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ONLINE REVIEWS OF HEARING AID ACQUISITION AND USE: A QUALITATIVE THEMATIC ANALYSIS

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11000865

A dissertation submitted in fulfilment of the requirements for the degree **MA (AUDIOLOGY)** in the Department of Speech Language Pathology and Audiology, Faculty of Humanities, University of Pretoria

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LIST OF ABBREVIATIONS

RJB – Rebecca Jane Bennett

DWS – De Wet Swanepoel

VM – Vinaya Manchaiah

TH – Tayla Heselton

LIWC – Linguistic Inquiry Word Count

IP – Internet Protocol

AG – Advice Giving

ABSTRACT

Hearing health care consumers are increasingly seeking online information regarding hearing aids and user experiences to aid their decision-making in seeking professional help or purchasing a hearing aid. One medium by which people gain information about hearing aids is through online consumer reviews. Yet, little is known about online hearing aid reviews and how they represent user experiences in relation to acquisition and use.

This study used inductive thematic analysis to explore online hearing aid reviews. A retrospective design was used to extract 1,378 hearing aid reviews (open-text responses) from the *www.hearingtracker.com* website. Hearing aid users voluntarily reported on their hearing aid experiences in an open-text format. These responses were analysed using a qualitative inductive approach to identify themes within the dataset. The data was coded into meaningful units of information using a Microsoft Excel spreadsheet by the student researcher and then cross-checked by an experienced researcher and supervisor, ensuring that the units themselves stayed true to their original meaning. Meaning units were then grouped by the researchers into domains, followed by categories of similar themes. Lastly the themes were grouped into categories of subthemes.

From this analysis of the open-text reviews, three domains emerged from the data, containing eleven themes and 100 sub-themes. The *Clinical Processes* domain included themes of *Hearing Assessment and Hearing Aid Acquisition.* The domain *The Device* included themes of *Function, Performance, Physical, Device Management and Maintenance*. Lastly, *The Person* domain included themes of *Satisfaction, Quality of Life, Personal Adjustment and Knowledge.* The themes provided a rich description of

the various factors, such as the hearing aid model, features, price, and the hearing health care professional factors that contribute to the hearing aid user experience. Hearing aid users' reviews covered a range of positive, negative, and neutral descriptions about hearing aid user experience, including advice to other users that provide insight into hearing aid satisfaction and use. Most user experiences were positive regarding satisfaction and performance of the device, as well as device management. Generally, users felt more positive than negative about their hearing aid experience. They also felt more positive than indifferent when giving advice.

The findings of this research could assist hearing health care professionals to develop a person-centered strategy to improve hearing aid fitting and user satisfaction. The hearing aid industry can also benefit from this knowledge, improving hearing aid design with information gained from comments covering aspects such as comfort and fit of the hearing aid. The approach of examining online user reviews has the potential to be a rapid way to develop knowledge about real-world hearing aid use and experience to inform person-centred practices.

KEYWORDS

Hearing aid

Experience

Online

User

Reviews

Qualitative research

Thematic analysis

CHAPTER 1: INTRODUCTION

More than 1.5 billion people across the world experience some degree of hearing loss (World Helath Organization [WHO], 2021). It is well documented that hearing loss prevalence increases with age (Reed et al., 2019). It is also associated with loneliness, anxiety, depression, and isolation, and if left untreated, may result in a reduced quality of life and higher social burden (Sarant et al., 2020). Age-related hearing loss is also a potential risk factor for cognitive decline, cognitive impairment, and dementia (Ho-Yee Ng & Loke, 2015). A recent study by Loughrey et al. (2018) indicated that hearing aids may benefit short-term and semantic memory.

The current primary clinical intervention for people with hearing loss are hearing aids, which improve listening ability, social participation, and overall quality of life (Ferguson, et al., 2017). Despite the need for hearing aid use, the uptake of hearing aids is still poor and not all adults fitted with hearing aids use them, wear them consistently, or are satisfied with them (Knudsen et al., 2010). This was further investigated by Grenness et al. (2014), who emphasised the importance of measuring patient outcomes to monitor improvements on patient satisfaction and adherence, as well as general health status.

Hearing aids have seen significant advances over the years with varied experiences amongst different hearing aid users (Lopez-Poveda et al., 2017). Satisfaction with the hearing aids is related to the individual improvement in hearing ability (i.e. benefit) experienced by the hearing aid user. Satisfaction rates with hearing aids have improved over the years and are encouragingly high (Picou, 2020). Positive outcomes of hearing aid use and benefit may facilitate greater social engagement, lower levels of hearing effort when following conversations, lower levels of depression and anxiety,

improved physical balance and feelings of independence and self-reliance (Mahmoudi et al., 2019). There is a positive association between the use of hearing aids and improvement in the user's quality of life, well-being, and the prevention of age-related conditions (Mahmoudi et al., 2019).

Various tools have been used to measure hearing aid outcomes, but there is currently no universal agreement on the most optimal tool to use in audiology (Granberg et al., 2014). Previous research identified over 246 outcome measures that have been used within the audiology profession to evaluate the benefit and satisfaction with hearing aids with no consensus (Granberg et al., 2014). According to Ho-Yee Ng and Loke (2015), despite good evidence of the existence of determinants affecting different stages of hearing rehabilitation, several issues such as the influence of significant others, the role of health care professionals and demographics have not been adequately explored. These issues therefore need to be addressed in further research to support the adoption of hearing aids, optimal use and outcomes.

Successful adoption of hearing aids is related to the satisfaction and benefit of the hearing aids themselves (Picou, 2020). Satisfaction with hearing aids is related to the subjective improvement in hearing ability experienced by the hearing-aid user. Research proves that perceived hearing difficulty, age at onset of hearing loss, and hearing aid experience are factors that may result in good hearing aid adoption and success (Ferguson et al., 2016). Non-audiological factors, such as perceived self-efficacy, positive attitudes, and support from communication partners, contribute to the success of adult hearing aid users (Ferguson et al., 2016). According to previous research, non-adoption of hearing aids includes financial concern and negative concepts of hearing aid use (Ng & Loke, 2015). Acclimatising to hearing aids includes many factors such as trials with different hearing aids and hearing aid settings,

counselling, spousal and family support and hearing aid adjustments throughout the fitting process (Ng & Loke, 2015). The cosmetic appearance of the hearing aid, as well as support from the health care professional can assist in increasing hearing aid satisfaction (Picou, 2020).

Effective hearing aid use requires a partnership between users and their hearing health care professional to ensure adjusting to their hearing aids, as well as reducing the barriers associated with wearing hearing aids (Bennett et al., 2018). Further investigations are needed to better understand how clinical assessment of non-audiological factors, such as expectations and readiness may best be implemented into clinical practice to assess who would benefit from hearing aids (Ferguson et al., 2016).

Health care users are increasingly seeking information and advice online about their health and well-being (Prescott et al., 2020). Use of the internet for health information and reviews by users is growing and there have been positive and negative responses to this, both within the research community and the medical and health-related professions (Prescott et al., 2020). Social and emotional support is gained from peer-to-peer interactions online (Zhao & Zhang, 2017), and in recent years, hearing aid users have been able to make informed decisions about hearing aid selections by reading the experiences of others with specific hearing aid brands and products using an online forum. These online forums allow for anonymous feedback to be reviewed by independent hearing aid users, which assist other potential hearing aid users in making purchase decisions. *www.HearingTracker.com* is one of the online forums where hearing aids and hearing health care professionals are reviewed (Manchaiah, 2021). Users can use the website to explore potential hearing aids and the professionals that best suit them. Online health information is a timely and futuristic

area of research and extremely important for hearing health care (Manchaiah, 2021). Insights into the hearing aid user experience are available on this forum and can assist users, as well as hearing health care professionals.

Understanding the user experience from a more person-centred approach is valuable and could offer hearing care insights into factors underlying satisfaction with hearing aids. Positive and negative experiences reported in online user reviews are valuable to other potential users and hearing care professionals (Manchaiah, 2021). In a recent study by Bennett et al. (2021), online hearing aid users indicate positive performance on questions relating to hearing aid performance and benefit. Their online reviews describe several barriers limiting their success and emphasise the importance of hearing health care professionals employing a personalised approach to audiological rehabilitation to address individual clients' needs.

Online reviews are unique sources of information, as they come of the patient's own volition (Shaw, 2014). Furthermore, they are written at the user's own discretion, rather than a response to a request of the hearing health care professional or researcher. This is valuable, as problems are then self-identified by the patient, which the hearing health care professional are then able to address. Consumer sites like www.*HearingTracker.com* allow users to identify top performing hearing aids, and honest feedback from online reviews can also be constructive within clinical practice (Shaw, 2014). Online reviews also contain information about various aspects of their hearing aid fittings that have bearing towards the way in which they rate their health care experiences, and are easier to access (Manchaiah et al., 2021). Consumer surveys suggest that more than 80% of people trust online reviews as much as personal recommendations and use this information when making decisions about

products and services (Manchaiah, 2021). The current study therefore addressed the question: What do online reviews tell us about hearing aid acquisition and use?

CHAPTER 2: METHODOLOGY

2.1 RESEARCH AIM

This study aimed to investigate the hearing aid user experience by examining online user reviews. An inductive thematic analysis was used to understand the lived experience of users acquiring and using hearing aids.

2.2 RESEARCH DESIGN

This study used a retrospective design to extract user reviews and the data was examined using a qualitative methodology. Inductive thematic analysis was employed to identify themes within the data (Braun & Clarke, 2006). There are four alternative approaches of qualitative research including grounded theory, interpretive phenomenological analysis, conversational analysis, and qualitative content analysis (Knudsen et al., 2012). Qualitative research can be informed by data-driven inductive or theory-driven deductive approaches (Knudsen et al., 2012).

The inductive thematic approach referred to themes that were strongly linked to the data themselves. Data for this study had been collected specifically for the research that was done (Braun & Clarke, 2006). The theory-driven deductive approach refers to analysis that is driven by researchers' theoretical or analytic interest in the area (Braun & Clarke, 2006). In the current study, inductive thematic analysis using the content analysis approach was applied. The inductive thematic analysis employed was a flexible method of qualitative data analysis and established a systematic form. This study made use of an inductive approach as a less known phenomenon was studied and themes were identified from the user's voice.

A pragmatic paradigm approach was chosen due to the flexibility in the data analysis, and to ensure that the research findings answered the research question. Using the pragmatic paradigm is arguably a rationale for formal research design and a more grounded approach to research (Feilzer, 2009).

2.3 ETHICAL CONSIDERATIONS

Ethical approval for this study was granted by the Faculty of Humanities at the University of Pretoria Research Ethics Committee before data extraction commenced (Appendix 1). The project received institutional review board clearance (reference number: 11000865 (HUM017/0820).

Anonymity is a form of confidentiality which includes that of keeping human participants' identities secret (Edwards & Branelly, 2017). This study was retrospective in nature and anonymous online review data was received and extracted from the website *www.hearingtracker.com*. On this website, users were able to leave their comments anonymously, of their own volition, therefore informed consent was not required. As the participants posted their reviews anonymously, no identifying information was evident in this study. No individual user details were included, thus posing minimal or no potential risk to individuals who provided the reviews. The reviews were voluntary and there was no solicitation from the website. Users were not made aware that their reviews may be used for research purposes.

2.4 RESEARCH PARTICIPANTS

Retrospective data was provided by the online consumer platform Hearing Tracker (*www.hearingtracker.com*), which was collected anonymously. Participants left open

text anonymous comments about the hearing aid experiences online at their own volition. Reviews posted between the years 2013 – 2019 were used and included 1,453 responses to the question “How are things going with your hearing aids?” This data was used to conduct the analysis for this study.

Participants leaving reviews on this website provided (i) metadata on their hearing aid (including brand, technology level, cost, whether the hearing aids had connectivity to a cellphone, and type of hearing aid provider), (ii) a 10-item closed response questionnaire asking how the hearing aid performed in relation to: hearing speech in quiet; hearing speech in noise; hearing on the phone; sound clarity; music listening; comfort; reliability; presence of feedback (buzzing/whistling); general improvement in hearing and perceived value; and (iii) hearing aid reviews via an open response question asking, “How are things going with your hearing aid?”

Participants who left reviews indicated that they owned hearing aids from a variety of manufacturers including Phonak, Resound, Oticon, Widex, Siemens, Unitron and Starkey. A total of 75 reviews were excluded from the data as they were irrelevant to the study. This included reviews where users reported owning a cochlear implant (n=1). In addition, if participants reported purchasing direct-to-consumer hearing aids their reviews were excluded, as this study only included participants whose hearing aids were fitted by hearing health care professionals.

Lastly, reviews were excluded if participants provided a blank text or entry that was not comprehensible by the research group (n = 64). The remaining 1,378 reviews were subsequently analysed in this study.

2.5 POTENTIAL RISKS AND BENEFITS FROM RESEARCH

Sampling bias was a potential concern, as data was extracted from an openly accessible online user review website and therefore users may vary from the general population. For example, according to Ernsting et al. (2017), online reviewers were likely younger and more comfortable with technology, therefore more inclined to give a review online, while older adults may potentially have not reviewed their hearing aids as frequently as younger adults. The metadata available was limited and it was therefore not possible to describe whether the sample represented the general population. The Hearing Tracker website did not collect recognisable data from users, and therefore, we as researchers, were unable to determine whether reviews were written by the hearing aid users themselves or someone on their behalf, where they were from, or how many reviews they had written. Reviews on the Hearing Tracker website are publicly available and regularly accessed by hearing aid users, therefore, analysis of online hearing aid reviews has provided insight into hearing aid recommendations. These recommendations are viewed by thousands of hearing health care users each year, as well as users themselves. Reviews on the Hearing Tracker website are publicly available and regularly accessed by hearing aid users and therefore analysis of online hearing aid reviews has provided insight into hearing aid recommendations. These recommendations are viewed by thousands of hearing healthcare users each year as well as users themselves. The researchers were not USA based, working on USA based reviews therefore some of the client language may not be colloquial for us. Hearing Tracker is a live website and new reviews are constantly being uploaded. Reproducibility of this study is dependent on the dataset used and we are happy to provide the dataset we used upon request. We also encourage others to analyze incoming reviews as we expect that the focus of the text

will change over time in line with the novel hearing aid features (e.g., health monitoring features) and modes of hearing aid fitting and support (e.g., remote care) entering the market. Hearing Tracker reviews are a public domain, and the data can be cross-checked by anyone, although extracting the data manually will take time.

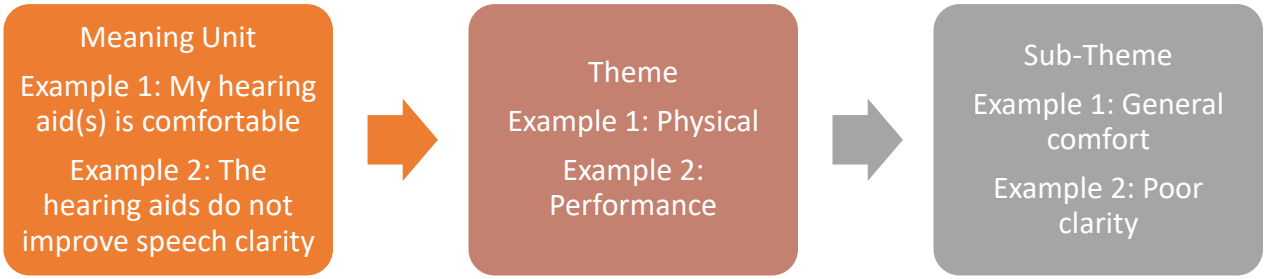
2.6 DATA ANALYSIS

Qualitative research methodologies have been used more frequently in audiology in recent years, as they allow for a more comprehensive understanding of the perspective of those who suffer from hearing loss (Knudsen et al., 2012). Qualitative research can generate new information that may have otherwise been overlooked. These methods recognise the uniqueness of the human experience (Knudsen et al., 2012). As this research data was collected and analysed by interpreting responses of the user's own volition, the hearing aid experience was described in the user's own words.

The data collected for this study followed a qualitative inductive thematic approach and was open text in nature. Thematic analysis involved searching for repeated patterns of meaning within the data set (Linssem et al., 2013). Thematic analysis is one of the most common forms of qualitative research (Javadi & Zarea, 2016). The data was exported anonymously from the HearingTracker.com website into Microsoft Excel for such analysis. In this study, we extracted meaning units from the dataset, and themes and sub-themes were created after detection, analysis, and reporting. A theme must be differentiated from a code derived from a meaning unit as explained by Javadi and Zarea (2016), which was completed by the researchers. Subthemes were then determined from each theme, if appropriate.

The data was analysed using the following thematic approach: (1) The data was coded into meaningful units of information, ensuring that the units themselves stayed true to their original nature, (2) meaning units were grouped into categories of similar themes, and (3) the themes were grouped into categories of sub-themes (Braun & Clarke, 2006).

Figure 1: Flowchart describing the step-by-step thematic approach



Themes and subthemes were then named once they had been defined. Meaning units were extracted and then transformed into themes and subthemes. Coding for this study was completed by a student researcher and all the coding was cross-checked by a senior researcher with experience in thematic analysis (co-supervisor: RJB). Furthermore, grouping of meaning units and identification of themes was conducted by the student researcher and cross-checked by the same senior research (co-supervisor: RJB), with inconsistencies discussed until agreement was reached. The dataset was then reviewed by supervisors, DWS and VM, for discussion and interpretation. According to Knudsen et al. (2012), sampling of thematic analysis should occur until saturation of the data was reached. Saturation in this study was reached, as no new codes were identified within the final 5% of the data analysis.

2.7 TRUSTWORTHINESS

Tests and measures used to establish the validity and reliability of quantitative research cannot be applied to qualitative research (Noble & Smith, 2015). Validity in qualitative research can also have different meanings, such as rigor, trustworthiness, appropriateness, and quality, and has been described using a variety of terms (Hayashi et al., 2019). The quality criteria for all qualitative research studies are credibility, transferability, dependability, and confirmability (Korstjens & Moser, 2018), which poses the question to whether the research findings can be trusted. According to Korstjens and Moser (2018), credibility in qualitative research is the equivalent of internal validity in quantitative research and is concerned with the aspect of truth value. Credibility also establishes the confidence that the results are true, credible, and believable (Forero et al., 2018).

Specific strategies to ensure credibility include prolonged engagement, which ensures that raw data is studied until theories emerge. This strategy was applied by analysing open-text data in Microsoft Excel for thematic analysis. The raw data was coded to create meaning units, which were then grouped into similar categories of themes and subthemes. This study applied persistent observation, ensuring codes, concepts and categories were developed, and data was thoroughly coded by a student researcher. All coding was cross-checked by an experienced researcher. Saturation was then reached, as no new codes were identified in the last 5% of the data analysis.

Dependability ensures the consistency of the data and therefore repeatable findings (Forero et al., 2018). Confirmability ensures neutrality, the process of the analysis, as well as the audit trail, confirming the results by other researchers. This trustworthiness, including dependability and confirmability, was applied as the research steps were

described transparently from the start of the research project, throughout the development of the project, until the results were found. The records of the research process were kept throughout the study.

In this current study, trustworthiness was further supported in that a similar paper, authored by RJB, reliably used the same dataset with a different methodological approach. The study by Bennett et al., (2021) used cluster analysis, as opposed to the thematic analysis used in this study. However, the concepts between this current study and the cluster analysis paper written by RJB were similar, as the same data was looked at using two different approaches, therefore supporting the trustworthiness of the current study approach. There were subtle but clear differences between the findings of the two studies, which will be addressed in the discussion chapter of this study.

The strategies of using the trustworthiness criteria in this study, being credibility (validity) and dependability (reliability), confirmed that the findings can be trusted. These findings are a true reflection of the perspectives reported by the group of participants used, proving the trustworthiness of this study.

CHAPTER 3: RESEARCH ARTICLE

ONLINE REVIEWS OF HEARING AID ACQUISITION AND USE: A QUALITATIVE THEMATIC ANALYSIS

Authors: Tayla Heselton, Rebecca J Bennett, Vinaya Manchaiah, De Wet Swanepoel

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Proof of submission: Appendix (E)

3.1 ABSTRACT

Persons with hearing loss are increasingly seeking online information regarding hearing aids and user experiences to aid decision-making. The objective of the current study was to understand the hearing aid user experience from online reviews using qualitative analysis. 1,378 hearing aid reviews (open-text responses) were extracted from the www.HearingTracker.com website and were analyzed using the qualitative thematic analysis. Three domains emerged containing eleven themes and 136 sub-themes. As per qualitative research methodologies, the term domain was used to describe the overarching concepts, the term theme was used to describe concepts within each Domain, and the term sub-theme to describe concepts within each theme. Clinical Processes domain themes were *Hearing Assessment and Hearing Aid Acquisition.* The Device domain themes included *Function, Performance, Physical, Device Management and Maintenance*. The Person domain themes were *Satisfaction, Quality of Life, Personal Adjustment and Knowledge.* Reviews included a range of positive, negative, and neutral descriptions about hearing aid user experience as well as advice to fellow hearing aid users providing insight into the

various contributing factors. Findings can help hearing health care professionals to develop patient-centered strategies to improve hearing aid fitting and support approaches.

3.2 INTRODUCTION

Hearing aids are the primary clinical intervention for people with hearing loss. They improve listening ability, social participation, and overall health-related quality of life (Ferguson et al., 2017). There is currently no universal agreement on how to measure hearing aid outcomes, and research reports that over 246 objective measures are used within the audiology profession to evaluate benefit and satisfaction with hearing aids (Granberg et al., 2014). A wide variety of hearing aid brands and technology features are available, and the provision of hearing aids along with the fitting process is increasingly varied in terms of benefit and satisfaction of the hearing aid user (Lopez-Poveda et al., 2017). Experiences of aided hearing performance differ greatly across hearing-aid users, and hearing-aid owners report varying benefits from using their hearing aids (Lopez-Poveda et al., 2017). Hearing aid satisfaction rates have improved over the years and are encouragingly high (Picou, 2020). Positive hearing aid outcomes can facilitate greater social engagement, lower levels of hearing effort with regards to following conversation, lower levels of depression and anxiety, improved physical balance and feelings of independence and self-reliance (Mahmoudi et al., 2019). There is a positive association between the use of hearing aids and improvement in the user's quality of life, well-being, and the prevention of associated age-related conditions, including cognitive decline (Mahmoudi et al., 2019). Previous research demonstrates the direct link between hearing loss, loneliness, and therefore cognitive decline in older adults, highlighting the importance of hearing aids (Lin et al., 2013).

Users' ability to successfully manage and use the hearing aid, however, needs to be observed and analyzed (Bennett et al., 2018a) as poor hearing aid management skills negatively impact on hearing aid use and outcomes (Bennett et al., 2018a). Users may feel frustrated and struggle to accept the necessity and benefit of wearing amplification and to commit to consistent use of hearing aids if their needs are not addressed. Adapting to hearing aids requires acclimatization, trials, counselling, inclusion of family and friends and fine tuning of the devices to suit the user's preferences and needs (Ng & Loke, 2015). Globally, 401.4 million people need hearing aids, however a large majority do not wear amplification due to financial constraints, poor service delivery, easy access to intervention as well as the stigma around hearing aids (Orji et al., 2020). Reasons for non-adoption of hearing aids have also included financial concern and negative concepts of hearing aid use (McCormack & Fortnum, 2013). Other studies report that aspects like shared decisions between hearing health care provider and user, as well as the cosmetic appearance of the hearing aid, can assist in increasing hearing aid satisfaction (Picou, 2020) and that readiness to improve hearing predicted both satisfaction and hearing aid benefit (Ferguson et al., 2016). Successful hearing aid use requires a partnership between users and their hearing health care professional to ensure rehabilitation programs are personalized and attainable (Bennett et al., 2018a). Hearing health care professionals should actively promote problem solving behaviors to reduce low satisfaction with hearing aid use and help reduce the barriers associated with hearing aids (Bennett et al., 2018a).

Determining the user experience is an important source of information and could offer hearing care insights into satisfaction with their hearing aids and service provision. An understanding of which could be obtained through analysis of online hearing aid

reviews. Although overall there have been positive experiences reported in online reviews, negative comments on barriers limiting the user's success with their hearing aids are also prevalent (Manchaiah, 2021a). The value of online reviews is that they are usually unsolicited and from the user's own volition (Shaw, 2014). Web platforms, such as www.HearingTracker.com, create a centralized place where users can identify top performing hearing aids, and peruse descriptions of the positive and negative experiences of others. Feedback from these online review sites can also be constructive within clinical practice as honest feedback allows for customer service to be acknowledged (Shaw, 2014). Information gained by examining the large data sets from users could therefore support the understanding of user health knowledge from the public health viewpoint (Manchaiah et al., 2019). Previous research into online hearing aid reviews using automated text analysis techniques have confirmed that such reviews are currently helping to shape healthcare provision in the United States of America which has led to a better understanding of hearing aid use and satisfaction (Bennett et al., 2021). Consumer experiences during the process of hearing aid acquisition and ownership as described on a publicly posted online consumer review website has provided valuable insights into the aspects of audiological rehabilitation that are important to hearing aid owners (Bennett et al., 2021). Users are also able to describe barriers to successful hearing aid adoption which provides hearing health care professionals with important information to minimize negative experiences with hearing aids and to support strategies towards optimal outcomes (Abrams & Kihm, 2015).

In the current study, online hearing aid user reviews were examined using qualitative analyses to better understand user experiences. Consumers focused on three key

performance aspects, including wireless audio streaming, hearing aid adjustments, using a smartphone, and hearing in a noisy environment. To date, there have been no qualitative analyses of online user reviews, and according to (Morse, 2011) qualitative methods have become recognized as crucial for obtaining types of information that cannot be produced quantitatively. This type of analysis could add rich perspectives on the user experience which will enhance practice in the hearing aid industry. In a paper written by Bennett et al. (2021), the same dataset was analyzed using an open-source automated text analysis software to examine the main themes reported by hearing aid users. Six clusters within two domains were identified. The domain Device Acquisition included three clusters: Finding the right provider, device, and price-point; Selecting a hearing aid to suit the hearing loss; Attaining physical fit and device management skills. The domain Device Use included three clusters: Smartphone streaming to hearing aids; Hearing aid adjustment using smartphone; and Hearing in noise. In another study, Manchaiah et al. (2021b) examined the same dataset using the automated text analysis technique Linguistic Inquiry Word Count (LIWC) and found that the star ratings were related to the language dimensions. For example, user engagement personally, socially, and emotionally in online reviews was associated with positive rating and the ratings were lower if the users talked much about time and money associated with hearing aids. While these studies help provide birds eye view of the data, a deeper understanding may be obtained using traditional qualitative analysis. The nature of computer driven analyses, such as automated text analysis or LIWC, is that clustering is based on the frequency of words used, whereas traditional methods of qualitative analysis, such as thematic analysis, value all relevant content provided.

The research question of this study was therefore to understand what online hearing aid reviews tell us about the user experience, retaining the voice of users by adopting qualitative research methods.

3.3 METHODOLOGY

3.3.1 STUDY DESIGN

This study used a retrospective design to extract user reviews and the data was examined using qualitative methodology. Inductive thematic analysis was used to identify themes within the data, according to Braun & Clarke, (2006). This project received institutional review board clearance (reference number: 11000865 (HUM017/0820).

3.3.2 DATA EXTRACTION

User reviews about hearing aids were extracted from the Hearing Tracker website where users voluntarily reported on their hearing aid experience. It is important to note that users leaving reviews on this website provide (i) meta-data on their hearing aid (including brand, technology level, cost, whether the hearing aids had connectivity to a cell phone, and type of hearing aid provider), (ii) a ten-item closed response questionnaire which asked how the hearing aid performed in relation to: hearing speech in quiet; hearing speech in noise; hearing on the phone; sound clarity; music listening; comfort; reliability; presence of feedback (buzzing/whistling); general improvement in hearing and perceived value and (iii) hearing aid reviews via an open response question asking, “how are things going with your hearing aid?”.

Data was extracted from reviews submitted to the HearingTracker.com website from 2013 to 2019, of which 1,453 included open field responses to the question “how are things going with your hearing aid?”. This study focused on the open text provided by participants. HearingTracker.com was used as they provided device specific reviews, as opposed to Google and Reddit. HearingTracker.com provided meta-data, whereas alternative sources provided reviews only about the hearing clinics or a general discussion regarding hearing aids.

Users who left reviews indicated that they owned hearing aids from a variety of manufacturers including Phonak, Resound, Oticon, Widex, Siemens, Unitron and Starkey. Reviews (n=75) were excluded from the data if they were irrelevant to the study. If users reported owning a cochlear implant (n=1) it was removed as this study sought to explore only the hearing aid user experience. If users reported purchasing direct to consumer hearing aids (n=10) they were excluded as well as this study did not include direct-to-consumer hearing aids, only hearing aids fitted by hearing health care professionals. Lastly, reviews were excluded if users provided a blank text or entry that was not comprehensible by the research group (n = 64). The remaining 1378 reviews were analysed in this study.

3.3.3 DATA ANALYSIS

Open-text data was exported anonymously from the HearingTracker.com website into Excel for thematic analysis. Data was analyzed using the following approach: (1) the data was be coded into meaningful units of information, ensuring that the units themselves stayed true to their original nature, (2) meaning units were grouped into categories of similar themes, and (3) the themes were grouped into categories of sub-

themes (Braun & Clarke, 2006). All the meaning units were coded; therefore, no data was omitted, and no analysis software was used, as opposed to the papers written by Bennett et. al (2021) and Manchaiah et al. (2021c).

This study used a retrospective design to extract user reviews and the data was examined using a qualitative methodology. Inductive thematic analysis was employed to identify themes within the data (Braun & Clarke, 2006). There are four alternative approaches of qualitative research including grounded theory, interpretive phenomenological analysis, conversational analysis, and qualitative content analysis (Knudsen et al., 2012). Qualitative research can be informed by data-driven inductive or theory-driven deductive approaches (Knudsen et al., 2012). The inductive thematic approach referred to themes that were strongly linked to the data themselves. Data for this study had been collected specifically for the research that was done (Braun & Clarke, 2006). The theory-driven deductive approach refers to analysis that is driven by researchers theoretical or analytic interest in the area (Braun & Clarke, 2006). In the current study, inductive thematic analysis using the content analysis approach was applied. The inductive thematic analysis employed was a flexible method of qualitative data analysis and established a systematic form. A less known phenomenon was studied, and themes were identified from the user's voice. For more information on conducting qualitative analyses see (Knudsen et al., 2012)

Coding was completed by a student researcher (TH) and 100% of the coding was cross-checked by a senior researcher with experience in thematic analysis (RJB). Saturation of data was reached, as no new codes were identified within the final 5% of data analysis. Grouping of meaning units and identification of themes was conducted by TH and cross checked by RJB, with inconsistencies discussed until

agreement was reached. The dataset was then reviewed by DWS and VM for discussion and interpretation.

3.4 RESULTS

Three Domains emerged within the data set, containing eleven themes (Table 1) and 100 sub-themes in total (Appendix 1). In general, user reviews described the hearing aid experience as positive, negative, indifferent, and advice-giving (Figure 1 and Table 2). However, not all the themes contained content relating to “positive,” “negative,” “indifferent” and “advice-giving” experiences, as some were skewed. For example, the themes Function, and Performance contained both positive and negative content, whereas conversely, the themes Assessment and Personal adjustment contained only advice-giving content. As another example, the theme Satisfaction contained positive content as the majority whereas conversely, the theme Maintenance contained negative content as the majority. The three domains were: Clinical Processes, The Device, and The Person, and are described below.

Table 1: Themes within the data with the number of meaning units within each sub-theme

Domain	Theme (number of sub-themes within theme)	Number of meaning units within sub-theme
Clinical Processes	Hearing Assessment (1)	5
	Hearing aid acquisition (4)	11
Device	Function (9)	652
	Performance (23)	1,345
	Physical (13)	354
	Device Management (17)	919
	Maintenance (4)	69

Person	Satisfaction (18)	1,316
	Quality of life (9)	137
	Personal adjustment (1)	1
	Knowledge (1)	1

Figure 2. Themes within the data classified by the nature of the review

Table 2: Themes within the data classified by the nature of the review: Positive, Negative, Neural or Advice Giving

Domains	Reviews that were **positive** in nature	Reviews that were **negative** in nature	Reviews that were **neutral** in nature	Reviews that were **advice giving** in nature
Clinical Process				Hearing assessment (5)
				Hearing aid acquisition (11)
Device	Function (422)	Function (202)	Function (23)	Function (5)
	Performance (835)	Performance (449)	Performance (56)	Performance (5)
	Physical (239)	Physical (96)	Physical (11)	Physical (8)
	Device Management (416)	Device management (391)	Device management (101)	Device Management (11)
	Maintenance (6)	Maintenance (54)	Maintenance (8)	Maintenance (1)
Person	Satisfaction (943)	Dissatisfaction (265)	Satisfaction (92)	Satisfaction (16)
	Quality of life (126)	Quality of life (1)		Quality of life (8)
				Personal adjustment (1)
				Knowledge (1)

Domain One: Clinical Processes containing two themes.

This domain includes user reviews regarding the hearing assessment including the hearing test, as well as the hearing aid acquisition which includes hearing aid trials, the model of the hearing aid as well as the latest hearing aid technology.

Hearing assessment containing one sub-theme, *Hearing Test*. This theme described advice given to users about getting their hearing tested and not delaying the process. This theme was neither positive, negative, or indifferent and was only described as advice.

"Get your hearing tested now for a baseline. Too many people put off purchasing hearing aids until it's either too late or more difficult to adjust to them. There is a direct correlation between dementia and hearing loss. Do something now!"

Hearing aid acquisition containing four sub-themes. This theme described advice given to users about upgrading their hearing aids, to try many different brands of hearing aids and ensure satisfaction before purchasing as well as to go for the latest hearing aid technology and certain models of hearing aids. Four sub-themes emerged from this theme which included Trials, Model, Latest Technology, and Upgrades. This theme was not described as positive, negative, or indifferent.

"Don't buy this model. Go for the latest."

"Make sure the hearing aids satisfy your problems before purchasing."

"Don't buy the hearing aids until the recharger is available."

Domain Two: The Device containing five themes.

This domain includes user reviews about the function, performance, physical fit, maintenance of the device as well as management of the hearing aid.

Function containing six sub-themes. The most highly reported theme was function, and it was generally described positively. Users reported more positive experiences (n=422) with hearing aid function than negative experiences (n=202). Although the theme function was the most highly reported theme and described positively as well as negatively, it was underrepresented and not described commonly as indifferent or as advice. Six sub-themes emerged under the theme Function, which included Features, Problem Solving, General, Rechargeable Battery, Battery, and Reliability.

"Received the hearing aids over a week ago and am very pleased with the product. They replaced 10 year old product and the features and enhancements are significant. The Bluetooth capability works very well both from my iPhone as well has my smart TV. Sound quality is excellent for my particular hearing loss. I would highly recommend this product based on a very competitive price point for the features provided."

Performance containing eleven sub-themes. Performance was also a highly reported theme and generally described positively. Users reported more positive experiences (n=835) with hearing aid performance than negative experiences (n=449). Eleven sub-themes emerged under the theme Performance which included Sound Clarity, Improved Hearing, Sound Comfort, Sound Detection and Pleasurable Sound Experience. These sub-themes were all described positively. The sub-themes described negatively included Sound Discomfort, Poor Clarity, Difficulty Hearing in Noise, Difficulty Hearing Conversation, Low Quality of Music, Poor Sound Detection, Difficulty Hearing the TV/Radio, Difficulty Hearing on the Phone, Sound Distortion, Unmet Expectations and Wind Noise. These sub-themes were also described

indifferently, and the sub-themes Overcoming Problems, Sound and Ongoing Problems were given as Advice.

“I am a professor. I have classroom-taught for decades. I can hear FAR better which will make me a better teacher. States should consider offering occupational assistance for teachers to improve hearing. It would improve learning.”

“These hearing aids are amazing! I knew I lost hearing and was missing things. But I did not realize how much I was missing. It's so clear! It's almost like I don't have hearing aids in!”

Physical containing five sub-themes. This was a highly reported theme and generally described more positively (n=239) than negatively (n=96). The five sub-themes positively described within this theme were General Comfort of the hearing aid, Discretion of the hearing aid, Retention of the hearing aid, Comfort of the tips/moulds of the hearing aid and Robustness of the hearing aid.

“With the type of work I do the hearing aids are constantly falling off my ears.”

“I wish the ear piece would fit.

“I don’t notice the hearing aids in my ears.”

“The hearing aids are very comfortable.”

“The hearing aids are nearly invisible.”

“The domes of the hearing aids keep slipping out of my ear canal which compromises the quality.”

“This hearing aid model is not as ergonomically well designed as the previous model.”

“I have broken the hearing aid speakers twice.”

Device Management containing twelve sub-themes. This was a highly reported theme described more positively (n=416) than negatively (n=319). It was not commonly described as indifferent and advice. The twelve sub-themes that emerged under the theme Device Management included Streaming of the Bluetooth devices through the hearing aids, the App that which allows users to control the hearing aids volume and programs, the hearing aid Accessories as well as the Adjustments that could be made to the hearing aids. Volume Control also emerged as a sub-theme along with Control via Smartphone and Programs that may be added to the users hearing aid. Bluetooth Connectivity as well as Handling and Maintenance were mentioned strongly in the negative context whereas, conversely, usage was mentioned positively, negatively, indifferently and as advice. Of the twelve sub-themes, Streaming was mentioned largely positive whereas Handling and Maintenance was reported on largely negative.

“The quality of streaming music is excellent with the hearing aids.”

“iPhone stream phone call: I hear great and comfortable.”

Maintenance containing four sub-themes. Maintenance was also a highly reported theme but generally described negatively (n=54) more so than positively (n=6). Four sub-themes emerged, namely Warranty, Repairs, Longevity and Maintenance.

“The repairs of the hearing aids cause nothing but frustration.”

“Cleaning and maintenance of the hearing aids is simple.”

Domain Three: The Person containing four themes.

The person includes user reviews about the user's satisfaction with the hearing aids, the quality of life with the hearing aids as well as the adjustment period of getting used to the hearing aids. Knowledge about the hearing aids was also included in this domain and described as advice.

Satisfaction containing nine sub-themes. Satisfaction was commented on and mostly described positively, with users being generally satisfied (n=608) with their hearing aids. Dissatisfaction with the hearing aids described negatively, included complaints about the hearing aids expense (n=84), general dislike of the hearing aids (n=78) as well as complaints about the audiologist (n=60). The nine sub-themes that emerged included General Satisfaction, Better than Previous Devices, Audiologist, Value for Money, Affordability, Performance, Expectations as well as Acclimatisation and were all sub-themes that appeared positively. Dislike, Regret and Frustration were strongly negative experiences whereas Hope, Programming, Apprehensions, Cost Benefit and Product Comparison were mentioned indifferently.

"These are the best hearing aids I found so far and would highly recommend them to others."

"I love these little hearing aids and they are the best that I've found! My profound hearing loss was starting to affect my ability to do my job as a drug counsellor and I thought I was going to have to retire until I found these! I would highly recommend them to anyone."

"This is my 5th set of BTE Hearing Aids and the worst. I feel the companies have become so enamoured by technology they have bypassed quality control."

“In a crowd of people they are worthless, or in church with kids in the background is another issue for me.”

“*Overpriced for what they do!!”*

“These hearing aids struck me as very expensive.”

Quality of Life containing three sub-themes. Users reported more positive experiences (n=126) and gave advice (n=8) about Quality of Life than negative (n=1) and indifferent (n=0) experiences. General quality of life was described positively (n=97) and connections with family and friends were described as advice (n=5). This domain was underreported as a negative experience (n=1) and not mentioned at all as a indifferent experience. Three sub-themes that emerged positively under the theme Quality of Life included the General Quality of Life, Social Interactions and Confidence. The sub-theme Negative Impact was mentioned negatively and the sub-themes Connections with Family and Friends, General Benefit and Spouse were sub-themes described as advice.

“When I first got them I didn't know what to expect!! I heard many people get hearing aids and stop wearing them! It took a short while to get use to them and now I can't do without them!!!!! They make the quality of life so much better.”

“People that I talk to do not have to repeat things 3 times before I answer them. My wife is very happy she doesn't have to recite the Honey-do list over and over.”

Personal adjustment containing one sub-theme. Users gave more advice (n=1) about personal adjustment as hearing aid users encouraged future hearing aid users to not be embarrassed by their hearing loss. One sub-theme emerged under advice, named Embarrassment.

“I would say don't be embarrassed by hearing aids.”

“You need a few days to get used to the hearing aids”

“Life is too short to not hear your family say "I love you"”

Knowledge containing one sub-theme. Knowledge was also solely represented and described as advice (n=1) and referred to hearing aids preventing further illness such as dementia as there is a direct correlation between the two. One sub-theme emerged, named Dementia.

“There is a direct correlation between dementia and hearing loss.”

“Too many people put off purchasing hearing aids until it is too late.”

To summarize the results, a table has been added below with examples of statements that illustrate themes in the various domains.

Table 3: Examples of statements that illustrate themes in the various domains

Clinical Processes	The Device	The Person
Hearing Assessment “I recommend everyone gets a hearing test” (+)	**Function** “My hearing aid(s) are reliable” (+) “The hearing aid(s) provide low battery warnings” (+) “I am pleased with my hearing aid(s) being rechargeable” (+)	**Satisfaction/Dissatisfaction** “I did not have a good experience with my audiologist” (-) “My hearing aid(s) are worth your time” (+)
Hearing Aid Acquisition “Get the telecoil model for the larger battery” (AG) “I advise others to look out for new and better devices” (AG) “Try many brands of hearing aid(s)” (AG)	**Performance** “I hear better in business meetings with my new hearing aid(s)” (+) “My family noticed a difference when I got my hearing aid(s)” (+)	**Quality of Life** “The hearing aid(s) give me confidence” (+) “My quality of life has decreased dramatically since getting these hearing aid(s)” (-)

	Physical “The hearing aid is a super great fitting with the ear mold” (+) “The hearing aid(s) stay on and fit my ears well” (+) “My hearing aid(s) are uncomfortable” (+)	**Personal Adjustment** “I would say don't be embarrassed by hearing aid(s)” (AG)
	Device Management “Streaming mobile phone conversations through my hearing aid(s) is very clear” (+) “The hearing aid(s) often stop working when I change the battery” (-)	**Knowledge** “There is a direct correlation between dementia and hearing loss” (AG)
	Maintenance “I have had to send my hearing aid in for a repairs often” (-) “All the hearing aid repairs have been covered by warranty” (+)	

3.5 DISCUSSION

The purpose of this study was to understand the user’s hearing aid experience as described on publicly available online user reviews. When asked the question “How are things going with your hearing aid(s)?” Users posted positive, negative, neutral, and advice-giving reviews.

The domain Clinical Processes highlighted two themes. The theme Hearing Assessment described the importance of advice given to users about getting their hearing tested and not delaying the process. This theme was neither positive, negative, or indifferent and consisted of advice-giving statements. Within this theme, statements suggested that waiting until it is too late to assess hearing problems was a bad idea and that getting hearing tested earlier would help address problems before

it is too late to benefit optimally from hearing aids. Previous research involving age related hearing loss and cognitive decline highlighted that age-related hearing loss is a potential risk factor for cognitive decline, cognitive impairment, and dementia (Loughrey et al., 2018), supporting the notion of not waiting to get hearing aids until it is “too late”.

The theme Hearing Aid Acquisition then described the importance of advice given to users about being satisfied with their hearing aids before committing to them, as well as going for the latest models for higher satisfaction. Persons who pay more for their hearing aids have been shown to report higher satisfaction than those who paid less, and hearing aid features such as rechargeable batteries increase hearing aid satisfaction rates (Picou, 2020).

The Device domain highlighted five themes. The theme Function described the importance of Features, Problem Solving, General, Rechargeable Battery, Battery, and Reliability which as a majority were all commented on as a positive hearing aid user experience. As mentioned in previous research, positive hearing aid function increases hearing aid satisfaction rates and improved quality of life (Kozlowski et al., 2017) and unsurprisingly, this theme contained more positive statements than negative ones. The theme Performance contained mostly negative user experiences about the performance of the hearing aids. This finding is not surprising as recent research has shown that problems related to the sound quality and performance of hearing aids are amongst the highest reported but unresolved experiences that contribute to lower levels of hearing aid benefit and satisfaction (Bennett et al., 2021). The theme Physical described the comfort, discretion and fit of the hearing aid or the lack of. The theme Device Management was described more positively with users commonly reporting enjoying the ability of hearing aids which stream via Bluetooth,

control their devices via an app, utilize accessories and have adjustments made to their hearing aids. In previous research such as the MarkeTrak series, hearing aid features such as Bluetooth, smart phone applications and wireless capabilities also increased hearing aid satisfaction rates (Picou, 2020) supporting findings from this qualitative analysis. Most users described their hearing aid experience positively, however sub-themes that highlighted negative experiences included aspects like reliability of the Bluetooth feature. Problems such as handling and maintenance was typical of negative user experiences as also reported in previous research (Bennett et al., 2018b).

The theme Maintenance highlighted the warranty, longevity and repairs of the hearing aids and was described more negatively. Previous research found that the need for hearing aid repairs was relatively low (Picou, 2020) however this study showed that hearing aid repairs and maintenance were a common nuisance and perceived negatively by many users.

The Person domain included four themes that focussed on the experience of the person. The theme Satisfaction of the hearing aid user was largely positive as users were generally satisfied with their devices which was supported by with previous research from the MarkeTrak series as well (Picou, 2020). This study found that overall satisfaction rates were high, indicating that the perceived benefit from the hearing aids are positive which encourages the use of hearing aids from the user's perspective (Picou, 2020). In this study however, dissatisfaction was evident in factors such as the expense of the hearing aids, general dislike of the hearing aids as a whole and complaints about the hearing health care professional including their levels of professionalism and skills. Positive association between satisfaction with the hearing aids and satisfaction with the health care practitioner has been demonstrated

previously (Uriarte et al., 2005) and vice versa. The hearing health care professional's clinical engagement and professional services have been identified as essential components in positive patient experiences according to Ratanjee-Vanmali et al., (2020).

As qualitative research is used more frequently in audiology it has allowed greater insight into the subjective experience of hearing loss as well as new insights in adjustments to hearing loss (Barker et al., 2017). The theme Quality of life refers to general changes in quality of life after a hearing aid fitting. This theme was generally positive with hearing aid benefits outweighing the negatives in description. A scale evaluating benefits and positive effects of hearing aids reported a similar trend with users indicating hearing aids generally improved their quality of life and overall hearing aid satisfaction (Dashti et al., 2015). Connections with family and friends was largely described through advice-giving statements. The psychosocial effects of hearing loss substantially affect both the person with the hearing loss as well as their communication partners (Barker et al., 2017) and the association of hearing loss and hearing aids with stigma was confined only to the person experiencing the loss (Wallhagen, 2009). User reviews describing social interactions and confidence under the theme Quality of life were largely reported positively. According to Vas et al., (2017) the consequences of hearing loss are varied and can extend to various aspects of life as well as to people close to those with hearing loss. The far-reaching effects of hearing loss may extend beyond the user, especially the effects on family members and their involvement in the user's experience living with hearing loss. The role of the spouse was reported on regularly in this study confirming that it is not only the user who is affected by the hearing loss. A spouse or significant other plays an important role in the adaption to hearing aids and the success thereof (Barker et al., 2017). This

previous area of research suggested that further investigation should be undertaken to identify ways partners could encourage the hearing aid user. In this study, advice was provided about adjusting to hearing aids and not being embarrassed by them as Wallhagen, (2009) pointed out that stigma can contribute to putting off when it came to hearing tests and hearing aids. Previous research supporting this notion found that even though hearing aid users were concerned about being made fun of for using hearing aids, the ability to communicate effectively outweighed that fear (Picou, 2020) and therefore embarrassment rarely occurred.

The sub-theme Knowledge, under the theme Quality of life, highlighted that preventing illness like dementia was given as advice by the user, tying in with the theme Hearing Assessment and the importance of not waiting too long to get your hearing checked as a way of preventing cognitive decline due to hearing loss. Age related hearing loss is a potential risk factor for cognitive decline, cognitive impairment and dementia as reported by (Loughrey et al., 2018) and the use of hearing aids has been associated with delayed diagnosis of these declines and reducing risk (Mahmoudi et al., 2019). Research by (Lin et al., 2013) confirmed that hearing loss is independently associated with cognitive decline and these associations are clinically significant. Communication impairments caused by hearing loss can lead to social isolation and loneliness in older adults causing opportunity for cognitive decline.

The findings of the study by Bennett et al. (2021) displayed the unique user journey of consumers navigating the process of selecting a hearing health care professional, selecting a hearing aid, and programming the hearing aid. Although consumers indicated high levels of hearing aid performance and benefit when responding to questions on the website, they described numerous problems limiting their success with hearing aids. This method was a quick way of analyzing the data and gave a

broad understanding and general information on the hearing aid experience. Conversely, the current study, using qualitative thematic analysis, was able to identify some new insights that were not identified via the topic modelling method. For example, when consumers talked about sound quality, the automated analysis using topic modelling identified these comments as a sound quality cluster but was unable to discern whether comments were of a positive, neutral, or negative tone. This qualitative thematic analysis enabled us to delve further delve into the meaning attributed to the concepts, revealing that 62.1% of statements pertaining to sound quality were positive and 30,3% were negative, elucidating sound quality to be a polarizing experience for many hearing aid users. Furthermore, the Bennett et al. (2021) paper reported consumers' overall hearing aid star ratings, which were high (mean rating of 4.04 in a 5-point scale). Yet, when we examine the online text responses provided with the star ratings, nearly 62% of the statements are positive, 6% neutral and over 30% negative reviews. These conflicting findings demonstrate that consumers are likely to give a high star rating even if their experiences were negative, suggesting that examining text responses may have more value than just looking at the star rating of reviews.

3.6 CONCLUSION

Online reviews have become an important source of information for potential hearing aid users (Manchaiah, 2021). Hearing aid user experiences that are made available online provide valuable information to potential hearing aid users and for hearing health care providers. In this study, users described their positive, negative, and neutral experiences with regards to the satisfaction and performance of the hearing aid they were fitted with and the management of that device, the hearing aid fitting as well as the hearing health care professional who assisted them. Reviewers also

provided advice to hearing aid users reading about hearing aids about, making the decision to get their hearing loss treated and the steps other users should take. Hearing health care professionals can use the findings in this study to employ a more comprehensive and responsive approach when supporting patients with hearing aids.

3.7 ACKNOWLEDGMENTS

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CHAPTER 4: DISCUSSION AND CONCLUSION

Previous research shows that many hearing aid users have problems adapting to their hearing aids and report unsatisfactory outcomes (Bennett et al., 2018). The purpose of this study was to investigate the hearing aid user experience from unsolicited sources through examining online user reviews. The main advantage of online reviews is that patients use their own words to express their sentiments (Manchaiah, 2021). Reviews were analysed from the hearing aid users' publicly voiced experiences. Online user reviews have become increasingly popular over the years and health care users are increasingly using health-related queries online to support decision making. These experiences and opinions written at the hearing aid user's own volition have become an important source of information about hearing aids, as well as the hearing health care professionals for potential hearing aid users (Manchaiah, 2021).

4.1 OVERVIEW OF RESEARCH FINDINGS

As online reviews have become increasingly popular, people are generally seeking information via the internet about their health care professional, as well as products such as hearing aids. Web platforms, such as *www.hearingtracker.com*, allow hearing aid users to identify the positive, negative, and neutral experiences regarding their hearing aids and professional interactions.

This study forms part of a larger body of research exploring the views of hearing aid owners shared via online hearing aid review platforms. The *HearingTracker* dataset was recently analysed via three different qualitative methodological approaches. Bennett et al. (2021) used cluster analysis and automated topic modelling to identify the main themes reported by hearing aid owners. Manchaiah et al. (2021) used automated Linguistic Inquiry Word Count (LIWC) to identify linguistic aspects of social,

emotional, health and personal dimensions in the hearing aid reviews. This current study used thematic analysis using a traditional, manual approach, as opposed to computer-driven approaches used in the previous two studies.

Although the same dataset was analysed, the findings differed and offer a triangulated, rich perspective on experiences of hearing aid users. In the study conducted by Bennett et al. (2021), outputs were compared with quantitative data from the consumer reviews. These were short response questions exploring hearing aid performance and benefit, and some metadata, such as hearing aid brand and years of hearing aid ownership. The findings of the study by Bennett et al. (2021) displayed the unique user journey of consumers navigating the process of selecting a hearing health care professional, selecting a hearing aid, and programming the hearing aid. Consumers focussed on three key performance aspects including wireless audio streaming, hearing aid adjustments using a smartphone, and hearing in a noisy environment. Although consumers indicated high levels of hearing aid performance and benefit when responding to questions on the website, they described numerous problems limiting their success with hearing aids. This method was a quick way of analysing the data and gave a broad understanding and general information on the hearing aid experience. Conversely, the current study, using qualitative thematic analysis, was able to identify some new insights that were not identified via the topic modelling method. For example, when consumers talked about sound quality, the automated analysis using topic modelling identified these comments as a sound quality cluster but did not know if the comments were positive, neutral, or negative. The qualitative thematic analysis was used to further delve into those comments. Manchaiah et al. (2021) used the automated LIWC approach to help identify various psychological, social, and clinic visit-related language dimensions. When examining the association

between key linguistic variables and the overall rating, two things were learnt. Firstly, this study by Manchaiah et al,. (2021) found that the more that people were personally, socially, and emotionally engaged with the hearing device experience, the higher they rated their hearing device. Secondly, that study also found that a minimal occurrence of clinic-visit language dimensions were related to benefit and satisfaction ratings. Conversely, if people wrote about their health or home, the ratings were higher. There was no significant difference in linguistic analysis across different hearing aid brands and technology levels. What users say to the hearing health care professional in the clinic is not always their true response, whereas an anonymous user review gives them a platform to express themselves honestly. Comparatively, the current study used a traditional researcher-led qualitative content analysis, where the researcher (TH) read every comment, categorised and analysed the comments to identify main themes and subthemes. The themes and subthemes were cross-checked by an experienced researcher (RJB) to ensure appropriate classification. This was a manual, therefore more thorough approach. It was a time-consuming and tedious method, however, it provided an in-depth understanding of the online user reviews and the hearing aid user experience. The qualitative thematic analysis was used to further investigate those comments and understand them on a deeper, more honest level, which was possible due to human interpretation.

The core findings of this study show the differences between the three methods used. The other two studies mentioned above are computer-based approaches with different features. Bennett et al. (2021) used a computer-based programme looking for the most frequently used terms, whereas this study also used meaning units to identify key themes. The manual thematic analysis placed user value on units. While the computerised approach used in the study by Bennett et al. (2021) was more time

efficient, it lacks depth of analysis, because it only presents commonly used terms. A limitation of this approach is that there can be many terms for one phenomenon. For example, hearing aid feedback is also commonly described as whistling, however, the computer-based programme would not group those two phenomena together. As the researchers in the current study were trained audiologists and therefore more familiar with terms used by hearing aid users, by using the manual approach, we were able to group these terms with similar meanings together, highlighting the value of this study.

In summary, users in the current study described their experience as either positive, negative or neutral. These descriptions were regarding their satisfaction with and performance of the hearing aid that they had been fitted with, subsequent device management, actual hearing aid fitting, and their experience with the hearing health care professional who assisted them. This offered further insight into how the hearing aid experience was truly going. Advice provided by the reviewers to other hearing aid users about making the decision to get their hearing loss treated was a common theme throughout the study. The main theme that emerged from the study was that of the function of the hearing aid. The performance of the device that the user was fitted with was highly important, as it justified the cost, time, and effort of the hearing aid fitting process. The theme performance was largely described positively among the reviewers.

Themes, such as the hearing assessment with the hearing health care professional, highlighted the importance of the initial meeting. The hearing aid trial period before committing to the purchase was highlighted as important to hearing aid users. Battery life was also an important subtheme that emerged, as users explained the stress surrounding the cost of replacing batteries often, as well as the inconvenience of changing the batteries. Rechargeability was highlighted as preferred.

4.2 CLINICAL IMPLICATIONS

One of the motivations for conducting this research was to better understand how hearing aid users describe their hearing aid experience in online review forums. The internet and online forums now provide a public platform for people to share their experiences with the general public, where previously traditional word-of-mouth referrals promoted hearing aid experiences. At the same time, where people would have previously gathered information about purchasing hearing aids from hearing health care professionals and perhaps any family or friends with hearing aid experience, online review platforms now give potential hearing aid buyers access to a wealth of views or opinions from complete strangers.

While the concept of referral via word of mouth is familiar, the notion of online reviews as a medium of word-of-mouth referral for hearing aid purchases is new. Given the novelty of this mode of information transfer, little is currently known about how people describe their hearing aid experience; how hearing aids are portrayed in these public forums; and to what extent these forums influence hearing aid purchasing behaviours (Picou, 2020).

This broader research project using the manual, in-depth thematic analysis looked to explore how the hearing aid experience and hearing aids are portrayed in public forums. For the individual hearing health care professional, gaining awareness about how hearing aids are portrayed in online forums could help to inform clinical practice in a variety of ways. Firstly, awareness of the problems faced by the hearing aid adopters and how they are described in online forums enables the professional to address these fears by providing accurate, truthful information, thereby preventing false information about hearing aids or the hearing aid experience proliferating.

Secondly, a novel finding of this body of work was the emphasis that consumers placed on the digital technology, such as hearing aid streaming capabilities in the data. A study by Ramsgaard et al. (2016) suggests that while the current rates of uptake of these digital streaming devices are on the rise, hearing health care professionals are often hesitant and do not offer streaming devices and the latest technology to hearing aid users. This is problematic given how beneficial these streaming devices are reported to be by users. One of the most common things users spoke about was how much they liked the hearing aid streaming technology and the benefit they received from it. Hearing health care professionals need to reconsider their way of practice and offer these devices and features in informed and accessible ways. Thirdly, two-thirds of reviews were positive, which is encouraging and highlights the experienced benefits of hearing aid use. The performance of the hearing aids and the sound clarity users experienced were some of the most frequently mentioned examples. However, one-third of reviews contained negative content. It is important for hearing health care professionals to be informed about this, since these aspects impact long-term hearing aid benefit and use. For example, a poor or uncomfortable hearing aid fit, the cost of the hearing aids, and the maintenance the hearing aids required, were mentioned as negative aspects. A recent paper by Bennett et al. (2018) identified the high frequency of problems arising with hearing aids, all of which were described by participants in the current study. Informed professionals can anticipate potential problems experienced by owners and allocate time within the hearing aid fitting appointment to identify and address these areas. Finally, participants in the current study described the value of involving their significant others during the adoption of acquiring and using hearing aids. This has been emphasised previously (Vercammen et al. 2020) and highlights the need for professionals to involve the spouse in the audiological

rehabilitation process (Meyer & Hickson, 2012). Even non-hearing aid owners were more likely to report adequate hearing aid self-efficacy, if they reported more positive support from a significant other (Meyer et al., 2013).

Knowledge gained from this research project can improve clinical care by furthering the research and development of hearing aids that overcome problems described by participants in this study. For example, research has highlighted flaws in hearing aid design which can lead to improved hearing aid function and subsequently improved client outcomes. Bennett et al. (2015) identified that some cochlear implant owners had insufficient dexterity to replace microphone filters on their devices. This information was fed back to the manufacturers enabling them to design different features on their devices that did not require such dexterity. Suggested improvements in hearing aid design, as raised by participants in the current study, included ergonomics to prevent issues with retention, rechargeable features to overcome dexterity issues, and higher internet protocol (IP) ratings for protection against water. As noted in the study results, a few desired design changes described by the participants already exist, therefore it is vital that hearing health care professionals are aware of the full range of hearing aids that they can offer their patients.

4.3 STRENGTHS AND LIMITATIONS

Strengths and limitations of this study were identified by conducting a critical evaluation of the study methods and findings.

Study strengths

The study used a large data set (1,378 reviews), an inductive thematic analysis was applied, and two researchers (student researcher; TH) and an experienced researcher

(RJB) checked the data being coded. Domains, themes, and subthemes were created with two researchers, and many cross-check principles were in place. Themes and subthemes were discussed between the two researchers so as to reach a finite decision about which were the most relevant to the study and described the dataset the most accurately. Sampling was used, and saturation was determined by ensuring no new codes were identified within the final 5% of data analysis. Credibility and dependability were criteria used with strategies such as prolonged engagement, triangulation, and an audit trail, to ensure trustworthiness of the study, thereby further strengthening the research conducted.

Study limitations

As this study was retrospective in nature, sampling bias was a potential concern, as data was extracted from a public online user review website. Users may not be representative of the general population of hearing aid users. For example, according to Ernsting et al. (2017), online reviewers were likely younger and more comfortable with technology, therefore more inclined to give a review online, while older adults may potentially have not reviewed their hearing aids as frequently as younger adults. The metadata available was limited and it was therefore not possible to describe whether the sample represented the general population. The Hearing Tracker website does not collect recognisable data from users, and therefore we were unable to determine whether reviews were written by the hearing aid users themselves or by someone on their behalf, as well as where they are from or how many reviews they had written.

Hearing aid recommendations were viewed by thousands of hearing health care professionals each year, as well as users themselves. The reviews were US-based;

however, the researchers were not therefore, some of the client language may not be colloquial.

Another key limitation in this current study is that unlike typical qualitative studies, the depth of data in each participant's review was limited, as people generally write short statements in online reviews. However, large data may have helped overcome this limitation to a certain degree. Lastly, the most recent data reflected is from the year 2019, which proposes a time gap, as there is no current data from the years 2020 or 2021.

4.4 FUTURE RESEARCH

This study has helped us gain further knowledge about how people describe their hearing aid experience, how hearing aids are portrayed in these public forums, and how these forums influence hearing aid purchasing behaviours.

Future research could therefore explore:

- Whether experiences reported throughout online reviews are similar to reviews made in the clinic. Some research suggests that online reviews are heavily skewed to the negative, as people find it a safe place to voice their disdain (Sen & Lerman, 2007). In contrast, some suggest that patient feedback collected in the clinic can be heavily skewed to the positive, as patients may want to please their hearing health care professional (Bennett et al., 2021). Patients who have had negative experiences may withhold information out of fear of poor treatment by the professional. It would be interesting to explore these notions further to deduce whether the online platform is closer to the experiential reality.

- Research based on the retail industry has demonstrated the strong influence that online consumer reviews can have on consumer purchasing behaviours (Manchaiah, 2021). However, there have been no studies to date exploring how online hearing aid reviews influence hearing aid purchasing behaviours. Given the high volume of individuals leaving consumer reviews and accessing consumer reviews through platforms such as *www.hearingtracker.com*, it is likely that these reviews have some impact on hearing aid purchasing behaviours. This concept warrants further investigation.
- Problems experienced with hearing aids after hearing aid fittings have been studied (Bennett et al., 2018), however, further research into fine tuning the hearing aid rehabilitation experience in order to alleviate these problems is warranted.
- Further research to investigate ways the hearing health care professional can involve the hearing aid user's spouse, as the role of the spouse was prominent in this study's findings and supported by Vercammen et al. (2020). The role of the spouse has been identified as an important aspect of the aural rehabilitation process, warranting future research into a possible framework that can be developed.

4.5 CONCLUSION

Online reviews have become an important source of information for potential hearing aid users (Manchaiah, 2021). Hearing aid experiences that are made available online provide valuable information to potential hearing aid users, such as the type of hearing aid to purchase, the preferred manufacturers, as well as which hearing health care providers to see (Bennett et al., 2021). The strengths and weaknesses of the hearing

aids and hearing health care professionals are described, which is helpful for the new hearing aid user, as well as the hearing health care professional.

In this study, users described their positive, negative, and neutral experiences. The main focus was on the satisfaction and performance of the hearing aids the users were fitted with, the management of that device, the hearing aid fitting process, as well as the hearing health care professional who assisted them. Reviewers also provided advice to hearing aid users researching hearing aids, making the decision to get their hearing loss treated, and the steps other users should take. Hearing health care professionals can use the findings from this study to employ a more comprehensive and responsive approach when supporting patients with hearing aids. The main finding from this study is that user reviews about hearing aids and their experience are very insightful and provide information about the user experience and satisfaction. These reviews may even help predict the hearing aid outcomes.

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APPENDICES

Appendix A: Domains, themes, and subthemes within the data with respect to the nature of the review (positive, negative, neutral, advice-giving)

	The green data includes data that was recorded as a positive statement			The red data includes data that was recorded as a negative statement			The yellow data includes data that was recorded as neither good or bad, but a more neutral statement			The blue data includes data that was recorded as advice to hearing aid users		
Domain	**Theme (number of subthemes within theme)**	**Subtheme (number of meaning units within subtheme)**	**Number of raw statements within subtheme**	**Theme (number of subthemes within theme)**	**Subtheme (number of meaning units within subtheme)**	**Number of raw statements within subtheme**	**Theme (number of subthemes within theme)**	**Subtheme (number of meaning units within subtheme)**	**Number of raw statements within subtheme**	**Theme (number of subthemes within theme)**	**Subtheme (number of meaning units within subtheme)**	**Number of raw statements within subtheme**
Clinical Processes										**Hearing Assessment (1)**	Hearing test (1)	5
										Hearing aid acquisition (4)	Trials (2)	7
											Model (2)	2
											Upgrades (1)	1
											Latest technology (1)	1
Device	**Function (6)**	Features (22)	163	**Function (5)**	Acoustic problems (21)	113	**Function (3)**	Battery life (3)	13	**Function (1)**	Batteries (4)	5

		Problem solving (21)	128		Battery (6)	50		Problem solving (6)	6			
		General (1)	60		Rechargeable battery (4)	15		Rechargeable batteries (2)	4			
		Rechargeable battery (1)	36		Features (5)	13						
		Battery (5)	24		Unreliability (1)	11						
		Reliability (2)	11									
	Perfomance (5)	Sound Clarity (15)	357	**Performance (11)**	Sound discomfort (23)	100	**Performance (7)**	Improved hearing (8)	13	**Performance (3)**	Overcoming problems (1)	3
		Improved hearing (29)	373		Poor Clarity (10)	78		Hopes and desires (8)	13		Sound (1)	1
		Sound comfort (4)	42		Difficulty hearing in noise (2)	70		Speech clarity (6)	10		Ongoing problems (1)	1
		Sound detection (8)	42		Difficulty hearing conversation (16)	61		Sound Quality (4)	8			

		Pleasurable sound experience (9)	21		Low quality of music (2)	29		Sound Detection (4)	7			
					Poor Sound detection (7)	25		Noise (4)	4			
					Difficulty hearing the TV/radio (3)	24		Wind (1)	1			
					Difficulty hearing on the phone (1)	20						
					Sound distortion (1)	20						
					Unmet expectations (3)	15						
					Wind noise (1)	7						
	Physical (5)	General comfort (2)	121	**Physical (5)**	Uncomfortable (6)	44	**Physical (4)**	Retention (4)	4	**Physical (1)**	General fit (7)	8
		Discretion (2)	69		Retention problems (4)	36		General comfort (2)	4			
		Retention (3)	23		Occlusion (2)	10		Dexterity (1)	1			

		Comfort of the tips/moulds (5)	17		Non-discretion (1)	5		Sensory (1)	2			
		Robustness (1)	9		Headache (1)	1						
	Device Management (7)	Streaming (7)	234	**Device management (11)**	Handling & maintenance problems (40)	114	**Device management (12)**	Acclimatisation (3)	45	**Device Management (2)**	Sound (1)	1
		App (3)	54		Bluetooth (13)	108		Bluetooth connectivity (9)	12		Usage (7)	10
		Accessories (5)	48		Streaming (10)	44		Cellphone (4)	9			
		Usage (4)	39		App (4)	28		Usage (6)	9			
		Control via smartphone (1)	24		Accessories (12)	27		Streamer (4)	6			
		Adjustments (2)	10		Programs (6)	17		Self programming (1)	5			
		Volume control (1)	7		Product comparison (4)	16		Programs (3)	3			
					Usage (4)	15		App (3)	3			
					Volume control (5)	13		Control via	3			

								smartphone (2)				
					Self-programming (1)	7		Accessories (3)	3			
					Control via smartphone (2)	2		Hope (2)	2			
								Volume control (1)	1			
	Maintenance (1)	Warranty (1)	6	**Maintenance (2)**	Warranty (2)	7	**Maintenance (4)**	Longevity (2)	3	**Maintenance (1)**	Maintenance (1)	1
					Repairs (6)	47		Maintenance (1)	2			
								Repairs (2)	2			
								Warranty (1)	1			
Person	**Satisfaction (8)**	General satisfaction (31)	608	**Dissatisfaction (8)**	Expense (4)	84	**Satisfaction (9)**	Mild satisfaction (14)	65	**Satisfaction (1)**	Audiologist (3)	10
		Better than previous devices (3)	134		Dislike (10)	78		Audiologist (hope) (6)	9		Acclimatisation (3)	6
		Audiologist (4)	87		Audiologist (7)	60		Programming (4)	4			

		Value for money (6)	45		Expectations (3)	20		Product comparison (2)	2			
		Affordability (1)	24		Programming (5)	14		Audiologist (competance) (1)	2			
		Expectations (3)	22		Frustration (4)	6		Expectations (1)	1			
		Acclimatisation (3)	19		Acclimatisation (2)	2		Apprehensions (1)	1			
		Performance (1)	4		Regret (1)	1		Affordability (4)	4			
								Cost-benefit (3)	4			
	Quality of life (3)	General (5)	97	**Quality of life (1)**	Negative impact (1)	1				**Quality of life (3)**	Connection with family & friends (3)	5
		Social interactions (4)	23								General benefit (1)	2
		Confidence (1)	6								Spouse (1)	1
										Personal adjustment (1)	Embarassment (1)	1
										Knowledge (1)	Dementia (1)	1

Appendix B: Ethical clearance from the Faculty of Humanities

8 October 2020

Dear Ms T Heselton

Project Title:	Hearing aid user experience: What can be learnt from online consumer feedback?
Researcher:	Ms T Heselton
Supervisor(s):	Prof DCDW Swanepoel
Department:	Speech Language Path and Aud
Reference number:	11000865 (HUM017/0820)
Degree:	Masters

I have pleasure in informing you that the above application was **approved** by the Research Ethics Committee on 1 October 2020. Data collection may therefore commence.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should the actual research depart significantly from the proposed research, it will be necessary to apply for a new research approval and ethical clearance.

We wish you success with the project.

Sincerely,

Prof Innocent Pikirayi
Deputy Dean: Postgraduate Studies and Research Ethics
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: PGHumanities@up.ac.za

Appendix C: Memorandum of Agreement

Memorandum of Agreement

for Academic Supervision of Postgraduate Students

This document should be read in conjunction with the following University of Pretoria policy documents: the ***University of Pretoria General Regulations*** *applicable to postgraduate study the* ***University Code of Ethics for Research,*** *the* ***University Plagiarism Policy,*** *the* ***Policy for the Preservation and Retention of Research Data,*** *the* ***Intellectual Property Policy,*** *the* ***Guidelines for Postgraduate Supervision*** *and the* ***Declaration of Originality form.***

These documents are all available on the university of Pretoria web site (http://www.up.ac.za) and on request from the Registrar's Division.

Clear mediation mechanisms are available to deal with any grievances, personal problems or disagreements that may arise between a postgraduate candidate and the supervisor. (Refer to the General Regulations and Information of the University of Pretoria pertaining to the ***Student Communication Channel****, Section B.15).*

Name of student: TAYLA HESELTON Student number: 11 000 865

Degree: (MA) AUDIOLOGY

Department: COMMUNICATION PATHOLOGY

School: UNIVERSITY OF PRETORIA

Faculty: HUMANITIES

Initial - Student	
Initial - Supervisor	

Memorandum of Agreement between Postgraduate Student and Supervisor

THE STUDENT TAYLA HESELTON (name)

accepts and undertakes the following roles and responsibilities:

1. Abiding by the relevant rules and regulations of the University.

2. Working independently under the guidance of the supervisor, and ensuring that she or he stays abreast of the latest developments in the field of study.
3. Agreeing with the supervisor, and abiding by, a time schedule which outlines the expected completion dates of various stages of the research work (See Supervisor section, #4 below).
4. Attending pre-scheduled meetings with the supervisor, and being adequately prepared for these consultation sessions (See Supervisor section, #5 below).
5. Submitting written work at times agreed upon by the student and the supervisor.
6. Taking account of the feedback provided by the supervisor before subsequent submission of written work.
7. Undertaking to submit the dissertation or thesis within the prescribed time for the completion of the degree unless exceptional circumstances arise, and to plan accordingly.
8. Accepting responsibility for the overall coherent structure of the final dissertation or thesis and, as far as possible, submitting written work that is free of spelling mistakes, grammatical errors and incorrect punctuation.
9. Undertaking to submit draft papers for publication, taking into account advice provided by the supervisor.
10. Informing the supervisor of any absence or circumstances that may affect the research progress and time line.

THE SUPERVISOR Prof De Wet Swanepoel (name)

accepts and undertakes the following roles and responsibilities:

1. Abiding by the relevant rules and regulations of the University.
2. Assisting the student in building knowledge and research skills in the specific area of postgraduate study and relevant to the level of the degree.

Initial - Student	
Initial - Supervisor	

3. Ensuring that the proposed research project is feasible, of an appropriate level for the degree under consideration, and that the necessary resources and facilities will be available to enable the student to complete the research timeously.
4. Providing information on the conditions to be met in order to achieve satisfactory progress/performance and assisting with the construction of a written time schedule which outlines the expected completion dates of various stages of the research work.
5. Being accessible to the student by attending meetings in line with a schedule agreed upon in advance by the supervisor and the student, and being prepared for the meetings.

6. Implementing an arrangement for student supervision in cases where the supervisor is away from the University e.g. sick leave, sabbatical leave, or leaves the employ of the University, and communicating these arrangements to the student timeously.
7. Accepting submission of written work at intervals agreed on by the student and supervisor, providing constructive comment and criticism within a time frame jointly agreed on at the start of the research, and informing the student, in writing, of any inadequacy relating to progress or work, in relation to the expectations previously agreed on by the student and supervisor.
8. Assisting the student with the production of the dissertation or thesis, providing guidance on technical aspects of writing including discipline-specific requirements.
9. Assisting with the publication of research articles as appropriate and agreeing the ownership of research results in accordance with the University's policy on intellectual property.
10. Contributing to the student's academic development by introducing her or him to relevant academic and professional networks through conferences, seminars and other events where possible.

THE STUDENT and THE SUPERVISOR :

1. confirm that we have read and understood this Memorandum of Agreement and
2. agree to accept its content for the duration of the period of study in respect of the degree as specified below.

Initial - Student	
Initial - Supervisor	

RECORD OF AGREEMENT ON PLACES AND DATES OF MEETINGS, MILESTONES AND DEADLINES

(to be completed at the time when the Agreement is signed)

Friday 18-10-2019	1st Masters meeting at UP	Tayla, De Wet, Kavina	Tayla agreed to do MA degree
January 2020	Orientation at UP	Tayla attended	MA degree began
February 2020	Data Collection / Analysis	Bec trained Tayla	Tayla started coding

April 2021: article finished	Started with article submission		
August 2021: dissertation complete			
	many Zoom * meetings attended		
	"		
	"		

Initial - Student	
Initial - Supervisor	

Name of student: TAYLA HESELTON

Student number: 11 000 865 Degree:

(MA) AUDIOLOGY

Department: COMMUNICATION PATHOLOGY

School: UNIVERSITY OF PRETORIA

Faculty: HUMANITIES

Signed at LINKSFIELD on 11 · 06 2021 (date)

Student's signature:

Name of supervisor: DE WET SWANEPOEL

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Supervisor's signature:..

Name of co-supervisor:... REBECCA BENNETT ....

Co-supervisor's signature:...

Provisional date for thesis / dissertation submission: ......31 AUGUST 2021

Date Forwarded to the Head of Department: ....

Signature of receipt by Head of Department:...

Initial - Student	
Initial - Supervisor	

Appendix D: Declaration of Originality

UNIVERSITY OF PRETORIA
FACULTY OF HUMANITIES
DEPARTMENT OF SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY

PLAGIARISM DECLARATION

Full name: Tayla Heselton

Student Number: 11000865

Degree/Qualification: MA(AUDIOLOGY)

Title of thesis/ dissertation/ mini dissertation: ONLINE REVIEWS OF HEARING AID ACQUISITION AND USE: A QUALITATIVE THEMATIC ANALYSIS

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Signature

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Appendix E: Proof of submission of article

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