived benefits to LDs are important as this is their primary use”
Response 4: “I would want something that really reduces noise”, “when people talk softly, I do struggle to hear them and then connectivity is really cool”
Response 5: “Features like noise reduction, Bluetooth connectivity, and water resistance would enhance usability and convenience of the device”
Response 6: “waterproof”
Response 7: “I work a lot on teams for meetings so connectivity is essential”, “I want one that will help me in busy situations where I can be part of the conversation”.

Question ten stated: “What do you think listening devices could improve on as a whole?”

Participant feedback reveals several key areas where listening devices could be improved. A unanimous theme among all seven participants was the need for enhanced features, indicating that the current functionality of listening devices is a major area for improvement. Specific aspects of device performance, usability, and customisation were highlighted as areas needing advancement. Cost was mentioned by one participant as a factor for improvement, suggesting that making devices more affordable could help increase accessibility. Education was noted by two participants, emphasising the need for better informational resources to help users understand and utilise the devices effectively. Additionally, accessibility was mentioned by one participant, pointing to the need for devices

to be more readily available and easier to obtain. These insights underscore the importance of focusing on improving device features, making them more affordable, and enhancing educational resources to better meet user needs and preferences.

Table 9

Participant Quotes on Potential Improvements for Listening Devices

Response 1: “price as a whole”, “comfort to the wearer is essential”, battery life must be sufficient to last the whole day”.
Response 2: “Accessibility- more needs to be done to educate people on how easily accessible and easy to use LDs are”, “features like Bluetooth are great and people need to know what all these devices have to offer”.
Response 3: “I think style is something LDs can consistently improve on. Training and education are things I didn’t think of before the questionnaire which could help improve uptake of LDs as a whole”.
Response 4: “more funky colours for people who are into that or smaller styles for more discrete patients and better aesthetics”.
Response 5: “Improvement on water and sweat resistance as they are not there yet. Enhancing durability of these devices”, “increasing battery life and improving he overall user interface”.
Response 6: “a nice improvement could be noise reduction”, “another addition could be Bluetooth connectivity to all devices”.
Response 7: “How they stay up to date. Phones get new software to make improvements do hearing aids do the same?”

Question 11 stated: “Is there anything you would like to add or any specific insights you think are important regarding listening devices and their uptake?”

Participant feedback provides several valuable insights into improving the uptake of listening devices. Four out of seven participants emphasised the importance of professional recommendations, suggesting that endorsements from healthcare professionals could significantly influence adoption rates. This indicates that integrating professional advice into the decision-making process might enhance credibility and encourage usage. Additionally, three participants highlighted the roles of advertising and education, noting that increased awareness and targeted marketing could better inform potential users about the benefits and availability of listening devices. Another important factor mentioned by three participants was the acceptance of hearing issues and the devices designed to address them. This suggests that fostering a more open and accepting attitude towards hearing loss and the use of listening devices could help overcome reluctance and improve adoption. These insights underscore the need for a multifaceted approach that includes professional endorsements, effective advertising, and educational initiatives to boost the uptake and acceptance of listening devices.

Table 10

Participant Quotes on Insights and Recommendations for Listening Device Uptake

Response 1: “hearing devices should be encouraged by medical practitioners as well as their friends and family. Social encouragement and acceptance will more likely increase uptake”.
Response 2: “advertise the positive features of these devices”.
Response 3: “doctors’ recommendations”
Response 4: “people should take the leap in terms of getting assistance and people need to embrace it more”
Response 5: “raise awareness and educate the public about the benefits and advancements in LDs”, “Ensure more people are informed about their options and make decisions that will significantly improve their quality of life”.
Response 6: “I don’t need to add anything”
Response 7: “Education, education education!!!”.

Discussion

Overview

The primary aim of this study was to identify the factors influencing the adoption of Listening devices (LDs) among individuals aged 18 and older. The results discussion will centre on three key objectives: identifying preferred characteristics of LDs, exploring factors affecting their uptake, and understanding individuals' views on LDs.

Preferred characteristics/features

The analysis of the Likert scale questionnaire (LSQ) alongside the Semi-structured interview (SSI) data provides a comprehensive view of the factors influencing the adoption of listening devices. The LSQ highlights that user’s most value comfort, battery life, and connectivity/Bluetooth in these devices. Comfort is particularly emphasised, pointing to the need for ergonomic and user-friendly designs that ensure long-term usability. Additionally, extended battery life is crucial as it minimises the need for frequent recharging and enhances convenience. Reliable connectivity and Bluetooth functionality are also essential, reflecting users' desire for seamless integration with other devices and consistent performance. The preference of rechargeable LDs is likely influenced by the convenience of avoiding frequent battery replacements, the environmental benefits of reduced battery waste, and advancements in rechargeable battery technology, which offer extended battery life and faster charging (Johnson, 2017). Both the LSQ and Saleh, Folkeard, Liao, and Scollie (2023) studies highlight the importance of connectivity features, with the LSQ emphasising connectivity/Bluetooth and Saleh et al. focusing on “advanced connectivity and streaming.” A third study stated smartphone application-based user-controlled settings, the ability to stream calls and music, and convenience features such as accessory compatibility are also significant (Saleh, Folkeard, Van Eeckhoutte & Scollie, 2022). While all studies agree on the importance of connectivity, they differ in their additional priorities. The LSQ of this study emphasizes comfort and battery life, Saleh et al. (2023) highlights "physical attributes and usability" as well as "sound quality and intelligibility," and Saleh et al. (2022) underscore convenience and user control. These differences reflect varying user priorities and perspectives on device functionality and performance.

In the discussion of results, it is notable that 66.2% of participants agree that societal attitudes affect their willingness to use listening devices. This finding underscores the significant role that societal perceptions play in shaping user attitudes toward these devices.

While societal attitudes are a substantial factor, the impact of these attitudes should be considered alongside other critical features that influence device adoption. Although societal attitudes are important and should not be overlooked, focusing on other aspects that receive a higher level of consensus among users might be essential for improving the acceptance and adoption of listening devices.

Similarly, stigma associated with LDs, the results revealed a range of opinions, with 77.3% of participants agreeing that stigma influences their willingness to use these devices. This high level of agreement highlights the substantial impact that stigma can have on user attitudes and acceptance. Despite this, it is crucial to recognize that while stigma is a significant factor, it must be considered in conjunction with other features that also affect device adoption. Addressing stigma remains an important aspect of enhancing user acceptance, but balancing this with attention to other features that are critical to users could lead to more effective strategies for promoting the use of listening devices.

Conversely, the SSIs shed light on broader adoption barriers, with education emerging as the most critical factor. Participants highlighted the importance of increasing awareness and understanding of LDs to encourage their use. This indicates a need for targeted educational initiatives and effective information dissemination. Cost is another major issue, suggesting that making over the counter listening devices (OTCLDs) more affordable through financial support or reduced pricing could significantly improve accessibility. Awareness of hearing impairment also plays a role, as recognising one's hearing issues can drive the decision to seek out these devices. Although stigma and accessibility were noted, they were considered less influential compared to education, cost, and personal awareness. Rawool and Keihl (2008) identified several factors influencing individuals' perceptions of hearing aids, including cost, uncertainty about the benefits, and denial or unawareness of hearing loss. They emphasised the need for awareness programs that clearly communicate the realistic benefits of hearing aids and foster a positive image to help reduce the associated stigma. Both studies highlight the critical role of awareness and education in addressing barriers to the adoption of LDs or OTCLDs, with Rawool and Keihl (2008) emphasising the need for awareness programs to reduce stigma, while the SSIs stress the importance of increasing understanding and education to overcome broader adoption challenges.

The comparison between these findings reveals that while the LSQ identifies key features that users find desirable—such as comfort, battery life, and connectivity—the interviews highlight broader adoption challenges. To effectively increase the use of LDs, it is

important to focus on both enhancing device features and addressing the identified barriers. Manufacturers should prioritise designing devices with better comfort, longer battery life, and improved connectivity. At the same time, addressing educational gaps, reducing costs, and raising awareness about hearing impairment are crucial steps in overcoming obstacles to adoption. By integrating these insights, strategies can be developed to improve user satisfaction and increase the overall uptake of LDs.

The widespread preference for rechargeable LDs illustrates a larger trend in technology adoption, driven by continuous advancements in rechargeable technology. As technology evolves, the preference for rechargeable devices is likely to grow (Johnson, 2017). For manufacturers and retailers, this trend signals an increasing demand for rechargeable LDs and related accessories. These insights point to opportunities for further innovation and targeted marketing to align with consumer preferences and leverage the expanding market for rechargeable solutions.

Future studies could assess user satisfaction and gather feedback on the functionality, comfort, and usability of LDs. Surveys and interviews with a diverse range of users, including those with varying degrees of hearing loss and different lifestyles, would provide valuable insights into user experiences.

Future research could evaluate the technical performance of LDs, examining aspects such as sound quality, battery life, durability, and connectivity features. Comparative studies with traditional HAs could identify areas needing improvement and highlight the advantages and disadvantages of LDs.

Given the importance of cost, future studies could investigate the cost-effectiveness of LDs and their accessibility to different socioeconomic groups. Research could explore ways to make these devices more affordable without compromising quality, addressing a significant concern for many users.

Patient characteristics

The predominance of female participants may influence the generalisability of the findings, particularly if the research topic is sensitive to gender or if gender diversity is vital for the study's results. This demographic imbalance should be considered when interpreting the outcomes. Future research might address this issue by seeking a more balanced gender representation or investigating the reasons behind the lack of gender diversity in the sample. A study with similar research highlighted that the predominance of female participants could

impact the generalisability of the findings, especially if the research topic is sensitive to gender or if gender diversity is crucial for the study's outcomes (Staehelin et al., 2011). This demographic imbalance should be considered when interpreting the results. Future research should aim to include a more diverse age range to enhance the generalisability of the findings to broader populations. Despite these limitations, the study's relatively large sample size and diverse participant demographics compared to similar studies add value to its conclusions.

The analysis identifies notable patterns related to age and attitudes toward listening devices, illustrating how age affects preferences and perceptions. The strong correlation between age and the importance of comfort suggests that comfort is a more significant consideration for individuals aged 30-44 years and 45-59 years compared to younger or older participants. This may be because middle-aged users are more likely to have specific comfort needs or have experienced discomfort with devices. Younger users might have different priorities or not yet experienced such discomfort, while older individuals might be adjusting to age-related changes in comfort needs. Consistent with our findings, a study involving participants with an average age of 62 years also prioritised comfort, reflecting a similar trend across different age groups, ranging from 24 to 78 years (Saleh, Folkeard, Van Eeckhoutte & Scollie, 2022).

The statistical analysis of the age distribution among participants reveals several insights into the composition of the sample. The mean age of 39.75 years suggests that, on average, participants are in their late thirties, which aligns with a broad representation of mid-career adults. This average age is useful for understanding the general demographic profile of the sample.

The median age of 43 years further supports the notion of a central tendency around middle adulthood. The median being slightly higher than the mean indicates that while the average age is relatively centred, there is a spread of ages, with a portion of the sample being older than the average age. This reflects a significant presence of participants in both early and late career stages, contributing to a well-rounded demographic profile.

The standard deviation of 12.7 years indicates a moderate degree of variability in participant ages. This variability shows that there is a considerable spread around the mean age, reinforcing the idea that the sample includes a wide age range. This variability is important as it reflects the inclusion of participants from different stages of life, which can

enrich the study's findings and provide a more comprehensive understanding of the issues being investigated.

Overall, the age distribution data suggests that the sample is diverse, with a significant representation of individuals across various age groups. This diversity is beneficial for generalising findings to a broader population. However, it also underscores the importance of considering age-related factors when interpreting the results, as different age groups may have varying perspectives and experiences relevant to the study's focus. Future research could further explore how age-related differences impact the study's outcomes and ensure that findings are applicable to a wider audience.

A significant association between age and the perceived value of training programs indicates that older adults (60 years and above) find these programs more beneficial for encouraging the use of listening devices. These findings suggests that older participants may be more open to structured support when adopting new technology, possibly due to a greater need for assistance or a heightened sensitivity to learning new devices. Conversely, younger participants in the study felt more self-assured about their ability to learn and use new technology on their own.

These findings suggest that healthcare providers should focus on creating and customising training programs specifically for older adults when introducing new listening devices. Acknowledging that older individuals may gain substantial benefits from targeted support, clinicians should design and execute detailed training and assistance plans that cater to their unique needs. This strategy can enhance the adoption and effective use of hearing technology, leading to improved patient outcomes and increased satisfaction.

A trend towards a significant link between age and perceived benefits shows that older participants are more likely to disagree that the benefits of listening devices influence their decision to use them. This pattern might reflect scepticism about the devices' benefits or different priorities and expectations compared to younger users. For older adults, the perceived advantages may be less compelling or weighed against other factors, such as costs or personal preferences, unlike younger users who might place higher value on technological advancements and potential benefits (Saleh, Folkeard, Van Eeckhoutte & Scollie, 2022).

These findings underscore the necessity of considering age-specific preferences and requirements when designing and marketing listening devices. The research, which included a median participant age of 48 years with a broad age range from 18 to 95, reveals that while

connectivity, usability, and sound quality are universally important features, the emphasis placed on these attributes varies significantly across different age groups (Saleh, Folkeard, Liao, & Scollie, 2023). Younger users, who may be more accustomed to integrating technology seamlessly into their lives, often prioritise advanced connectivity features and customisable sound settings. In contrast, older users might place greater importance on ease of use, comfort, and clear communication about how the device can improve their daily experiences. This variation highlights the need for targeted design considerations and marketing strategies that address these divergent needs. For instance, younger individuals might benefit from sleek, modern designs and digital training resources, while older users could prefer devices that accommodate physical changes and come with comprehensive, hands-on support. By addressing these age-specific concerns and preferences, manufacturers can enhance user satisfaction, increase adoption rates, and ensure that listening devices are accessible and effective for all age groups. The age distribution was also a limiting factor, with 34% of participants being between 18 and 24 years old, which may not fully represent older age groups, given that needs and lifestyles can vary significantly across different ages.

Factors influencing uptake of LDs

The analysis reveals that cost, education, and comfort are pivotal factors in enhancing the uptake of LDs. Participants identified cost as a major barrier, suggesting that making these devices more affordable could significantly boost adoption rates. This indicates that reducing the financial burden through lower prices or financial assistance might improve accessibility. Education also emerged as a critical factor; participants emphasised the need for increased awareness and information about LDs to facilitate better understanding and acceptance. Effective educational programs and outreach could help potential users recognise the benefits and proper usage of these devices. Additionally, comfort was highlighted as essential for encouraging use. Ensuring that LDs are ergonomically designed and comfortable could make them more attractive to users. Addressing these three areas—cost, education, and comfort—could effectively promote the adoption of LDs and improve overall user satisfaction.

The findings from both the questionnaire and interviews highlight several critical barriers to the uptake of LDs. The questionnaire identified cost, education, and comfort as key factors influencing the adoption of these devices. Specifically, high costs were noted as a primary impediment, suggesting that reducing the financial burden through more affordable pricing or financial assistance could significantly enhance adoption rates. Additionally, the need for better education emerged as crucial, with participants indicating that increased awareness and understanding of LDs could help overcome knowledge gaps and encourage usage.

Comfort was also highlighted as a major factor, indicating that improvements in device ergonomics could make LDs more appealing and easier to use.

Similar research in the field consistently highlights cost as a significant barrier to the adoption of LDs (Bridges et al., 2012). Previous studies have corroborated this finding, indicating that cost remains a predominant concern across various contexts. The research aligns with these observations, revealing that both the LSQ and SSI methodologies identified high cost as the most frequently cited obstacle to the uptake of LDs (Bridges et al., 2012; McCormack & Fortnum, 2013; (Zhu et al., 2020 & Saleh, Folkeard, Van Eeckhoutte & Scollie, 2022). This recurring theme underscores the need for addressing financial constraints to enhance accessibility and encourage broader use of these medications.

Research on the barriers to HA adoption has consistently identified several critical factors that influence non-use. Studies often emphasise the importance of addressing the perceived value of HAs, their fit and comfort, the care and maintenance required, as well as attitudes towards and characteristics of the devices themselves (McCormack & Fortnum, 2013). In alignment with this body of literature, our research reveals that in the LSQ, the primary barriers to HA uptake are related to price, comfort, and stigma. Similarly, the SSI results identify cost, lack of education, stigma, and denial of hearing impairment as significant impediments. These findings highlight a consistent pattern in the barriers to HA adoption and underscore the need for targeted interventions that address these specific issues to improve accessibility and utilisation of HAs.

The interview data further elucidates the role of stigma and education, with participants expressing that societal attitudes and insufficient knowledge also play significant roles in discouraging the use of LDs. The stigma associated with using such devices can create a psychological barrier, preventing individuals from seeking out and using these aids. This underscores the need for public awareness campaigns to address and reduce negative perceptions. In terms of education, the interviews reinforce the questionnaire's findings by highlighting the importance of targeted educational efforts to inform potential users about the benefits and functionalities of LDs.

Combining the findings from the Likert scale questionnaire (LSQ) and the Semi-Structured Interviews (SSI) reveals a consistent perspective on key factors affecting the uptake and effectiveness of the technology. Both sources of data highlight comfort, improved battery life, and connectivity as crucial features. The LSQ results show unanimous agreement on the importance of comfort, while the SSI also identifies the role of cost, education, and

accessibility in improving uptake. Specifically, the LSQ finds high agreement on the importance of cost and insurance, while the SSI also identifies cost and education as barriers to uptake. Discrepancies in societal attitudes and stigma were noted in the LSQ, with less consensus compared to other features. However, the SSI also acknowledges stigma as a factor impacting uptake. This alignment across both the LSQ and SSI underscores a consistent opinion on the importance of comfort, cost, and education in promoting the technology, while also recognising that stigma and societal attitudes are less critical factors in comparison.

Research on HA effectiveness in various environments often highlights that individuals with moderate to severe hearing loss prioritise performance in noisy settings (Zhu et al., 2020). However, our research presents a contrasting perspective with 50.94% of participants ranked noisy settings as one of their least important features when selecting LDs. This divergence suggests that while noise management is critical in some contexts, it may not be universally prioritised by all users, particularly in different geographical or demographic settings. This discrepancy underscores the need for further investigation into how regional and contextual factors influence HA preferences and effectiveness.

There is a notable gap in public knowledge about OTCLDs. Future research could assess the level of public awareness and the effectiveness of educational campaigns. Identifying the best strategies for informing potential users about the benefits and limitations of these devices will be crucial for their widespread adoption and effective use.

Together, these insights suggest a multifaceted approach to improving LD uptake. Addressing high costs, enhancing user comfort, combating stigma, and expanding educational initiatives are all critical components of a comprehensive strategy to increase adoption rates. By focusing on these areas, manufacturers, policymakers, and healthcare providers can better support individuals in overcoming barriers and encourage the wider use of LDs.

Strengths and limitations

Strengths

Focusing on adults who are proficient in multiple languages provides valuable insights into a specific demographic, facilitating the customisation of products to meet their needs. Participants with no prior experience with listening devices can offer new perspectives on which features and characteristics are intuitive and appealing to first-time users. The inclusion of proficiency in English, Afrikaans, Zulu, and Xhosa enables the research to address a range of linguistic requirements and preferences, potentially leading to a more nuanced understanding of language-related features and usability. Clear inclusion criteria assist in identifying specific user needs and preferences, leading to more precise and actionable insights into what constitutes an ideal OTC listening device for this group. Feedback from novice users can establish a baseline for essential features and user-friendly elements that should be prioritised in LDs.

Limitations

The study's focus on individuals proficient in particular languages and with no previous experience with listening devices may not fully represent the broader population, including those with different language skills or prior exposure to such devices. The study did not collect data on certain demographic variables, such as race, socioeconomic status, and education level. The research might not adequately consider cultural variations or differing needs across regions, potentially impacting the generalisability of the findings. Participants lacking experience may hold unrealistic expectations or may not fully grasp the practical limitations and advantages of various device features. Proficiency in multiple languages does not ensure a uniform understanding or preference regarding technology, and subtle differences in perception could influence the results. Feedback based on hypothetical scenarios rather than practical experience may affect the accuracy of the findings. Additionally, the rapid evolution of listening devices could render the research outcomes quickly outdated, potentially limiting their long-term applicability.

Recognising these strengths and limitations allows researchers to design studies that optimise the relevance and utility of their findings while addressing potential gaps or biases.

Future Research

Future research on listening devices (LDs) could encompass several key areas to enhance their design, functionality, and user satisfaction. Additionally, the impact of customisable features on user satisfaction warrants investigation. Studies could focus on the effectiveness of self-fitting options and the ability of users to adjust settings according to their specific needs, enhancing personalisation and user control. Since over the counter listening devices (OTCLDs) are relatively new, longitudinal studies could monitor their long-term outcomes. This would include tracking hearing improvement, user compliance, and any potential side effects over time, providing a comprehensive understanding of their effectiveness and sustainability. By addressing these research prospects, the development and deployment of OTCLDs can be significantly improved, ultimately enhancing the quality of life for users.

Conclusion

This thesis aimed to develop and employ a Likert scale questionnaire (LSQ) to identify key characteristics and factors influencing the adoption of listening devices (LDs). Through a detailed analysis of both the LSQ and Semi structures interview (SSI) data, this research provides valuable insights into user preferences and adoption barriers.

The LSQ revealed that the most valued features of LDs are comfort, battery life, and connectivity/Bluetooth. Users emphasise the need for ergonomically designed devices that ensure long-term wearability, highlighting the importance of comfort. Additionally, extended battery life is crucial for reducing the frequency of recharging, and reliable connectivity, including Bluetooth functionality, is essential for seamless integration with other devices.

Conversely, the interviews identified several significant barriers to LD adoption. Education emerged as the most critical factor, with participants underscoring the necessity for increased awareness and understanding of LDs. Cost was also a major concern, suggesting that affordability plays a key role in enhancing accessibility. Awareness of hearing impairment and overcoming stigma were noted as important but less critical compared to education and cost.

The comparison between the LSQ and SSI findings reveals a comprehensive picture of both desirable features and adoption challenges. While the LSQ provides a clear view of what users find appealing in LDs, the interviews offer a broader understanding of the obstacles preventing their adoption. To effectively increase the use of LDs, it is essential to address both user needs and barriers.

Manufacturers should prioritise features such as comfort, long battery life, and connectivity in their product designs. At the same time, addressing barriers through educational initiatives, reducing costs, and promoting awareness about hearing impairment are crucial steps in improving adoption rates. Efforts to combat stigma and enhance accessibility should also be considered, although they were found to be less impactful compared to education and cost.

In conclusion, by integrating insights from both user preferences and adoption barriers, this study provides a foundational understanding of the factors influencing LD use. Addressing these factors comprehensively can lead to improved device designs, enhanced user satisfaction, and increased adoption rates, ultimately supporting individuals in overcoming hearing challenges and improving their quality of life.

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Appendices

Appendix A: Flyer: Ideal characteristics of a listening device (English)

Appendix B: Flyer: Ideal characteristics of a listening device (isiXhosa)

Appendix C: Flyer: Ideal characteristics of a listening device (Afrikaans)

Appendix D: Flyer: Ideal characteristics of a listening device (isiZulu)

Appendix E: Request for permission to put up flyers

UNIVERSITY OF CAPE TOWN
Health and Rehabilitation Sciences
Division of Communication Sciences and Disorders

F46 Old Main Building.
Groote Schuur Hospital, Observatory, 7925
Telephone: 021 406-6402
Fax: 021 406-6323

To whom it may concern

I hope this letter finds you well. My name is Alexia Chappel, and I am requesting authorisation for placement of flyers on your premises for the research study titled "**Ideal characteristics of a listening device**" as a requirement for the completion of my master's degree in Audiology at the University of Cape Town. I am conducting this research under the supervision of Dr Lucretia Petersen. The flyers will only need to be up for around 2 months. This study focuses on understanding user preferences for listening devices and their ideal characteristics to promote usage among individuals (18 and older) with mild to moderate sensorineural hearing loss. Research is crucial for advancing knowledge, solving problems, and making informed decisions across various fields.

This study focuses on understanding user preferences for listening devices and their ideal characteristics to promote usage among individuals with mild to moderate sensorineural hearing loss. A listening device is used to improve overall communication of individuals with hearing difficulties as well as enhance speech signals through amplification equipment within the device.

The research aims to identify factors influencing the use of listening devices among potential users. These results will help developers manufacture listening devices more people would use and therefore improve the overall uptake and use of listening devices and in return, reduce the stigma of these listening devices. While you may not receive direct benefits from the findings, your input is crucial in enhancing understanding of current practices and potential improvements in listening device usage.

I assure you that the materials to be distributed are non-intrusive, in compliance with all relevant regulations, and are intended solely for research purposes.

I kindly request your approval for this activity, and I am willing to adhere to any specific guidelines or restrictions you may have in place for such requests. If necessary, I am available to meet with you at your convenience to discuss this matter further.

I understand the importance of maintaining a clean and orderly environment within the building, and I assure you that every effort will be made to ensure the flyers do not cause any inconvenience.

Thank you for considering this request. I appreciate your time and attention to this matter.

Please sign this document if you are willing to have flyers distributed within your building.

I _____hereby approve the request for placement of players within _____(business name)

_____

Signature

Appendix F: Pilot study questions for LSQ

Pilot study questions for LSQ participants
1. How would you rate the overall clarity of the questions? 2. Were the instructions in the beginning clear on how to answer the questions? 3. Did the information letter provide enough information on the study? 4. On a scale of 1-5, how easy was it to understand and respond to the questions? 5. Were there any questions you struggled to answer or were unclear? 6. Were there any questions you feel could be left out of the study and do not apply? 7. Was the scale sufficient to express tour answers? 8. How long did it take you to complete the questionnaire? 9. Was the length of the questionnaire appropriate? 10. Any additional topics/feedback you feel should be included in the questionnaire?

Appendix G: Pilot study questions for SSI

Pilot study questions for SSI participants
1. How would you describe your overall experience of the interview process? 2. Did the information letter provide enough information on the study? 3. Were you comfortable throughout the interview? Why or why not? 4. Did you find the questions clear and easy to understand? 5. Were there any questions you struggled with or found unclear? 6. Do you feel like the interview covered all relevant topics of characteristics of listening devices? 7. Did you feel there was sufficient time for the interview? 8. How would you describe the interviewer's approach (eg: friendly, empathetic, professional etc.) 9. Did you feel listened and understood throughout the interview? 10. Did you find the follow-up questions effective into gaining a better understanding of your perspective? 11. Were you comfortable sharing your views during the interview? 12. How do you feel about the interviews being recorded and did this affect your willingness to respond? 13. Was the length of the questionnaire appropriate? 14. Any additional topics/feedback you feel should be included in the questionnaire?

Appendix H: Likert Scale Questionnaire English

1. Have you ever used a listening device to improve your hearing?		Yes		No	
2. What sex are you?		Male			
		Female			
		Other			
		Prefer not to say			
3. Please select your age range		18-29 years			
		30-44 years			
		45-59 year			
		60+ years			
Likert Scale	**Strongly disagree**	**Disagree**	**Agree**	**Strongly agree**	

Questions				
4. The cost of listening devices will affect their use				
5. Having better knowledge about listening device will increase their usage				
6. You would be inclined to recommend listening devices to others based on a positive experience?				
7. Improved access to listening devices can increase their use				
8. Comfort is important when considering using listening devices				
9. Training programs for potential users of listening devices will improve the uptake				
10. Advanced features like noise cancellation and Bluetooth will improve the uptake of listening devices				
11. Stigma of wearing listening devices impacts their use				

12. Having different styles of listening devices will encouraging their use				
13. Reviews and testimonials will influence the use of listening devices				
14. Recommendations made by a healthcare professional will improve uptake of a listening device				
15. Improved battery life and charging ease will increase listening device use				
16. Personalised fitting by a health care practitioner will influence the likelihood of using a listening device				
17. A listening device that seamlessly integrates with other technology will improve uptake (eg: TV Connector)				
18. Cost and insurance coverage play a crucial role in using listening devices				
19. Educational campaigns influence the adoption of listening devices				
20. Societal attitudes affect your willingness to use listening devices				

21. Perceived benefits of listening devices impact your decision to use them				
22. Recommendations from friends and family will influence your decision to use listening devices				
23. Your knowledge of hearing loss and listening devices will impact your decision to use them				
24. Rechargeable listening devices or battery listening devices? Would you choose A. rechargeable listening device (charge daily) or B. Battery listening device (lifespan around 7-10 days before changing the battery)	A. Rechargeable B. Battery			
25. Rate these features from most to least important (1 most important -8 least important)				

	Battery life		Quiet environment
	Cost		Noisy environment
	Style		Water/sweat resistant
	Connectivity		Comfort

26. Most important features you would like on a listening device	1. 2. 3.
27. What would **improve** uptake of a listening device?	
28. What would **reduce** uptake of a listening device?	
29. Would you like to participate in a 20–30-minute individual interview on the same topic but in a bit more detail? Please note: Interviews will only be conducted in English	☐ Yes ☐ No
30. Details for R500 Takealot voucher	Name: _____ Cell number: _____ Email address: _____

Appendix I: Likert Scale Questionnaire isiXhosa

1. Ngaba ukhe wasebenzisa isixhobo sokumamela ngaphambili?		Yes		No	
2. Uyintoni na ngesondo?		Indoda			
		Ibhinqa			
		Enye			
		N/A			
3. Nceda ukhethe uluhlu lwakho lobudala		18-29			
		30-44			
		45-59			
		60+			
Uhlu lwemibuzo	**Angivumi neze**	**Angivumi**	**Vuma**	**Ngivume Ngokuqinile**	

4. Indleko zezixhobo zokumamela ziya kuchaphazela ukuthathwa kwazo				
5. Ukuba nolwazi olungcono malunga nezixhobo zokumamela kuya kukwandisa ukusetyenziswa kwazo				
6. Uyakukhuthazwa ukuba unikise umdla kwizixhobo zokuphulaphula kwabanye abantu ngokusekelwe kumava akhuthazayo				
7. Ukufikelela okuphuculweyo kwizixhobo zokumamela kunokunyusa ukuthathwa kwazo				
8. Intuthuzelo ibalulekile xa ucinga ukusebenzisa izixhobo zokumamela				
9. Iinkqubo zoqeqesho kubasenzisi abanokuba ngabasebenzisi bezixhobo zokumamela ziya kuphucula ukuthathwa kwazo				
10. Iimpawu eziphambili ezifana nokucinywa kwengxolo kunye nebluetooth iya kuphucula ukuthatyathwa kwezixhobo zokumamela				
11. Ibala lokunxiba izixhobo zokumamela lichapazela indlela abazisebenzisa ngayo				

12. Ukuba neentlobo ezahlukeneyo zezixhobo zokumamela kuya kukhuthaza ukuthathwa kwazo				
13. Ukuphononongwa kunye nobungqina kuya kuba nefuthe ekuthathweni kwezixhobo zokumamela				
14. Iingcebiso ezenziwe ngumsebenzi wezempilo ziya kuphucula ukuthatyathwa kwesixhobo sokuphulaphula				
15. Ubomi bebhetri obuphuculweyo kunye nokulula kokutshajwa kuya kwandisa isixhobo sokumamela				
16. Ukufaneleka komntu ngamnye ngugqirha wezempilo kuya kuba nefuthe kumathuba okusebenzisa isixhobo sokumamela				
17. Isixhobo sokumamela esidibanisa ngaphandle komthungo kunye nobunye ubuchwephesha siya kuphucula ukuthathwa (umzekelo: isinxibelelanisi seTV)				
18. Indleko kunye ne-inshurensi zidlala indima ebalulekileyo ekusebenziseni izixhobo zokuphulaphula				
19. Amaphulo emfundo anefuthe ekuthathweni kwezixhobo zokumamela				

20. Isimo sengqondo soluntu sichaphazela ukuvuma kwakho ukusebenzisa izixhobo zokuphulaphula				
21. Iinzuzo ezibonwayo zezixhobo zokumamela zinefuthe kwisigqibo sakho sokuzisebenzisa				
22. Iingcebiso ezivela kubahlobo kunye nosapho ziya kuba nefuthe kwisigqibo sakho sokusebenzisa izixhobo zokumamela				
23. Ulwazi lwakho lokungeva kunye nezixhobo zokumamela ziya kuba nefuthe kwisigqibo sakho sokuzisebenzisa				
24. Izixhobo zokumamela ezitshajwayo okanye izixhobo zokumamela ibhetri? Ungakhetha. A. isixhobo sokumamela esithajwayo okanye B. Isixhobo esisebenzisa ibhetri (ixesha lokuphila malunga neentsuku ezi-7-10 ngaphambi kokutshintsha ibhetri)	A. isixhobo sokumamela esithajwayo okanye B. Isixhobo esisebenzisa ibhetri			

<table>
<tr>
<td>25. Nika izinga yezi mphawu zilandelayo zezixhobo zokuva ukusuka kweyona nto ibalulekileyo ukuya kweyona ingabalulekanga (1 eyonanto ibalulekileyo – 8 okungabalulekanga kangako)

Phawula: ungatsala iimpendulo ngokubamba kwaye ushukumise okanye usebenzise iintolo ekupheleni kokhetho</td>
<td>
<table>
<tr><td></td><td>Ubomi bebhetri</td><td></td><td>Indawo ezolileyo</td></tr>
<tr><td></td><td>Iindleko</td><td></td><td>Indawo enengxolo</td></tr>
<tr><td></td><td>Isimbo</td><td></td><td>ukuxhathisa amanzi/ukubila</td></tr>
<tr><td></td><td>Uqhagamshelwano</td><td></td><td>Intuthuzelo</td></tr>
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</td>
</tr>
<tr>
<td>26. Ezona mpawu zibalulekileyo onokuzithanda kwisixhobo sokumamela (ubuncinci be-3)</td>
<td>1.
2.
3.</td>
</tr>
<tr>
<td>27. Yintoni eya kuphucula ukuthatyathwa kwesixhobo sokumamela?</td>
<td></td>
</tr>
<tr>
<td>28. Yintoni eya kunciphisa ukuthatyathwa kwesixhobo sokumamela?</td>
<td></td>
</tr>
</table>

29. Ungathanda ukuthatha inxaxheba kudliwano-ndlebe elimalunga nemizuzu engama-20 ngeengcinga zakho ezingaphezulu ngesihloko? Ukuba kunjalo, faka iincukhacha ngezantsi	☐ Yebo ☐ Cha
30. Iinkcukacha nge-R500 yevawutsha yakwa Takealot (gama, inombolo yomnxheba kunye idilesi yemeyile)	: _____ : _____ : _____

Appendix J: Likert Scale Questionnaire Afrikaans

29. Het jy al ooit ‘n gehoorapparaat gebruik om jou gehoor te verbeter?		Yes		No		
30. Wat is jou geslag?		Manlik				
		Vroulik				
		Ander				
		Verkies om nie te sê nie				
31. Kies asseblief jou ouderdomsgroep		18-29 jaar				
		30-44 jaar				
		45-59 jaar				
		60+ jaar				
LSQ Vrae	**Stem glad nie saam nie**		**Stem nie saam nie**		**Stem saam**	**Stem sterk saam**

32. Die koste van gehoorapparate sal bepaal of dit aangekoop word.				
33. Wanneer mense meer kennis oor gehoorapparate het, sal hulle meer geneig wees om dit aan te skaf.				
34. ‘n Mens sal geneig wees om gehoorapparate vir ander mense aan te beveel, as jy ‘n positiewe ondervinding gehad het.				
35. Verbeterde toegang tot gehoorapparate kan die aanskaf daarvan verhoog.				
36. Gemak is belangrik wanneer ‘n mens die gebruik van gehoorapparate oorweeg.				
37. Opleidingsprogramme vir potensiële gebruikers van gehoorapparate sal die aanskaffing daarvan bevorder.				
38. Gevorderde eienskappe, soos die uitskakeling van lawaai en *Bluetooth,* sal die aanskaffing van gehoorapparate bevorder.				
39. Die stigma van die dra van gehoorapparate het ‘n invloed op die aanskaffing daarvan.				

40. As daar verskillende style gehoorapparate is, sal dit die aanskaffing daarvan bevorder.				
41. Resensies en getuigskrifte sal ‘n invloed hê op die aanskaffing van gehoorapparate.				
42. Aanbevelings deur ‘n gesondheidsorgkundige sal die aanskaffing van ‘n gehoorapparaat bevorder.				
43. Verbeterde batterylewe en maklike herlaai van die battery sal die aanskaffing van ‘n gehoorapparaat bevorder.				
44. Persoonlike passing by ‘n gesondheidsorgkundige sal ‘n invloed op die besluit om ‘n gehoorapparaat aan te skaf, hê.				
45. ‘n Gehoorapparaat, wat soomloos met ander tegnologie (bv. ‘n TV-koppeling) integreer, sal die aankoop van gehoorapparate bevorder.				
46. Die koste en versekeringsdekking speel ‘n groot rol by die gebruik van gehoorapparate.				
47. Opvoedkundige veldtogte beïnvloed die aanskaffing van gehoorapparate.				

48. Die houdings van mense in die samelewing het ‘n invloed op jou bereidwilligheid om gehoorapparate te gebruik.				
49. Wanneer jy die voordele van gehoorapparate waarneem, het dit ‘n invloed op jou besluit om dit te gebruik.				
50. Aanbevelings deur vriende en familie sal jou besluit om ‘n gehoorapparaat te gebruik, beïnvloed.				
51. Jou kennis van gehoorverlies en gehoorapparate sal ‘n invloed op jou besluit om dit te gebruik, hê.				

52. Wat herlaaibare gehoorapparate of apparate, wat met battery werk betref, wat sal jy kies? A. ‘n Herlaaibare gehoorapparaat (word daagliks herlaai) óf B. ‘n Apparaat wat met batterye werk (battery se leeftyd is ongeveer 7 – 10 dae voordat dit vervang moet word).	A. Herlaaibaar B. Batterye

53. Beoordeel die volgende eienskappe van die onbelangrikste tot die belangrikste (1 is die belangrikste en -8 die onbelangrikste. Let wel: Trek die antwoorde deur daarop te klik en dit in te hou en dan te beweeg, of gebruik die pyltjies aan die einde van die opsies.			
	Batterylewe		Stil omgewing
	Koste		Lawaaierige omgewing
	Styl		Sweet/waterbestand
	Konnektiwiteit		Gemak

26. Die belangrikste eienskappe, volgens jou, waaroor ‘n gehoorapparaat moet beskik (minimum 3).	1. 2. 3.
27. Wat sal die aanskaf van ‘n gehoorapparaat **bevorder**?	
28. Wat sal die aanskaf van ‘n gehoorapparaat **verminder**?	
29. Sou jy aan ‘n onderhoud oor dieselfde onderwerp wou deelneem? Neem asseblief kennis: Onderhoude sal slegs in Engels gevoer word	☐ Ja ☐ Nee
30. Meer inligting vir die R500 Takealot-geskenkbewys	Naam: _____ Selfoonnommer: _____ E-posadres: _____

Appendix K: Likert Scale Questionnaire isiZulu

1. Uke wasebenzisa umshini wokulalela ukuze uthuthukise izindlebe zakho?		Yes		No		
2. Buyini ubulili bakho?		Owesilisa				
		Owesifazane				
		Okunye				
		N/A				
3. Sicela ukhethe ihla lweminyaka yakho		18-29				
		30-44				
		45-59				
		60+				
Uhlu lwemibuzo	**Angivumi neze**		**Angivumi**		**Vuma**	**Ngivume Ngokuqinile**

4. Izindleko zemishini yokulalela zizothinta ukusetshenziswa kwazo				
5. Ukuba nolwazi mayelana nensiza kuzwa kuzokwandisa amathuba amaningi olwazi lwezinsiza zokuzwa				
6. Ungathambela ekuncomeni ekuthuthukisweni kwezinsiza zokuzwa ukusiza abangakwazi ukuzwa kahle ekuhlanganyeleni ukuthuthukisa izinsiza zokuzwa				
7. Ukufinyelela okuthuthukisiwe emishinini yokulalela kungakhuphula ukusetshenziswa kwazo				
8. Ukunethezeka kubalulekile lapho ucabangela ukusebenzisa izinto zokulalela				
9. Izinhlelo zokuqeqesha zalabo abangase babe ngabasebenzisi bemishini yokulalela zizothuthukisa ukusetshenziswa				
10. Izici ezithuthukisiwe njengokukhanselwa komsindo ne-Bluetooth kuzothuthukisa ukutholwa kwemishini yokulalela				
11. Ukucwaswa kokugqoka amathuluzi okulalela kunomthelela ekusetshenzisweni kwawo				

12. Ukuba nezitayela ezahlukene zemishini yokulalela kuzokhuthaza ukusetshenziswa kwazo				
13. Ukubuyekeza nobufakazi kuzoba nomthelela ekuthathweni kwemishini yokulalela				
14. Izincomo ezenziwe uchwepheshe wezokunakekelwa kwempilo zizokwenza ngcono ukusetshenziswa kwethuluzi lokulalelav				
15. Impilo yebhethri ethuthukisiwe kanye nokushaja kalula kuzokhuphula ukutholwa kwedivayisi yokulalela				
16. Ukufakwa komuntu siqu okuqondene nomsebenzi wezempilo kuzoba nomthelela emathubeni okusebenzisa idivayisi yokulalela.				
17. Idivaysi elalelayo ehlangana ngaphandle komthungo nobunye ubuchwepheshe izothuthukisa ukusetshenziswa (isb: Isixhumi se-TV)				
18. Ukufakwa kwezindleko nomshwalense kudlala indima ebalulekile ekusebenziseni izinto zokulalela				
19. Imikhankaso yezemfundo inomthelela ekuthathweni kwemishini yokulalela				

20. Isimo sengqondo somphakathi sithinta ukuzimisela kwakho ukusebenzisa izinto zokulalela				
21. Izinzuzo ezibonwayo zemishini yokulalela zinomthelela esinqumweni sakho sokuzisebenzisa				
22. Izincomo ezivela kubangani nomndeni zizoba nomthelela esinqumweni sakho sokusebenzisa izinto zokulalela				
23. Ulwazi lwakho lokungezwa nezinsimbi zokulalela luyoba nomthelela esinqumweni sakho sokuzisebenzisa				
24. Imishini yokulalela eshajwayo noma imishini yokulalela ibhethri? Ungakhetha idivayisi yokulalela engu-A. eshajwa kabusha (ishaja nsuku zonke) noma i-B. Idivayisi yokulalela ibhethri (isikhathi sokuphila cishe izinsuku ezingu-7-10 ngaphambi kokushintsha ibhethri)	A. Iyashajwa kabusha B. Ibhethri			
25. Linganisela lezi zici kusukela kwezibaluleke kakhulu kuye kwezingabalulekile (1 okubaluleke kakhulu -8 okungabalulekile) Qaphela: ungahudula izimpendulo ngokubamba nangokunyakazisa noma usebenzise imicibisholo ekugcineni kwezinketho		Impilo yebhethri		Indawo ethule
		Izindleko		Indawo enomsindo
		Isitayela		Ukumelana namanzi/umjuluko
		Ukuxhumana		Induduzo

26. Izici ezibaluleke kakhulu ongazithanda kudivayisi yokulalela (ubuncane obungu-3)	1. 2. 3.
27. Yini engathuthukisa ukusetshenziswa kwethuluzi lokulalela?	
28. Yini enganciphisa ukusetshenziswa kwethuluzi lokulalela?	
29. Ungathanda ukuhlanganyela kwinhlolokhono cishe imizuzu engama-20 ukuze uthole eminye yemicabango yakho ngesihloko? Uma kunjalo, sicela ufake imininingwane ngezansi	☐ Yebo ☐ Cha
30. Imininingwane yevawusha ye-Takealot ka-R500	Igama: _____ Inombolo nekheli: _____ L-imeyili: _____

Appendix L: Semi-structured interview topic guide

Introduction

- Start by introducing yourself and explaining the purpose of the interview.
- Ensure the participant's consent for the interview and emphasise the confidentiality of their responses.

Demographics

- Gather some basic demographic information:
  - Age
  - Sex
  - Occupation
  - Location

Questions

1. What is your view of a hearing aid or listening device?
2. Could you share any experiences of someone who faced any stigmatization/discrimination related to hearing devices?
3. Reflecting on your knowledge prior to completing the questionnaire, what information did you have about OTC listening devices?
4. From your observations, what do you believe are the most significant factors influencing individuals' decisions to adopt hearing aids or listening devices?
5. What do you think are the reasons for low uptake of listening devices?
6. If you were struggling to hear, how would you go about getting assistance? What steps would you take?
7. After completing the questionnaire, what insights/learnings did you take away from the experience?
8. Can you identify any specific barriers or improvements in accessibility that come to mind?
9. Can you explain why and give more information as to why these features are particularly important to you? (Refer to question 29 and 30)
10. Based on your answers to question 31 and 32, what do you think listening devices could improve on as a whole?
11. Is there anything you would like to add or any specific insights you think are important regarding listening devices and their uptake?

It is important to note that I will adapt and expand upon these questions based on the participant's responses to ensure a thorough and insightful conversation during the interview.

Appendix M: Participant informed consent for LSQ (English)

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PARTICIPANT INFORMATION LETTER

RE: PARTICIPATION IN RESEARCH STUDY TO IMPROVE THE OVERALL UPTAKE OF LISTENING DEVICES FOR POTENTIAL USERS (Questionnaire)

To whom it may concern,

My name is Alexia Chappel and I would like to invite you to participate in the research study titled "**Ideal characteristics of a listening device**" as a requirement for the completion of my master's degree in Audiology at the University of Cape Town. I am conducting this research under the supervision of Dr Lucretia Petersen.

The following information explains the purpose of the study, what you will be expected to do, as well as your rights. Please read this carefully before you decide to participate in this study.

1. What is the research about?

This study focuses on understanding user preferences for listening devices and their ideal characteristics to promote usage among individuals with mild to moderate sensorineural hearing loss. A listening device is used to improve overall communication of individuals with hearing difficulties as well as enhance speech signals through amplification equipment within the device.

The research aims to identify factors influencing the use of listening devices among potential users. These results will help developers manufacture listening devices more people would use and therefore improve the overall uptake and use of listening devices and in return, reduce the stigma of these listening devices. While you may not receive direct benefits from the findings, your input is crucial in enhancing understanding of current practices and potential improvements in listening device usage.

2. What will be required from you?

Once you have read the informed consent letter and agree to participate in the study, you will be required to fill in a questionnaire of 25 questions. The questionnaire should take about 10 minutes to complete. Once you have completed the questionnaire, you can submit your response which will be sent to the researcher.

Who may participate in this study?

- If you are 18 years or older and have not previously used assisted listening devices (for amplification purposed only) for hearing loss, you qualify to take part in this study.
- Individuals who are proficient in English, Afrikaans, IsiZulu or Xhosa.

3. What are the risks and benefits of the study?

Responding to the survey presents a low level of risk for participants. If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the Faculty of Health Sciences Human Research Ethics Committee, telephone 021 650 1236, email hrec-submissions@uct.ac.za.

By supplying your contact information upon completing the full questionnaire, you become eligible to win a R500 Takealot voucher as a token of appreciation for your participation. **Please note that only one questionnaire submission is permitted per person.**

How will the information be kept confidential?

All data is set to be stored in password-protected files on an external hard drive, and an identical copy of the data will be retained on OneDrive, an established and secure online storage platform. The researcher will ensure the installation of Windows Defender and antivirus systems on their laptop. To enhance security measures, the external hard drive will be carefully placed in a locked drawer at the researcher's place of residence. The data will be exported to an Excel spreadsheet which leave no room for errors as it is done automatically. It is important to note that participants who partake in the online interviews will however not be anonymous (audio recording), but their information will be kept confidential throughout the study. If individuals choose to give their details for the incentive, they will also not be anonymous, but their details will not be used in the study.

4. What if you do not want to participate in this study?

It is important to know that your participation is completely voluntary.

- You do not have to participate in this study if you do not want to
- If you decide not to participate, you will not be affected in any way whatsoever
- If you agree to participate, you may withdraw from this study at any point

Thank you for your time,

Should you have any questions, please do not hesitate to contact us:

Researcher: Alexia Chappel

Email: chpale003@myuct.ac.za

Supervisor: Dr Lucretia Petersen

Email: Lucretia.petersen@uct.ac.za

Appendix N: Participant informed consent for LSQ (IsiXhosa)

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PARTICIPANT INFORMATION LETTER (IsiXhosa)

RE: UKUTHATHA INXAXHEBA KUPHONONONGO LOPHANDO UKUPHUCULA UKUTHATHWA KWEZIXHOBO ZOKUMAMELA KUBASEBENZISI ABANOKUBAKHO (Uluhlu lwemibuzo)

Kulowo ibhekisele kuye

Igama lam ndingu Alexia Chappel. Ndingathanda ukunimema ukuba nithathe inxaxheba kuphononongo olunesihloko esithi "**Ideal characteristics of a listening device**" njengemfuneko yokugqibezela isidanga se-master's kwi Audiology kwiYunivesithi yaseKapa. Ndiqhuba olu phando phantsi kweliso likaGqirha Lucretia Petersen.

Olu lwazi lulandelayo luchaza injongo yophando, okulindeleke ukuba ukwenze, kunye namalungelo akho. Nceda ufunde ngononophelo phambi kokuba uthathe isigqibo sokuthatha inxaxheba kolu phononongo.

Ingaba uphando lumalunga nantoni?

Olu phononongo lujolise ekuqondeni izinto ezikhethwa ngumsebenzisi wezixhobo zokumamela kunye neempawu zabo ezifanelekileyo ukukhuthaza ukusetyenziswa phakathi kwabantu abanobuncinci ukuya kobuphakathi belahleko yokuva. Isixhobo sokuphulaphula sisetyenziselwa ukuphucula unxibelelwano ngokubanzi lwabantu abanengxaki yokuva kunye nokuphucula imiqondiso yentetho ngesixhobo sokukhulisa isandi ngaphakathi kwesixhobo.

Oluphando lujolise ekuchongeni izinto ezinefuthe ekusetyenzisweni kwezixhobo zokumamela phakathi kwabasebenzisi abanokubakho. Ezi ziphumo ziya kunceda abaphuhlisi benze izixhobo zokumamela ezinothi abantu abaninzi bakwazi ukuzisebenzisa kwaye ke ngoko baphucule ukuthatyathwa kunye nokusetyenziswa kwezixhobo zokumamela kwaye ngembuyekezo, ukunciphisa iyantlukwano ngokwenkolelo lezixhobo zokumamela. Ngelixa ungenakufumuna izibonelelo ezithe ngqo kwizinto ezifunyenweyo koluphononongo, igalelo lakho libalulekile ekwandiseni ukuqonda kweendlela ezikhoyo kunye nophuculo olunokubakho kusetyenziso lwesixhobo sokumamela.

Kufunwa ntoni na kuwe?

Wakuba uyifundile ileta yemvume enolwazi kwaye wavuma ukuthatha inxaxheba kuphononongo, kuya kufuneka ugcwalise iphepha lemibuzo, uphendule imibuzo eyi 25. Kungakuthatha imizuzu eyi-10 ukugqiba uphendula lemibuzo. Wakuba ugqibile ukuphendula uluhlu lwemibuzo, ungangenisa impendulo yakho eya kuthunyelwa kumphandi.

Ngubani onokuthatha inxaxhebha kolu phononongo?

Ukuba uneminyaka eli-18 okanye ngaphezulu kwaye awuzange usebenzise izixhobo zokumamela ezincediswayo ngaphambili (ngeenjongo zokukhulisa kuphela) ngenxa yokungeva kakuhle, ukulungele ukuthatha inxaxheba kolu phonongo.

Abantu abanolwazi ngesiNgesi, isBhulu, isiZulu okanye isiXhosa

Ulwazi luya kugcinwa njani luyimfihlo?

Zonke iincukhacha zizakuthi zigcinwe kwiifayile eziyimfihlo ezikhuselweyo kwi-drive yangaphandle kwaye ikopi efanayo yeencukhacha iya kugcinwa kuOneDrive, eli liqonga elimiselweyo nelikhuselekileyo lokugcina kwi-intanethi. Umpandi uya kuqinisekisa ukufakwa kweWindows Defender kunye neenkqubo ze-antivurus kwilaptop yazo ukuqinisekisa ukhuseleko lwezi nchukhaca. Ukwandisa amanyathelo okhuseleko, i-hard drive yangaphandle iya kufakwa ngononophelo kwindawo yokuhlala abaphandi. Ezincukhacha ziya kuthunyelwa ngaphandle kwi-spreadsheet sika-Excel esingashiyi mpazamo njengoko isenziwa ngokuzenzekelayo. Kubalulekile ukuqaphela ukuba abathathi-nxaxheba abathatha inxaxheba kudliwano-ndlebe lwe intanethi baya kukwaziwa (ushicilelo lwesandi) kodwa iincukhaca zabo ziya kugcinwa ziyimfihlo kulo lonke uphononongo. Ukuba umntu ngamnye ukhetha ukunikezela iincukacha zakhe ngenkuthazo kolu phononongo, amagama wabo azokuthi aziwe, kodwa iinkcukacha zabo aziyi kusetyenziswa kuphononongo.

Ingaba awufuni ukuthatha inxaxheba kolu phononongo?

Kubalulekile ukwazi ukuba ukuthatha kwakho inxaxheba kukuzithandela ngokupheleleyo.

- Awunyanzelekanga ukuba uthabathe inxaxheba kolu phononongo ukuba awufuni.
- Ukuba uthatha isigqibo sokungathathi nxaxheba awusayi kuchaphazeleka nangayiphi na indlela.
- Ukuba uyavuma ukuthatha inxaxheba ungarhoxa kolu phononongo nangaliphi na ixesha.

Ndiyifundile ileta yolwazi kwaye ndiyawaqonda amalungelo wam njengomthathi-nxaxheba kuphando. Ndiyayiqonda into equlathwe kukuthatha inxaxheba kolu phononongo kwaye ndifumene ithuba lokubuza imibuzo kwaye ndiyiphendulwe. Ndiyazi ukuba ndingarhoxa kuphononongo nangaliphi na ixesha ukuba ndinqwenela njalo, ngaphandle kokunika ingcaciso.

Ukurhoxa kuphononongo akusayi kuba neziphumo ezibi kum. Ndivuma ngokuzithandela ukuthatha ixaxheba kolu phononongo.

Nceda uqaphele ukuba uluhlu lwemibuzo luya kubonelelwa ngeelwimi ezi-4 ezahlukeneyo: Isingesi, Isibhulu, IsiZulu kunye nesiXhosa.

Abathathi-nxaxheba banethuba lokucacisa uketho lwabo lokufumana uhlaziyo lweziphumo zophononongo. Ngesicelo sabo, umphandi uya kuthumela isishwankathelo seziphumo nge-imeyile.

Ndiyayivuma le miqathango ingentla.

Ukuba unayo nayiphi na imibuzo nceda ungathandabuzi ukuqhagamshelana nathi (jonga iinkcukacha kwileta yolwazi)

Researcher: Alexia Chappel

Email: chpale003@myuct.ac.za

Supervisor: Dr Lucretia Petersen

Email: Lucretia.petersen@uct.ac.za

Appendix O: Participant informed consent for LSQ (Afrikaans)

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PARTICIPANT INFORMATION LETTER (Afrikaans)

RE: DEELNAME AAN NAVORSINGSTUDIE OM ALGEHELE OPNAME VAN GEHOORAPPARATE VIR POTENSIËLE GEBRUIKERS TE VERBETER (Vraelys)

Aan wie dit mag aangaan

My naam is Alexia Chappel. Ek wil jou uitnooi om deel te neem aan die navorsingstudie, genaamd "Die ideale eienskappe van ‘n gehoorapparaat" as ‘n vereiste vir die voltooiing van my Meestersgraad in Oudiologie aan die Universiteit van Kaapstad. Ek doen hierdie navorsing onder die leiding en toesig van dr. Lucretia Petersen.

Die volgende inligting verduidelik die doel van die studie, wat van jou verwag word om te doen, sowel as wat jou regte is. Lees dit asseblief noukeurig deur, voordat jy besluit of jy aan die studie wil deelneem.

Waroor handel die narvorsing?

Die studie fokus op die begrip van gebruikervoorkeure rakende gehoorapparate en hulle ideale eienskappe om die gebruik daarvan onder individue met mindere tot matige sensorineurale gehoorverlies te bevorder. ‘n Gehoorapparaat word gebruik om algehele kommunikasie van individue met gehoorprobleme te verbeter asook om spraakseine deur versterkingstoerusting in die apparaat te verbeter.

Die navorsing poog om faktore, wat die gebruik van gehoorapparate onder potensiële gebruikers beïnvloed, te identifiseer. Hierdie resultate sal ontwikkelaars help om gehoorapparate te vervaardig wat meer mense sal gebruik. Dit sal boonop die stigma van hierdie luisterapparate verminder. Al sal jy moontlik nie direk by die bevindings baat nie, is jou insette noodsaaklik om die begrip van huidige praktyke en potensiële verbeterings aan gehoorapparate te weeg te bring.

Wat sal van jou verwag word?

Wanneer jy die inligtingstoestemmingsbrief gelees het en instem om aan die studie deel te neem, sal daar van jou vereis word om ‘n vraelys met 25 vrae te voltooi. Die vraelys sal

ongeveer 10-minute neem om te voltooi. Wanneer jy die vraelys voltooi het, kan jy dit indien. Dit sal aan jou navorser gestuur word.

Wie mag aan hierdie studie deelneem?

- As jy 18 jaar of ouer is en jy het nog nie voorheen ondersteunende gehoorapparate (slegs vir versterkingsdoeleindes) vir gehoorverlies gebruik nie, kwalifiseer jy om aan hierdie studie deel te neem.
- Individue wat Engels, Afrikaans, IsiZulu of Xhosa magtig is.

Hoe sal die inligting vertroulik gehou word?

Alle data word in wagwoordbeskermde lêers op ‘n eksterne hardeskyf gestoor. ‘n Identiese kopie van die data sal op OneDrive, ‘n gevestigde en veilige aanlynstoorplatform, gestoor word. Die navorser sal verseker dat Windows Defender en antivirusprogramme op hulle skootrekenaar geïnstalleer is. Om sekuriteitsmaatstawwe nog te verbeter, sal die eksterne hardeskyf in ‘n laai, wat gesluit is, by die navorser se blyplek bewaar word. Die data sal na ‘n Excel-sigblad uitgevoer word, wat geen ruimte vir foute laat nie, aangesien dit outomaties gedoen word. Dit is belangrik om kennis te neem dat deelnemers aan aanlynonderhoude nie anoniem sal kan wees nie, maar hulle inligting sal ten tye van die studie as vertroulik hanteer word. As individue kies dat hulle detail as aansporing bekend kan wees, sal hulle ook nie anoniem wees nie, maar hulle detail sal nie in die studie gebruik word nie.

What gebeur as jy nie aan die studie wil deelneem nie?

Dit is belangrik om te weet dat jou deelname heeltemal vrywillig is.

- Jy hoef nie aan hierdie studie deel te neem as jy nie wil nie.
- As jy besluit om nie deel te neem nie, sal jy op geen manier beïnvloed word nie.
- As jy instem om deel te neem, mag jy jou enige tyd aan die studie onttrek.

Ek het die inligtingsbrief gelees en verstaan wat my regte as navorsingsdeelnemer is. Ek verstaan wat my deelname aan hierdie studie behels en het ‘n geleentheid gehad om vrae te vra, wat beantwoord is. Ek is bewus daarvan dat ek enige tyd, wanneer ek wil, aan die studie mag onttrek, sonder dat ek enige verduideliking hoef te verskaf. Ontrekking aan die studie sal geen negatiewe implikasies vir my inhou nie. Ek stem vrywillig in om aan hierdie studie deel te neem.

Let asseblief daarop dat die vraelys in 4 verskillende tale aangebied word: Engels, Afrikaans, IsiZulu en Xhosa.

Deelnemers het die geleentheid om hulle voorkeur vir ontvangsdatums van die studie se bevindinge te spesifiseer. By ontvangs van hulle versoek, sal die navorser ‘n opsomming van die resultate per e-pos vir hulle stuur. Ek het die inligtingsbrief gelees en verstaan wat my regte

as navorsingsdeelnemer is. Ek verstaan wat my deelname aan hierdie studie behels en het ‘n geleentheid gehad om vrae te vra, wat beantwoord is.

Ek is bewus daarvan dat ek enige tyd, wanneer ek wil, aan die studie mag onttrek, sonder dat ek enige verduideliking hoef te verskaf. Ontrekking aan die studie sal geen negatiewe implikasies vir my inhou nie. Ek stem vrywillig in om aan hierdie studie deel te neem.

Let asseblief daarop dat die vraelys in 4 verskillende tale aangebied word: Engels, Afrikaans, IsiZulu en Xhosa.

Deelnemers het die geleentheid om hulle voorkeur vir ontvangsdatums van die studie se bevindinge te spesifiseer. By ontvangs van hulle versoek, sal die navorser ‘n opsomming van die resultate per e-pos vir hulle stuur.

Ek stem toe tot die bogenoemde terme.

As jy enige vrae het, moet asseblief nie huiwer om ons te kontak nie (sien detail in die inligtingsbrief).

Dankie vir jou tyd,

Researcher: Alexia Chappel **Supervisor: Dr Lucretia Petersen**

Email: chpale003@myuct.ac.za Email: Lucretia.petersen@uct.ac.za

Appendix P: Participant informed consent for LSQ (IsiZulu)

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PARTICIPANT INFORMATION LETTER (IsiZulu)

RE: UKUBAMBA IQHAZA OCWANIWENI LOCWANINGO UKUZE KUTHUTHUKISE UKUTHATHA KONKE KWAMADIVAYISI OKULALELA ABANTU ABANGABASEBENZISI (Uhlu lwemibuzo)

Othintekayo,

Igama lami ngingu-Alexia Chappel futhi ngingathanda ukukumema ukuthi ubambe iqhaza ocwaningweni locwaningo olunesihloko esithi **"Izici ezikahle zedivayisi yokulalela"** njengemfuneko yokuphothula iziqu zami ze-Master's in Audiology eNyuvesi yaseKapa. Ngenza lolu cwaningo ngaphansi kokuqondisa kuka Dr Lucretia Petersen.

Ulwazi olulandelayo luchaza inhloso yocwaningo, lokho okulindeleke ukuba ukwenze, kanye namalungelo akho. Sicela ufunde lokhu ngokucophelela ngaphambi kokuthatha isinqumo sokubamba iqhaza kulolu cwaningo

Lumayelana nani ucwaningo?

Lolu cwaningo lugxile ekuqondeni okuncanyelwayo komsebenzisi kwamadivayisi okulalela nezici zawo ezikahle ukuze kuthuthukiswe ukusetshenziswa phakathi kwabantu abanokulahlekelwa kwezinzwa okumaphakathi kuya kokumaphakathi. Idivayisi yokulalela isetshenziselwa ukuthuthukisa ukuxhumana okuphelele kwabantu abanezinkinga zokuzwa kanye nokuthuthukisa amasignali enkulumo ngokusebenzisa okokusebenza kokukhulisa ngaphakathi kwedivayisi.

Ucwaningo luhlose ukuhlonza izici ezinomthelela ekusetshenzisweni kwemishini yokulalela phakathi kwabasebenzisi abangaba abasebenzisi. Le miphumela izosiza onjiniyela ukuba bakhe amadivaysi okulalela abantu abaningi abangawasebenzisa futhi ngaleyo ndlela bathuthukise ukutholwa kanye nokusetshenziswa kwemishini yokulalela futhi ngokubuyisela, behlise isigcwagcwa sale mishini yokulalela. Nakuba ungase ungatholi izinzuzo eziqondile kokutholiwe, okokufaka kwakho kubalulekile ekuthuthukiseni ukuqonda kwezinqubo zamanje kanye nentuthuko engaba khona ekusetshenzisweni kwedivayisi yokulalela.

Yini eyodingeka kuwe?

Uma usuyifundile incwadi yemvume unolwazi futhi uvuma ukubamba iqhaza ocwaningweni, kuzodingeka ukuthi ugcwalise uhlu lwemibuzo lwemibuzo engama-25. Uhlu lwemibuzo kufanele luthathe cishe imizuzu eyi-10 ukuphothula. Uma usuliqedile uhlu lwemibuzo, ungathumela impendulo yakho ezothunyelwa kumcwaningi.

Obani abangabamba iqhaza kulolu cwaningo?

- Uma uneminyaka engu-18 noma ngaphezulu futhi awukaze usebenzise izinsiza zokulalela ezisizwayo (ukukhulisa okuhloselwe kuphela) ekulahlekelweni kwezindlebe, uyafaneleka ukubamba iqhaza kulolu cwaningo.
- Abantu abasazi kahle isiNgisi, isiBhunu, isiZulu noma isiXhosa.

Ulwazi luzogcinwa kanjani luyimfihlo?

Yonke idatha isethwe ukuthi igcinwe kumafayela avikelwe ngephasiwedi kusigcinalwazi sangaphandle, futhi ikhophi efanayo yedatha izogcinwa ku-OneDrive, inkundla yokugcina ye-inthanethi emisiwe nevikelekile. Umcwaningi uzoqinisekisa ukufakwa kweWindows Defender kanye nezinhlelo zokulwa namagciwane kumalaptop abo. Ukuze kuthuthukiswe izinyathelo zokuphepha, i-hard drive yangaphandle izobekwa ngokucophelela ekhabetheni elikhiyiwe lapho kuhlala khona umcwaningi. Idatha izothunyelwa kusipredishithi se-Excel esingashiyi indawo yamaphutha njengoba enziwa ngokuzenzakalelayo. Kubalulekile ukuqaphela ukuthi ababambiqhaza abahlanganyela ezingxoxweni eziku-inthanethi nokho ngeke badalulwe amagama abo (okuqoshiwe okulalelwayo) kodwa ulwazi lwabo luzogcinwa luyimfihlo kulo lonke ucwaningo. Uma abantu bekhetha ukunikeza imininingwane yabo ukuze bathole isisusa, nabo ngeke badalulwe amagama abo kodwa imininingwane yabo ngeke isetshenziswe ocwaningweni.

Kuthiwani uma ungafuni ukubamba iqhaza kulolu cwaningo?

Kubalulekile ukwazi ukuthi ukuhlanganyela kwakho kungokuzithandela ngokuphelele.

- Akudingekile ukuba ubambe iqhaza kulolu cwaningo uma ungafuni
- Uma unquma ukungabambi iqhaza, angeke uthinteke nganoma iyiphi indlela
- Uma uvuma ukubamba iqhaza, ungahoxa kulolu cwaningo nganoma yisiphi isikhathi

Ngiyifundile incwadi yolwazi futhi ngaqonda amalungelo ami njengomhlanganyeli wocwaningo. Ngiyaqonda ukuthi ukuhlanganyela kwami kuhlanganisani kulolu cwaningo futhi ngibe nethuba lokubuza imibuzo futhi ngiyiphendule. Ngiyazi ukuthi ngingahoxa ocwaningweni nganoma

yisiphi isikhathi uma ngifisa, ngaphandle kokuthi nginikeze incazelo. Ukuhoxa ocwaningweni ngeke kube nemithelela engemihle kimina. Ngivuma ngokuzithandela ukuhlanganyela kulolu cwaningo.

Sicela uqaphele ukuthi uhlu lwemibuzo luzohlinzekwa ngezilimi ezi-4 ezahlukene okuhlanganisa: isiNgisi, isiBhunu, isiZulu nesiXhosa.

Ababambiqhaza banethuba lokucacisa ukukhetha kwabo ekutholeni izibuyekezo mayelana nokutholwe ocwaningweni. Ngesicelo sabo, umcwaningi uzothumela isifinyezo semiphumela nge-imeyili.

Ngiyavumelana nemigomo engenhla

Uma unemibuzo sicela ungangabazi ukusithinta (bheka imininingwane encwadini yolwazi).

Researcher: Alexia Chappel

Email: chpale003@myuct.ac.za

Supervisor: Dr Lucretia Petersen

Email: Lucretia.petersen@uct.ac.za

Appendix Q: Participant informed consent for SSI

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Health and Rehabilitation Sciences
Division of Communication Sciences and Disorders
F46 Old Main Building.
Groote Schuur Hospital, Observatory, 7925
Telephone: 021 406-6402
Fax: 021 406-6323

PARTICIPANT INFORMATION LETTER

RE: PARTICIPATION IN RESEARCH STUDY TO IMPROVE THE OVERALL UPTAKE OF LISTENING DEVICES FOR POTENTIAL USERS

To whom it may concern,

My name is Alexia Chappel, and I would like to invite you to participate in the research study titled "**Ideal characteristics of a listening device**" as a requirement for the completion of my master's degree in Audiology at the University of Cape Town. I am conducting this research under the supervision of Dr Lucretia Petersen.

The following information explains the purpose of the study, what you will be expected to do, as well as your rights. Please read this carefully before you decide to participate in this study.

1. What is the research about?

This study focuses on understanding user preferences for listening devices and their ideal characteristics to promote usage among individuals with mild to moderate sensorineural hearing loss. A listening device is used to improve overall communication of individuals with hearing difficulties as well as enhance speech signals through amplification equipment within the device.

The research aims to identify factors influencing the use of listening devices among potential users. These results will help developers manufacture listening devices more people would use and therefore improve the overall uptake and use of listening devices and in return, reduce the stigma of these listening devices. While you may not receive direct benefits from the findings, your input is crucial in enhancing understanding of current practices and potential improvements in listening device usage.

2. What will be required from you?

Once you have read the informed consent letter and agree to participate in the online interview, a date and time will be discussed between the researcher and participant. The online interview consists of around 11 questions for the individual to give their own opinions of and should take around 20-30 minutes.

3. Who may participate in this study?

- If you are 18 years or older and have not previously used assisted listening devices for hearing loss, you qualify to take part in this study.
- Individuals who are proficient in English, Afrikaans, IsiZulu or Xhosa.

4. What are the risks and benefits of the study?

Responding to the survey presents a low level of risk for participants. If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the Faculty of Health Sciences Human Research Ethics Committee, telephone 021 650 1236, email hrec-submissions@uct.ac.za.

By supplying your contact information upon completing the full questionnaire, you become eligible to win a R500 Takealot voucher as a token of appreciation for your participation.

How will the information be kept confidential?

All data is set to be stored in password-protected files on an external hard drive, and an identical copy of the data will be retained on OneDrive, an established and secure online storage platform. The researcher will ensure the installation of Windows Defender and antivirus systems on their laptop. To enhance security measures, the external hard drive will be carefully placed in a locked drawer at the researcher's place of residence. The data will be exported to an Excel spreadsheet which leave no room for errors as it is done automatically. It is important to note that participants who partake in the online interviews will however not be anonymous (audio recording) but their information will be kept confidential throughout the study. If individuals choose to give their details for the incentive, they will also not be anonymous but their details will not be used in the study.

5. What if you do not want to participate in this study?

It is important to know that your participation is completely voluntary.

- You do not have to participate in this study if you do not want to
- If you decide not to participate, you will not be affected in any way whatsoever
- If you agree to participate, you may withdraw from this study at any point

Thank you for your time,

Should you have any questions, please do not hesitate to contact us:

Researcher: Alexia Chappel

Email: chpale003@myuct.ac.za

Supervisor: Dr Lucretia Petersen

Email: Lucretia.petersen@uct.ac.za

UNIVERSITY OF CAPE TOWN

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Participant Consent Form

I, _____ (full name in print) have read the information letter and understand my rights as a research participant. I understand what my participation in this study entails and have had an opportunity to ask questions and have these answered. I am aware that I may withdraw from the study at any time if I so wish, without having to provide an explanation. Withdrawal from the study will have no negative implications for me. I voluntarily consent to participate in this study.

Please note that the interviews will only be conducted in English

Participants have the opportunity to specify their preference for receiving updates on the study's findings. Upon their request, the researcher will send a summary of the results via email.

☑ I agree to the above terms

Should you have any questions please do not hesitate to contact us (see details on information letter).