Perceived Role of Recipients of Cochlear Implants and Their Spouses in Auditory Rehabilitation

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Perceived Role of Recipients of Cochlear Implants and Their Spouses in Auditory Rehabilitation

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Rehabilitation Counseling

by

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Abstract

Hearing loss can drastically impact the quality of life of the individual who has hearing loss as well as the frequent communication partners of the individual with hearing loss. There is ample research that discusses the use of auditory rehabilitation with individuals who utilize hearing aids; however, there is little evidence to support its use with individuals who utilize cochlear implants. A qualitative methodology was utilized to examine the phenomenon recipients of cochlear implants and their spouses experience during the auditory rehabilitation process. Six couples, a total of twelve individuals, participated in this study. Eight axial codes were identified through grounded theory data analysis including: pre-operational experience, persistent support, actions, positive mentality, group support, improved social motivation, spousal support, and the importance of auditory rehabilitation. These codes were further analyzed to the selective codes of support, auditory rehabilitation, and process which contributed to the theory of improved quality of life for recipients of cochlear implants and their spouses.
Acknowledgements

This dissertation would not have been given breath if it were not for the following people:

To the participants, thank you for your time and willingness to share your stories. Your ability to articulate your experiences provided a reality and perspective that added great depth to this study. This would not have been possible with you.

To Dr. Brent Williams, thank you for believing in me the first day I walked in to your office, wide-eyed and unsure of my pursuit of a doctoral degree. Your consistent support and willingness to help, despite your very busy schedule and career, mean more to me than you know.

To Dr. Sam Atcherson, thank you for taking a chance years ago on a quick-talking “speechie” who was interested in completing a research project with teens who had hearing loss. Thank you for taking time to listen to my (often eccentric) research and project ideas. You have a way of teaching through example and always being open that is unique and impactful. Thank you for taking time to help me through this process. For your mentorship, guidance, and support, thank you.

To Dr. Stephanie Lusk, thank you for your willingness to hear out my ideas and for helping me brainstorm. Your kind and warm spirit is a constant beacon of hope and inspiration for your students. I am grateful to have been one of many that has crossed your path.

To Dr. Fran Hagstrom, thank you for your support over the years. I love that we can sit down for lunch and identify three research agendas in the span of an hour. Thank you for your willingness to brainstorm and for your willingness to share your expertise. You have been a constant support and for that I am very appreciative. Thank you.
To Dr. Mary Ramey, thank you for helping me to determine “what makes my heart sing,” while in your courses which ultimately led to my choosing of the research topic for this dissertation. You are an inspiration to many and your positive attitude and determination are infectious. I constantly try to emulate your passion and genuine care for students in my teaching approach. You inspired me to not only become a better researcher, but also a better teacher and mentor. Thank you.

To Tracy Pate, I am not sure where to start. You spent hours pouring knowledge into me and helping me to hone my skills as a clinician. You did this voluntarily with nothing in return expected. I would argue there is no greater gift. Your passion about working with children and adults with hearing loss is unsurpassed. The idea for this dissertation spawned from work that would not have been possible without your mentorship and guidance in the clinical setting. The children and adults with hearing loss you have worked with are unaware of the multitude of hours you have spent studying, learning, teaching, guiding, worrying, writing, stressing, celebrating, pushing for, and standing up for them. You do it because you care about each child, each parent, and each family. You spend hours training other professionals because you know the importance of spreading the passion and knowledge you have to future generations is critical for a continued high standard of quality of care for children and adults with hearing loss. In short, I continue to be amazed by your strength, your passion, and your commitment not only the children and adults with hearing loss, but also to training future generations of professionals. You are a blessing to many. Thank you will never be enough.

To Krista Scruggs, thank you for helping me develop my “why” questions and for consistently inspiring me to “think outside the box.” Your ability to develop lessons, materials, and plans that are motivating and meaningful to children and adults with hearing loss is most
certainly a gift. Thank you for encouraging me to be a “‘why’ and ‘why not’ asker” (even though it sometimes gets us both in trouble). Your determination to analyze information holistically is what makes you one of the best Speech-Language Pathologists I have ever seen in action. The care and patience you demonstrate with the families of children and adults with hearing loss with whom you work is undeniable. You are an inspiration in more ways than you know. Your support to me has been that of more than a colleague, but also a friend. Thank you.

To Dr. Amy Hunter, your willingness to collaborate with me in helping adults who receive cochlear implants is the foundation for not only this study, but also the creation of a support group for individuals who have or are considering a cochlear implant. You have stood by my side, consistently communicated, and been a constant support for the individuals with which we have worked as well as myself. Without your commitment to auditory rehabilitation, this study would not have been possible. I am grateful for our professional relationship as well as your friendship. You go out of your way to make sure the individuals you serve receive the best care possible, even if that means you sacrificing your personal time. You are an inspiration, a motivation, and are passionate about serving individuals with hearing loss. Thank you.

To my family members, there are too many to count and thank. I do want to mention and thank my brother Noah Smith for always believing and me and sticking up for me against all odds. Thank you to Jennifer Mathews always being a phone call or short drive away for me to vent, to chat, to hang out, or to help with the boys whenever needed. Your faith is inspiring and your friendship is invaluable to me. Thank you to my grandparents for your constant love and support over the years. Thank you to my step-dad and step-mom for your encouragement throughout this process as well.
To my sons Maddux and Mason, thank you for sacrificing mommy time to allow me to chase a dream. Leaving you to write or attend class was quite difficult. You have been and will always be my joy and happiness. Regardless of how I felt or how exhausted I was throughout this process, your smiles and hugs helped me to persevere. I love you both to the nth degree.

To my husband Andrew, you have been my rock during the pursuit of this degree. You humbly asked how you could help, pushed me when I was ready to be done, and encouraged me to persevere when this degree did not seem possible. You are gracious. You are kind. You are strong. You are humble. You are a man of God. You are who I want our boys to look up to and emulate when they get older. This dissertation process brought out many emotions for me, both positive and negative. You consistently and fervently loved me through whatever I presented. You had me at “me too.” I am forever grateful for our friendship and love.
Dedication

This dissertation is dedicated to my parents. To my father, Marty Smith, for teaching me how to persevere no matter what others do or say and for teaching me the meaning of hard work, I am forever grateful. To my mother, Jackie Songer, for teaching me to have no fear in asking questions, to have no shame in new ideas, to passionately care for others, and to always stand up for what I believe, you are my inspiration. Were it not for you two empowering me to believe in myself and chase my dreams, this achievement would not have been possible. For my mother and father, my cup runneth over.
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Category Three: Process

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Chapter One: Introduction to the Study

Organization of the Chapter

The first chapter of this document is organized as follows: an introduction to the research is followed by a background report of applicable former research findings. This section is followed by a statement of the problem and the purpose of the study. The research questions are stated as well as the significance of this study. The conceptual design is then displayed and discussed. This is followed by descriptions for theoretical sensitivity for the study as well as parameters of the study. The definition of terms section follows a discussion of the parameters of the study. This chapter then describes limitations of the study, an overall summary, and organization of the dissertation.

Introduction

In 2008, over 34 million people in the United States reported a hearing difficulty. (Kochkin, 2009). By 2012, over 37 million people over the age of 18 reported having some difficult with hearing loss (Blackwell, Lucas, & Clarke, 2014). Some individuals with hearing loss function in what some term the “hearing world” which means they utilize hearing technology and spoken language as a primary means of communication and refer to themselves as hard of hearing. Others term themselves as being deaf because they function without the use of hearing technology and often use sign language as a primary means of communication. Many of these individuals also consider themselves to be members of the Deaf culture, which will be discussed in the forthcoming literature review.

For some individuals, a diagnosis of hearing loss is celebrated, while for others it is considered limiting to daily life function. Hearing loss can be a barrier in activities of daily living not only for the individual with the hearing loss, but also for people who frequently communicate
with this individual. This could include but is not limited to a spouse, coworkers, family members, friends, and acquaintances. Daily communication breakdowns can lead to lower self-esteem, depression, anxiety, and overall decreased quality of life for these individuals as well as those with whom they most frequently communicate.

In the 1980’s the United States Food and Drug Administration (FDA) approved the first cochlear implant, a device that when implanted has the potential to restore the ability to hear. This device has been a catalyst for debate since its inception, but the fact is that more and more adults are considering this option as the success rate and positive data continue to compile. As of December 2012, over 300,000 registered cochlear implant surgeries had occurred worldwide with nearly 60,000 of those surgeries were in adults in the United States (NIDCD, 2016). This research does not serve to debate the choice of cochlear implantation, but rather serves to examine the quality of life of individuals who have made the decision to undergo cochlear implantation. When a cochlear implant is activated (or powered on), the brain must learn to interpret the new sound stimulus (Cole & Flexer, 2016).

Auditory rehabilitation, also known as aural rehabilitation, is defined as “intervention aimed at minimizing and alleviating the communication difficulties associated with hearing loss” (Tye-Murray, 2015, p. 3). Auditory rehabilitation is an essential component for people with hearing loss where trained professionals (audiologists or speech-language pathologists) help the individual with a cochlear implant learn how to utilize their device as well as how to provide detailed functional feedback to their managing cochlear implant audiologist. Critical components of auditory rehabilitation include the individual’s desire to succeed and their willingness to practice listening therapy objectives (Tye-Murray, 2016). The process of re-training the brain to interpret new sounds through utilizing the cochlear implant takes time. Research has established
that spousal support is a positive prognostic indicator in auditory rehabilitation for individuals who utilize hearing aids (Tye-Murray, 2016); however, there is a paucity of evidence in the literature in this area for users of cochlear implants. Research is needed to examine the perceived role of individuals who receive cochlear implants as well as the spouses of individuals who receive cochlear implants in the auditory rehabilitation process.

A phenomenology in nature, the focus of this study is on the perceived role of recipients of cochlear implants and their spouses in auditory rehabilitation. This qualitative study utilized grounded theory (Patton, 2015) to develop themes and identify opportunities for future research. Participants were couples, one member of which must have received a cochlear implant. Each couple must have been married for at least two years and they must have participated in a post-operative auditory rehabilitation program. This study may serve to educate individuals with cochlear implants, individuals considering cochlear implantation, professionals who work with individuals with hearing loss, and policy makers about the importance not only of auditory rehabilitation, but also the importance of including families in the auditory rehabilitation process.

Background

The American Speech Language Hearing Association (2014) reports the number of Americans with hearing loss has doubled in the last 30 years. The National Institute on Deafness and Other Communication Disorders (2014) reports “about 2 percent of adults aged 45 to 54 have disabling hearing loss. The rate increases to 8.5 percent for adults aged 55 to 64. Nearly 25 percent of those age 65 to 74 and 50 percent of those who are 75 and older have disabling hearing loss.” (National Institute on Deafness and Other Communication Disorders, para. 5) The population of adults with hearing loss is increasing and therefore the way hearing loss affects this
population and their family needs to be looked at more stringently. This is not an issue that is diminishing with time.

In 2001, the International Classification of Functioning, Disability and Health (ICF) was developed by the World Health Organization (World Health Organization (WHO), 2001). A unique facet of the ICF was the goal of looking a variety of factors influencing the quality of life (considered to be a broad construct for the purpose of this study and will be further discussed in the literature review) of individuals with hearing loss, rather than mainly focusing on fitting them with hearing technology. A conceptual framework was developed by the ICF to include all the following: health condition, body function and body structure, activity, participation, environmental factors, and personal factors (Tye-Murray, 2015). In 2007, Hickson, Worrall, and Sarinisci, noted “it is generally conceded that hearing aid fitting alone does not meet the needs of all older people with hearing impairment” (p. 212). Research has identified a shortcoming of the ICF’s conceptual framework to be its minimal focus on the inclusion of the family members and communication partners of people with hearing loss (Laplante-Lévesque, Hickson, & Worrall, 2010; Scarinci, Worrall, & Hickson, 2009).

For many, a spouse or significant other is a primary source of support during a critical life event. Whether the life event is medical, emotional, occupational, or financial in nature, it affects both members of the couple. “Communication, which is the centerpiece of intimacy, invariably suffers when a member of a marriage partnership has hearing loss” (Tye-Murray, 2015, p. 76). Family members and frequent communicators of an individual with hearing loss often experience the second-hand effects of hearing loss. “Many times, the patient’s hearing loss imposes an adverse effect on the perceived quality of life experienced by a frequent communication partner.” (Tye-Murray, 2015, p. 6). Kramer, Allessie, Dondorp, Zekveld, and
Kapteyn (2005, p. 256) note that “the role of the significant other (a person with whom an important and regular relationship is maintained) may be assumed to be just as relevant as the role of the affected individual for the enhancement of communication and improvement of performance and psychosocial wellbeing.” Communication breakdowns are a primary source of frustration and can impact the quality of life of both the individual with hearing loss and their frequent communication partner. Communication repair strategies do not come naturally to everyone and often have to be taught. Teaching communication repair strategies is a primary goal of auditory rehabilitation that has the potential to impact the quality of life of both the individual with hearing loss and their frequent communication partner.

Auditory (Aural) rehabilitation is defined as an “intervention aimed at minimizing and alleviating the communication difficulties associated with hearing loss” (Tye-Murray, 2015, p. 3). One of many goals of auditory rehabilitation is to teach the person with hearing loss communication repair strategies to help them better navigate conversations when there is a communication breakdown. Since their spouse is their primary support, it is not a stretch to postulate that many communication breakdowns often happen within the context of the relationship between the person with hearing loss and their spouse and therefore a need to teach the spouse these communication repair strategies would be advantageous. In 2009, Hickson, Worrall, and Scarinski invited people with hearing loss and their significant others (when available) to participate in Active Communication Education (ACE) (Hickson, Worrall, & Scarinsci, 2007) in which the participants learned about communication repair strategies and completed the International Outcome Inventory-Hearing Aids (IOI-HA, Cox, Alexander, & Beyer, 2003). At the study’s caseation, over half the participants and their significant others reported the 5 week interactive group sessions were beneficial and the “majority of participants
with hearing loss reported using communication strategies on a daily basis” (Tye-Murray, 2015, p. 469). Similar programs involving the significant others of those with hearing loss who utilize hearing aids have previously been developed (Hickson, Worral, Yiu, and Barnett, 1996; Hickson & Worral, 2003; Getty and He´tu, 1991). An interesting note regarding all the aforementioned studies is that they were all completed with individuals who utilize hearing aids. There is limited information regarding the relationship between significant others and those who have hearing loss and utilize cochlear implants.

Cochlear implants are hearing technology that has revolutionized the field of audiology. People with severe-to-profound hearing loss who were previously told there was nothing more that could be done to improve their hearing with hearing aids are now told they have the option of pursuing cochlear implantation. In 1984, the Food and Drug Administration (FDA) approved the first multi-channel cochlear implant for adults in the United States. This device is comprised of two components: an external component that is most often worn at the ear level (much like a hearing aid) with an external magnet, and an internal component that must be surgically implanted in to the inner ear. The surgery is typically an outpatient procedure, but is still to be considered a major medical event. When the internal device of a cochlear implant is stimulated, the signal from the electrodes inside the implant take the place of the hair cell transducer system of the inner ear thus bypassing the damaged or missing hair cells and sending a signal for the brain to interpret via the auditory nerve (Tye-Murray, 2015). The signal sent to the brain through a cochlear implant is not the same acoustic signal that a hearing aid simply amplifies; but it is rather a digital signal that the brain must learn to interpret. This is not a skill that develops overnight or simply by stimulating the auditory nerve. This takes time and practice on the part of
the recipient of the cochlear implant. It is not unusual for it to take up to a year after the activation of the device to achieve optimal programming for daily use.

During this process of learning to listen again via a new signal from the device, the recipient of the cochlear implant and his or her spouse may experience numerous communication breakdowns and frustrations. Despite this struggle cochlear implant recipients choose to proceed with hopes of gaining improved hearing ability and quality of life. Olze, Grabel, Forster, Zirke, Huhnd, Haupt, and Mazurek (2012) noted that “Nearly 30% of patients suffered from depressive disorders before CI [cochlear implantation]. The proportion of patients with depressive disorders decreased to 11% in younger [patients] and dramatically to only 1% in older patients [following cochlear implantation]” (p. 24).

A meta-analysis of the literature revealed that older cochlear implant [recipients] have improved confidence and increased participation in social activities, have perceived gains in their communication performance, and have an improved sense of self-worth and hearing related quality of life (Tye-Murray, 2015, p. 466).

Auditory rehabilitation is a key component in the process of the recipient of the cochlear implant learning to listen and communicate through the use of their device. This process takes time and can include not only the recipient of the cochlear implant, but also those with whom he or she most frequently communicates. The purpose of this research study is to bridge the gap in the literature regarding the perceived role of recipients of cochlear implant and their spouses in auditory rehabilitation in an effort to improve the effectiveness of auditory rehabilitation and the quality of life for individuals with cochlear implants (and their spouses) in the future.

**Statement of the Problem**

There is clear documentation in the literature of hearing loss impacting an individual’s quality of life (Chisolm, Johnson, Danhauer, Portz, Abrams, Lesner, McCarthy, & Newman, 2007; Dalton, Cruickshanks, & Klein, 2003; Mulrow, Aguilar, Endicott, Tuley, Velez, Charlop,
Rhodes, Hill, & Denino, 1990; Stark & Hickson 2004; Yueh, Souza, McDowell, Collins, Loovis, Hendrick, Ramsey, & Deyo, 2001). For the purpose of this study, quality of life will be referred to as a multidimensional construct that involves subjective evaluations of both negative and positive facets of daily living (Group, 1998). Hearing loss can impact many aspects of a person’s life including but not limited to their self-esteem, participation in social situations and overall feeling of self-worth. The diagnosis of hearing loss can be expected for some and completely unexpected for others. In 2002, Espmark, Rosenhall, Erlandsson, and Steen, noted that hearing loss as a person ages is “a condition which covers a wide spectrum from mild to severe hearing loss [and] is an almost inevitable consequence of aging” (p.126).

Spouses, significant others, family members, caregivers, co-workers, and others are effected when someone they interact with has or is diagnosed with hearing loss. Communication breakdowns, fatigue, stress, and frustration are experienced by individuals with hearing loss as well as those with whom they most often interact (Tye-Murray, 2015). It is often other people, especially those closest to the person with hearing loss, that serve as the primary support system for the individual as they go through the process of being diagnosed with hearing loss and subsequent fittings for hearing aid technology. Frequent communication partners can play a major role in the individual with hearing loss electing to pursue hearing technology in the first place (Kochkin, 2009).

Auditory rehabilitation is a therapy service that can be provided by audiologists or speech language pathologists. Auditory rehabilitation can be recommended prior to and certainly after an individual is fit with appropriate hearing technology. Auditory rehabilitation involves providing counseling for the individual and their family on appropriate expectations, helping them to identify communication break downs, teaching them communication repair strategies,
and working to improve auditory/listening skills which can positively impact speech perception (ability to identify words through audition only) scores of the person with hearing loss.

The topic of this research is to examine the role of spouses of recipients of cochlear implants who were post-lingually deafened as well as the recipients of cochlear implants in auditory rehabilitation. For the purpose of this research, a spouse is considered to be an individual to whom the participant is lawfully married. Cochlear implants are a fairly new hearing technology (described in depth later in this document) that provide access to sound for individuals with severe-to-profound sensorineural hearing loss. Due to the severity of the hearing loss, these individuals receive limited benefit from hearing aids. Unlike hearing aids, cochlear implants provide a completely different signal to the brain which the brain must learn to interpret. This process takes time and varies from person to person. Limited research exists about the dynamic between a recipient of a cochlear implant and his or her spouse during the auditory rehabilitation process. Significant research exists to describe the impact hearing loss has on the spouses/significant others of those who utilize hearing aids (Lormore & Stephens, 1994; Stark & Hickson, 2004; Stephens, France, & Lormore, 1995). Thus, there is a need to examine the impact hearing loss has on spouses of those whom utilize cochlear implants. The crucial dynamic between the recipient of the cochlear implant and his or her spouse in the auditory rehabilitation process is not well documented in the literature and needs to be explored.

**Purpose of the Study**

The purpose of this study is to examine the perceived role of spouses of recipients of cochlear implants as well as recipients of cochlear implants in auditory rehabilitation. Relationships are dynamic and differ from couple to couple. This research is exploratory in nature and seeks to determine if themes are common across couples in their perceived roles in
auditory rehabilitation that might help to brainstorm future research and possibly impact service provision with this group of individuals.

**Research Questions**

1. What do recipients of cochlear implants perceive their role to be in auditory rehabilitation?
2. What do spouses of recipients of cochlear implants perceive their role to be in auditory rehabilitation?

**Significance of the Study**

This research is relevant to individuals who have or are considering cochlear implantation as well as their spouses. This research is important for caregivers, families, colleagues, and employers of people with and considering cochlear implantation. Audiologists, speech-language pathologists, otolaryngologists, neurotologists, and cochlear implant centers and programs could certainly benefit from the findings of this research. This research also has potential to impact service provision and policy in the future; therefore, policy makers and stakeholders who are involved in the field of hearing loss and cochlear implantation may also benefit from this research.

**Conceptual Design**

For this study, the conceptual design included a review of the literature and the conceptualization of the study design. This was followed by study approval from the dissertation committee and approval by the Institutional Review Board (IRB) of the University of Arkansas. Recipients of cochlear implants and their spouses were then interviewed individually. The data was analyzed utilizing grounded theory. This researcher first identified open codes from the data which were then streamlined to axial codes and finally selective codes. Prolonged and persistent
engagement as well as data triangulation, peer debriefing, and member checks were completed in an effort to establish trustworthiness. For additional information regarding the methodology of this study, see chapter three. For a visual representation of the conceptual design, see below Figure 1.1 Conceptual Design for the Study.

Figure 1.1. Conceptual design for the study

Figure 1.1 Conceptual Design for the study. After a review of the literature, a study design was established. The study design was approved by the dissertation committee as well as the IRB of the University of Arkansas. Participants were then be recruited. They were asked to complete an intake form as part of their interview and were then interviewed. Data was hand coded and analyzed utilizing a grounded theory approach. The perceived role of both the recipient of the cochlear implant as well as the spouse of the recipient of the cochlear implant were analyzed and discussed as it relates to the quality of life of each individual. CI = Cochlear Implant, AR = Auditory Rehabilitation
Theoretical Sensitivity

Cohen, Manion, & Morrison (2007) noted that “Research is a combination of both experience and reasoning and must be regarded as the most successful approach to the discovery of truth, particularly as far as the natural sciences are concerned” (p. 7). Given this foundation, it was imperative that theoretical sensitivity be developed and maintained for this study. Hall and Callery (2001) note:

Theoretical sensitivity refers to the researcher’s manipulation of the data to yield explanations that best reflect the reality that is being apprehended. It is not intended to critically examine the researcher’s effect on data construction. (p. 263)

Theoretical sensitivity was maintained by my professional experience, personal experience, knowledge of the literature, and analytic rigor as described below. With eight years of experience in the field and the personal experience of knowing several individuals with hearing loss outside my family, sensitivity to the topic and nature of hearing loss has been established. A review of the literature helped to establish the need for this study and will be further discussed in chapter 2. Participation in analytic rigor entrenched the plan for this study to be a phenomenological study that utilized grounded theory to allow for the development of themes and possible theories.

Professional Experience

While working in the Audiology/Speech Pathology Department at Arkansas Children’s Hospital (ACH) as a graduate assistant for two years, I gained countless insights into the world of working with children and adults with hearing loss. During the fall of 2009, I initiated my pursuit of becoming a Certified Auditory Verbal Therapist (Cert. AVT). This is a prestigious certification of which there are currently only 700 worldwide; two of whom were practicing Certified Auditory Verbal Therapists in the state of Arkansas when I initiated my application. After graduating from the University of Arkansas for Medical Sciences with a Master’s Degree...
in Speech Language Pathology in 2010, I immediately started working full time in a private practice facility serving children with a variety of disabilities. I continued my pursuit of becoming a Cert. AVT during this time. Rigorous requirements for this certification included seven hundred and fifty documented direct contact hours with children or adults who had hearing loss and were pursuing an Auditory-Verbal Approach to communication (primary means of communication was spoken language), one hundred fifty hours of indirect hours in related areas in working with individuals with hearing loss (i.e. evaluations, conferences), ten hours of observation of a Cert. AVT that were required to be meticulously documented, eighty hours of additional continuing education hours in the field of hearing loss, a minimum of eighteen hours of Cert. AVT supervised direct contact hours working with a child or adult with hearing loss, three letters of recommendation from families I had worked with over the years, application approval by the Alexander Graham Bell Association for the Deaf and Hard of Hearing and finally I was required to pass a four-hour exam of which only sixty percent of applicants pass on their first attempt. This lofty goal was achieved in August of 2012, placing me in a prestigious group of professionals and one of only two Cert. AVTs working clinically in the state of Arkansas.

While finishing up my Cert. AVT application, I had an opportunity to go back to work for ACH. Starting the fall of 2012, I coordinated the ACH Northwest Arkansas Hearing Impaired Program of which 100% of my case load was children and adults with hearing loss. I have worked tirelessly with this group of individuals and have a passion to see continued improvements in opportunities and service provision.

In the spring of 2013 I initiated my doctoral degree program through the University of Arkansas while still working clinically for ACH. In the fall of 2015, I accepted a clinical
instructor position in the Communication Disorders in Science program at the University of Arkansas. I continue to work with children and adults with hearing loss clinically as well as be involved in efforts to support them. For example, I have been a board member of the non-profit organization, Arkansas Hands & Voices (an organization for families who have children with hearing loss) since 2012 and helped to initiate a support group for adults with cochlear implants or adults who are considering cochlear implantation in Northwest Arkansas in 2013.

Personal Experience

Like many people, I too have individuals in my family with hearing loss. I have seen first-hand the difficulties these people experience. Just as importantly, I have seen the defeat in the eyes of caregivers and fracture in the relationship with loved ones that occurs when they are unable to communicate well with the person with hearing loss. I have family members who are unaware of the information they miss due to their hearing loss and who also subconsciously exclude themselves from family activities due to difficulties with communication. This group of individuals with hearing loss is important because this condition significantly effects the life of the person with hearing loss as well as the life of those who work with, interact, or care for the individual with hearing loss.

Knowledge of the Literature

Improved quality of life after cochlear implantation in adults is supported in the literature (Castro, Lasaletta, Bastarrica, Alfonso, Prim, de Sarria, & Gavilan, 2005; Hallberg & Ringdahl, 2004; Hirschfelder, Grabel, Olze, 2008; Hogan 2001; Looi, Mackenzie, Bird, & Lawrenson, 2011; Rebmar, Lind, Arnesne, & Helvik, 2009; Zaidman-Zait, 2010). Of note is there is evidence to support the use of auditory rehabilitation for those who utilize hearing aids (Abrams, Chisolm, & Mc Ardle, 2005; Pichora-Fuller & Carson, 2001; Rhodes & Duncan, 2010; Tye-Murray, 2015);
however, this topic has been approached by few researchers concerning individuals who receive cochlear implants. Maki-Torrkko, Vesterfren, Harder, and Lyxell (2014) noted, “the [cochlear implant] CI increases well-being and satisfaction in life for both [cochlear implant] CI-users and their significant others, especially regarding enhanced autonomy, normality and everyday social life” (p. 6). There is a need to research the role of individuals who receive cochlear implants as well as the role of their spouses in auditory rehabilitation to improve not only the quality of service provision, but also to determine the potential impact auditory rehabilitation (that involves the spouses of the recipient of the cochlear implant) could have on the quality of life of all individuals involved.

**Analytic Rigor**

Analytic rigor has been defined as a reflection of “an assessment of process quality, affording communication about the process, rather than the product, of analysis.” (Zelik, Patterson, & Woods, 2007, p. 1). It is essentially a description of the researcher’s plan. Kline (2008) noted, “In general, rigor means that qualitative research manuscripts include statements that present researchers’ initial methodological considerations” (p. 211). A phenomenological research approach was utilized to compile a description about an experience that also happens to be a phenomenon. Fossy, Harvey, McDermott, and Davidson, (2002), stated “Phenomenological researchers, ‘study the ordinary ‘life world’: they are interested in the way people experience their world, what it is like for them” (p.720). This study can be classified as a phenomenology that utilized grounded theory to analyze the data. Charmaz (2008) notes that grounded theory strategies are “strategies for creating and interrogating our data, not routes to knowing an objective external reality” (p. 401) and in 2006, Bowen stated that “grounded theory is a research approach or method that calls for a continual interplay between data collection and analysis to
produce a theory during the research process” (p.13). Constant comparison was applied by this researcher as data was collected and analyzed as is recommended by several other researchers (Glaser, 1978; Strauss & Corbin, 1994). From initial data open codes were identified, which were then compared and resulting axial codes were parsed. From axial codes, selective codes were derived which led to the development of the resulting theory from this research.

**Parameters of the Study**

The six couples in which one partner of the couple was post-lingually deafened and utilized (a) cochlear implant(s) were from a southern state. Participants were all over the age of 18 with spouses being involved in the auditory rehabilitation program following cochlear implantation of their partner. Children under the age of 18 were not included in this study. All recipients of cochlear implants has their cochlear implant activated a minimum of 6 months to participate in this study. A listening check was conducted at the beginning of each interview. If the cochlear implant was not judged to be functioning appropriately, a referral was made to the managing audiologist and the interview was discontinued. Interviews were completed only after establishing that the cochlear implant(s) was working optimally. Confidentiality was maintained by coding all data and transcripts. In addition, all documents collected were maintained in a locked filing cabinet and/or on a computer that was password protected.

**Definition of Terms**

This section describes several terms that are pertinent to the understanding of the topics discussed and purpose of this research study. This section provides functional definitions for how these terms are intended for this study.

**Audiologist** – a professional who has earned a clinical doctorate, diagnoses hearing loss, and provides audiological monitoring and management for individuals with hearing loss.
**Auditory brainstem response (test)** – hearing testing that is most often completed while the child or infant is asleep. This involves placing electrodes on the child’s head and measuring the brain’s response to sound stimuli. This testing provides frequency specific information and can be performed while the child is sedated or un-sedated. This assessment requires that the individual be very still to get accurate readings; therefore, often children are sedated for this test (Madell & Flexer, 2008).

**Auditory (Aural) Rehabilitation** – a therapy service that involves re-training the brain to interpret an acoustic signal if the individual is utilizing a hearing aid and a digital signal if the individual is utilizing a cochlear implant. This service can be provided by an audiologist or speech-language pathologist. One of the main goals of this service is to help the individual to recognize and interpret the auditory stimulus appropriately which subsequently impacts speech perception skills and compliance with their hearing technology.

**Behavioral Observation Audiometry (BOA)** – hearing testing that requires an audiologist with excellent observation skills. This type of audiometry is typically performed with very young infants as an option to avoid going under sedation to complete an ABR test. An example of this would be watching a baby suck on a pacifier while in an audiology booth. The child’s behavior will change when sound is presented (i.e. stop sucking, eye gaze shift) (Madell & Flexer, 2008).

**Cochlear implant** - surgically implanted device that bypasses the damaged auditory system in the inner ear that impedes the sound signal from reaching the brain. A cochlear implant consists of an internal device that is placed by a fellowship-trained, board certified surgeon and an external device that is activated and managed by an audiologist.

**Conditioned play audiometry (CPA)** – a type of hearing test that involves a child performing an action when they hear a sound. For example, a child might be conditioned to hold a block to
their ear upon the cue to “listen.” Then, when a sound is presented, the child is to drop the block in a bucket. This keeps a young child engaged in hearing testing and allows an audiologist to complete hearing testing in a timely manner.

**Conductive hearing loss** – hearing loss that occurs at the level of the outer ear or middle ear.

**Communication repair strategy** - technique used by a communicator to rectify a communication breakdown (Tye-Murray, 2015).

**Immittance testing** – testing often performed prior to a complete hearing evaluation that evaluates the function of the middle ear and acoustic reflexes. The most common type of immittance testing performed is tympanometry; however additional immittance testing can also include acoustic reflex testing (provides information about the function of outer hair cells in the inner ear).

**Mixed hearing loss** – hearing loss that has both a conductive and sensorineural component; therefore, it occurs at the level of both the inner ear and outer or middle ear.

**Neurologist** – a medical doctor with specific training in the anatomy and physiology of the nervous system.

**Otoacoustic emissions testing (OAEs)** – an immittance measure to determine the function of the outer hair cells in the cochlea. Presence of OAEs indicates no greater than a mild hearing loss. This can be used as a screening tool by audiologists, speech-language pathologists, medical professionals, health care staff, and caregivers given that they have access to the appropriate equipment to run the test.
Otolaryngologist – a medical doctor with specific training in the anatomy and physiology of the ear, nose, and throat. These physicians are often referred to as Ear, Nose, and Throat physicians (ENTs).

Perilingual hearing loss – hearing loss that occurred as the individual was learning to speak

Phoneme perception – Phonemes are sounds. Phoneme perception is the ability to identify phonemes when they are presented with no visual cues. This skill development is critical at improving the quality of sound perceived by the individual with hearing loss.

Postlingual hearing loss – hearing loss that occurred after the individual has learned to speak

Prelingual hearing loss – hearing loss that occurred prior to the individual learning to speak

Quality of life – a multidimensional construct that involves the subjective evaluation and review of both positive and negative aspects of activities of daily living.

Role or Spousal Role – in this study the role is defined as the extent to which the spouse or recipient of the cochlear implants was involved or participated in the auditory rehabilitation process.

Spouse – the spouse is defined as an individual who is a frequent communication partner and caregiver of the recipient of the cochlear implant. They must have been with the recipient of the cochlear implant for a minimum of two years to allow for time to be with the recipient prior to them receiving their cochlear implant. The spouse must have also at least minimally participated in the auditory rehabilitation program completed by their spouse who received the cochlear implant.
Sensori-neural hearing loss – hearing loss that occurred at the level of the inner ear. This type of hearing loss indicates damage, absence, or malfunction of the inner hair cells that line the cochlea.

Speech-Language Pathologist (SLP) – a professional with a master’s degree with specific training in the development and rehabilitation of speech and language.

Speech perception – speech perception is an auditory skill that provides critical information to how an individual hears in functional environments. Speech perception can be completed at the word or sentence level at a variety of loudness levels in aided or unaided conditions.

Tympanometry – immittance testing that evaluates the compliance and mobility of the tympanic membrane. A probe is placed in the ear canal, pressure is pumped in to the ear canal and then released providing a measurement of the tympanic membrane’s (ear drum) response to the pressure. A healthy tympanic membrane is pliable and moves adequately when presented with a stimulus. If the tympanic membrane is tense, damaged (i.e. a perforated ear drum), or has fluid behind it, the sound stimulus (as well as the tympanometry results) will be effected.

Visual Reinforcement Audiology (VRA) – a hearing test for children in which they are reinforced for responding to sound by a visual cue such as a dancing toy in a box that is lit and mounted on the wall or even the playing of a few seconds of a cartoon on a video screen.

Limitations

One possible limitation to this study is that it may be difficult to generalize the themes that develop from the interviews. It is possible that the themes that develop from this study may be unique to the individuals who participate in the study. In addition, participants in the study included married couples only. The implications of this data may be difficult to apply to individuals who are single and receive a cochlear implant. Another possible limitation is my
experience as a speech-language pathologist who provides auditory rehabilitation. I acknowledge the possibility that my personal and professional experiences leave room for the potential of researcher bias to develop; however, I am making every effort possible to limit the opportunity of researcher bias to be a factor in data collection, management, and analysis.

Summary

Hearing loss directly impacts not only the individual with hearing loss, but also all those with whom the individual attempts to communicate. Research has established that auditory rehabilitation which involves family members is beneficial for individuals who utilize hearing aids (Tye-Murray, 2016). However, there is limited data available regarding effects of auditory rehabilitation for individuals who utilize cochlear implants. Chapter one introduced this study and established the need for this research. Parameters of the study were discussed as well as potential limitations. It is evident that understanding the perceived roles of individuals who have received cochlear implants as well as their spouses could have an impact in service provision across multiple disciplines. Chapter one has established that this research is needed to identify possible ways to improve the quality of service provision for many professionals (audiologists, speech-language pathologists, rehabilitation counselors), but also to identify possible ways to improve the quality of life for individuals who have received cochlear implants and their spouses.

Organization of the Dissertation

Chapter one is an introduction to the topic of hearing loss and the need for this research. This chapter included a discussion of the background of hearing loss and a statement of the problem to establish a need for this research. This was followed by a discussion regarding the purpose of this study, the research questions posed, and the significance of the study. The
conceptual design and a review of how theoretical sensitivity was established by this researcher ensued. Parameters of the study, definition of terms, limitations and a final summary of chapter one followed. Chapter two is a review of the literature to further establish a need for this research. The search strategy is discussed followed by a literature review of the following topics: hearing, culture, cochlear implants, candidacy for cochlear implantation, quality of life for individuals with hearing loss, auditory rehabilitation, adult learning, auditory skill development, and communication repair strategies. Chapter three discusses the methodology utilized in this study. This includes a discussion of the focus of the study followed by the research questions and research timeline. A conceptual framework follows. Site and sample selection, participants, depth versus breadth, and data collection are then discussed. This is followed by a review of the researcher’s role management, a discussion of how trustworthiness is established and how evidentiary inadequacies are addressed. Chapter four is a presentation of the data. Subsequently, chapter five discussed the results, conclusions, and implications for future research.
Chapter Two: Review of the Literature

Organization of the Chapter

The purpose of this study is to examine the perceived role recipients of cochlear implants and their spouses in auditory rehabilitation. Relationships are dynamic and differ from couple to couple. This study was exploratory in nature and sought to identify common themes across couples in their perceived roles in auditory rehabilitation. The second chapter of this document was organized via the following structure: The search strategy was followed by a review of relevant research pertaining to the research questions. Research reviewed included that related to:

- Hearing
- Culture of Deaf and Hard of Hearing Individuals
- Cochlear Implants
- Quality of Life for Individuals with Hearing Loss
- Components of Auditory Rehabilitation
- Communication
- The roles of both recipient of the cochlear implant and their spouse in rehabilitative settings

Each aforementioned topic was introduced, discussed, and summarized in its respective section. This was followed by an overall summary of the chapter.

Search Strategy

The search strategy employed for this chapter involved a review of the literature retrieved from all of the following: text books, multiple databases including but not limited to ProQuest, Ebsco, ERIC, JSTOR, PubMed, and Google Scholar, dissertations, as well as relevant magazines, and periodicals. Keywords searched included but were not limited to: hearing, hearing loss, cochlear implants, hearing aids, aural rehabilitation, aural habilitation, communication breakdowns, communication repair strategies, adult learning styles, cochlear
implant recipient perceptions, spouse/partner perceptions in rehabilitation, spouse/partner quality of life, quality of life and health-related quality of life for individuals with hearing loss.

**Functional Dynamics of Hearing**

The purpose of this section was to provide a review of the basic anatomy and physiology of normal hearing and discuss the types and degrees of hearing loss. This information was relevant to this study because the US Food and Drug Administration currently approves cochlear implantation for only those with severe-to-profound, sensori-neural hearing loss who get minimal or no benefit from the use of hearing aids (United States Food and Drug Administration, para. 4.) This information provided the reader with insight for how normal hearing works, what disordered hearing is, and established a foundation of knowledge regarding how hearing loss impacts an individual’s quality of life as well as the quality of life of his or her partner. The literature presented in Table 2.1, Reviewed Hearing Literature, provided a basic overview of the concepts discussed in this section.

**Table 2.1 Reviewed Hearing Literature**

<table>
<thead>
<tr>
<th>Author</th>
<th>Year of Publication</th>
<th>Research Method</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baker et. al.</td>
<td>2014</td>
<td>Article, Retrospective Review</td>
<td>Reviewed interventions used with hearing aid users</td>
</tr>
<tr>
<td>Bainbridge &amp; Wallhagen</td>
<td>2014</td>
<td>Article, Literature Review</td>
<td>Offered review of effect of hearing loss in the aging population in the US</td>
</tr>
<tr>
<td>Author</td>
<td>Year of Publication</td>
<td>Research Methods</td>
<td>Conclusions</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Clark</td>
<td>1981</td>
<td>Article</td>
<td>Literature Review</td>
</tr>
<tr>
<td>Finitzo et al.</td>
<td>1998</td>
<td>Article</td>
<td>Experimental</td>
</tr>
<tr>
<td>Fucci &amp; Lass</td>
<td>1999</td>
<td>Text Book</td>
<td>Literature Review/Documents</td>
</tr>
<tr>
<td>Killion &amp; Mueller</td>
<td>2010</td>
<td>Article</td>
<td>Literature Review/Documents</td>
</tr>
<tr>
<td>Madell &amp; Flexer</td>
<td>2008</td>
<td>Text Book</td>
<td>Literature Review/Documents</td>
</tr>
<tr>
<td>Author</td>
<td>Year of Publication</td>
<td>Research Methods</td>
<td>Conclusions</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>McCreery, et al.</td>
<td>2014</td>
<td>Article</td>
<td>Examined 192 children with hearing loss and determined that over half of them had been fit with hearing aids that did not meet desired sensation level (DSL) targets</td>
</tr>
<tr>
<td>Mehl &amp; Thompson</td>
<td>1998</td>
<td>Article</td>
<td>Provided newborn hearing screenings for over 40,000 infants. Nearly 3,000 failed their newborn hearing screening and ultimately it was reported that 1 in 500 newborns were diagnosed with hearing loss</td>
</tr>
<tr>
<td>Moeller</td>
<td>2000</td>
<td>Article</td>
<td>Examined the vocabulary skills of 5 years old children who had hearing loss. The children who had been enrolled in a comprehensive intervention program demonstrated significantly improved vocabulary skills.</td>
</tr>
<tr>
<td>Seikel et. al.</td>
<td>2000</td>
<td>Text Book Literature Review/Documents</td>
<td>Reviewed anatomy and physiology for speech, language, and hearing</td>
</tr>
</tbody>
</table>
Table 2.1 Reviewed Hearing Literature Cont.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year of Publication</th>
<th>Research</th>
<th>Methods</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>White, K.</td>
<td>2003</td>
<td>Article</td>
<td>Literature Review</td>
<td>Reviewed early detection of hearing loss practices across the US</td>
</tr>
<tr>
<td>White K. &amp; Munoz, K</td>
<td>2014</td>
<td>Book Chapter</td>
<td>Literature Review</td>
<td>Provided description of hearing technology and audiological management</td>
</tr>
<tr>
<td>Yoshinaga-Itano et al.</td>
<td>1998</td>
<td>Article</td>
<td>Experimental</td>
<td>Examined the language development of early and later identified children with hearing loss</td>
</tr>
</tbody>
</table>

**Normal Hearing**

Before discussing hearing loss, it is important to first understand normal hearing.

“Hearing is acoustic access to the brain.” (Flexer & Madell, 2008, p. xxi). In 1999, Fucci & Lass wrote:

The hearing mechanism is critical to the process of speech production and speech perception. It is responsible for the initial learning of speech from others, the monitoring of a speaker’s own speech (feedback), and the reception of the acoustic speech signal for continued communication purposes throughout life. (p. 43)

A basic review of audition, the process of hearing, follows. The acoustic signal travels in invisible waves. For example, if someone were to ring a bell out of your line of sight, an acoustic signal (series of waves) would be produced. This signal would travel to your outer ear which consists of your auricle (also referred to as the pinna) and your external auditory meatus (also referred to as the ear canal). Then your middle ear gears up for its role in the process of audition/hearing involving the conversion of the acoustic signal to a mechanical signal.
The signal then hits your tympanic membrane (TM) (also referred to as your ear drum) causing it to vibrate, thus converting of the signal to a mechanical signal. Connected to your TM are the three smallest bones in your body, the incus, malleus, and stapes (also referred to as the ossicles or ossicular chain). As the TM vibrates, the ossicles also vibrate, signaling the inner ear (comprised of the vestibular system and cochlea) that it is time to get involved.

The ossicular chain (the innermost ossicle being the stapes) is connected to the fenestra vestibule (also known as the oval window), located just above the fenestra rotunda (round window). As the sound moves medially from the ossicular chain, the stapes vibrates the oval window causing the fluid in the inner to be set into motion and thus converting the mechanical signal to a hydraulic signal. The small ringing sound initially detected has now entered the cochlea, a spiral cavity comprised of three channels that lie parallel to one another in a snail-shape. The inner ear also contains the vestibular system which is comprised of three semicircular canals, each filled with fluid, and all necessary to maintain balance and equilibrium. The channels of the cochlea are filled with fluid that is set in to motion by the hydraulic signal created by the movement of the oval window. The channels are separated by a thin membrane so that movement from one channel impacts the movement of another channel. It is important to know that the middle channel of the cochlea (also called the organ of Corti) is lined with small hair cells, or cilia, that have nerve fibers which help to form the auditory nerve (also known as cranial nerve XIII). As fluid moves in the cochlea, the hydraulic signal created by the movement of the fluid is converted in to an electrical signal at the level of the auditory nerve as the hair cells in the organ of Corti create nerve impulses. This electrical signal is then transmitted to the brain via the central auditory pathway, which is a complex system comprised of the cochlear nucleus, superior olivary complex (located in the medulla), nucleus of lateral lemniscus (located
in the pons), the inferior colliculus (located in the midbrain), and the medial geniculate (located in the thalamus). This pathway allows for sound to be transmitted to the auditory cortex of the brain located in the left temporal lobe (Fucci & Lass, 1999; Seikel, King, & Drumwright, 2000).

Thus, the small ringing sound that initially passed through the outer ear was converted from an acoustic signal, to a mechanical signal, to a hydraulic signal, and finally to an electrical signal that was passed along the central auditory pathway to be processed by the auditory cortex to “hear” the sound.

**Types and Degrees of Hearing loss**

Hearing is a complex and intricate system and a breakdown at any point in the process described above results in a hearing loss. The type and degree of hearing loss depends on where the breakdown in the system occurs. An individual who ultimately decides to undergo cochlear implantation may have experienced a variety of types and severities of hearing loss during their lifetime. Hearing loss can fluctuate and change over time. For some, hearing can change day to day. Hearing loss can be progressive in nature which means an individual who has been diagnosed with a mild hearing loss at eight years of age could have a significant drop in their hearing and be a candidate for a cochlear implant later in life. These unique facets of hearing loss highlight the need for continued management and monitoring by an audiologist. The purpose of this section was to discuss how hearing loss is different from normal hearing and also to discuss how hearing loss is classified.

It is estimated that 3 in 1,000 infants are born with a congenital hearing loss making hearing loss the most frequently occurring birth defect (Flexer & Madell, 2008; White, 2003). Bainbridge & Wallhagen (2014) note that the percentage of the individuals presenting with a hearing loss increases dramatically with age, with a projected estimate of 41 million people
(double the 2014 estimate) over the age of 65 to experience hearing loss in one or both ears by the year 2030. Thus, the impact and prevalence of hearing loss across the life span and increases with age.

Hearing loss is described by hearing level and frequency. An audiogram is used to depict hearing loss. Loudness or hearing level (HL) is measured in decibels (dB) from very quiet sounds at the top of the chart to very loud sounds at the bottom of the chart. The frequency (or pitch) of sound is measured in cycles per second (Hertz (Hz)) and is represented as very low sounds to the far left of the chart to very high pitched sounds to the far right of the chart. Hearing loss is typically described by four common categories: degree, onset, causation, and time course (Tye-Murray, 2015). Degree of hearing loss is discussed first. The range of normal hearing for a child is 15 dB HL across all speech frequencies. The range of normal hearing for an adult is 25 dB HL across all speech frequencies. Hearing loss that falls between 26 dB HL (or 15 dB HL for children) and 40 dB HL is classified as a mild hearing loss. Hearing loss that falls between 41 dB HL and 55 dB HL is referred to as a moderate hearing loss, while hearing loss that falls between 56 dB HL and 70 dB HL is referred to as moderate-to-severe hearing loss. Severe hearing loss is that which falls between 71 dB HL and 90 dB HL and hearing loss beyond 90 dB HL is classified as profound hearing loss (Clark, 1981). See Figure 2.1 for an example of an audiogram with depictions of familiar sounds and phonemes.
In 2014, McCreery noted that a child with even a unilateral hearing loss (normal hearing in one ear) has difficulty discerning speech, even if the speaker directs their signal to the better ear. “A child with a 35- to 40-dB [bilateral] hearing loss without hearing technology can miss up
to 50% of class discussions” (Cole & Flexer, 2016, p. 45). Children with moderate hearing losses may miss 50% to 75% of speech information (Killion & Mueller, 2010). A child with a moderately severe hearing loss (a hearing loss greater than 55 dB across speech frequencies) can miss one hundred percent of the information shared in the classroom if the hearing loss remains untreated (Killion & Mueller, 2010). These same performances can apply to adults.

Hearing loss is also classified based on when it was identified or is believed to have occurred. It can be classified as congenital, pre-lingual (occurring prior to learning speech and language), peri-lingual (occurring when the child has developed some language, but not all language has been acquired), post-lingual (occurring after learning speech and language), or acquired (occurs post-lingually as a person ages).

Hearing loss is also classified based on the believed causation of the hearing loss. Hearing loss that is caused by a breakdown in the acoustic signal in the outer or middle ear is referred to as a conductive hearing loss. For example, an obstruction in the ear canal or even something as simple as an ear infection could cause a conductive hearing loss. If the sound signal passes through the outer and middle ear with no obstruction or difficulty but has a breakdown at the level of the inner ear (and/or the auditory nerve or auditory cortex in the brain), it is termed a sensorineural hearing loss. A mixed hearing loss is a combination of both a conductive and a sensorineural hearing loss. In addition, hearing loss may be categorized as a progressive (i.e., gets worse over time) or sudden onset (i.e., happened unexpectedly). (Tye-Murray, 2015).

In summary, this section briefly discussed the anatomy and physiology of the hearing mechanism, discriminated between normal and abnormal hearing, and discussed the various ways hearing loss is classified. This information provided a foundation upon which additional sections below will expound.
Assessment of Hearing Loss

Knowledge of normal hearing and the types and degrees of hearing loss leads us to the question: How is hearing loss identified? The purpose of this section is to briefly discuss how hearing loss is identified across the lifespan. This information is important for this study because an individual who ultimately decides to pursue a cochlear implant may have experienced hearing loss for all their life. This information provides a foundation of understanding for what participants in this study may have experienced.

It is important to describe how a hearing loss is diagnosed in order to understand the psychological, emotional, and overall impact the diagnosis of a hearing loss can have on a child, adult, and family. In 1999 the American Academy of Pediatrics published their stance concurring with the wealth of established research (Finitzo, Albright, & O’Neil, 1998; Madell & Flexer, 2008; Moeller, 2000; Mehl & Thompson, 1998; Yoshinaga-Itano, Sedley, Coulter & Mehl, 1998) on the importance of newborn hearing screening. With the establishment of newborn hearing screenings in all states, professionals were better able to identify and serve children with hearing loss and their families. If a child does not pass their initial newborn hearing screening, they are typically referred to their managing primary care physician (PCP) for follow-up screenings. If the child is unable to pass subsequent hearing screenings by their PCP, they are referred to an audiologist for additional testing. Madell and Flexer (2008) concisely noted appropriate audiological test protocols and age groups accordingly:

- Birth through 5 months of age: physiologic measures such as auditory brainstem response (ABR) testing, behavioral observation audiometry (BOA), and otoacoustic emissions (OAEs) are recommended
- Five through 24 months of age: behavioral assessments such as visual response audiometry (VRA) and conditioned play audiometry (CPA) should be utilized first followed by OAEs and ABRs only when necessary
- Twenty five through 60 months of age: behavioral assessments listed above in addition to immittance tests are recommended in addition to speech perception
testing. These types of protocols continue to be appropriate across the lifespan. This type of testing is most commonly completed with adults, including those considering cochlear implantation (p. 47).

In 2008, Madell and Flexer noted, “As a result of the [Joint Committee on Infant Hearing] JCIH (2007) and the Centers for Disease Control and Prevention (CDC, 2004), most people stopped using the phrase, ‘universal newborn hearing screening’ and began referring to ‘early hearing detection and intervention’ (EDHI) programs” (p. 34). This is an important shift in terminology because it references the need to diagnose in addition to providing appropriate intervention services for children with hearing loss. With the placement of EDHI programs, more children are able to be appropriately diagnosed and fit with hearing technology in a timely manner.

Testing for hearing loss in adults involves behavioral, immittance, and speech perception testing. The primary purpose of immittance testing is to determine the health of the middle ear by utilizing tympanometry. This testing identifies if the tympanic membrane (ear drum) is moving as it should to be able to transmit the acoustic signal to the inner ear. A small change in the mass or mobility of the tympanic membrane can alter the acoustic signal perceived by the individual. After immittance and behavioral testing, speech perception testing is completed. Traditional behavioral testing typically involves the adult in an audiological booth raising his/her hand when they hear a sound or tone. Speech perception testing is perhaps the most critical for an individual considering a cochlear implant because the results provide insight into how the individual hears in functional contexts.

Speech perception testing is critical for cochlear implant candidacy, as it assess how the candidate hears speech information in predetermined functional settings. There are multiple speech perception tests that can be performed and analyzed several ways. What is important to
know is that speech perception testing provides the most descriptive information about how an individual is functioning during natural listening situations (Madell & Flexer, 2008). Results of speech perception testing are typically presented as a percentage of correctness. For example, if an individual’s speech perception score is 85% when stimuli are presented at 55 dB, the assumption is that the individual hears around 85% of what is being communicated to them at typical conversational level during their daily life. It is important to note that speech perception testing is often completed in optimal listening conditions (i.e., a soundproof audiology booth). This means that with the addition of background noise (e.g., road noise while driving, restaurant noise, multiple talkers, etc.) the individual may not perceive speech as well as they did in optimal listening conditions. Criteria for speech perception scores to determine cochlear implant candidacy are discussed later in this chapter.

Culture

Culture is a complex concept that can be a result of a person’s heritage and can help to form the foundation of whom the person believes himself or herself to be. For a person with hearing loss, identity and culture can be quite perplexing. There are many facets to the culture of hearing loss and strong viewpoints are ever-present. The purpose of this section was to briefly discuss the culture of hearing loss. Congenital, pre-lingual, post-lingual, peri-lingual, and acquired hearing loss were briefly discussed in the previous section. The focus of this section was on the different experiences and cultures of those with pre-lingual deafness and post-lingual deafness. Table 2.2, Reviewed Culture Literature, is a summary of the literature reviewed for this section.
### Table 2.2 Reviewed Culture Literature

**Reviewed Culture Literature**

<table>
<thead>
<tr>
<th>Author</th>
<th>Year of Publication</th>
<th>Research</th>
<th>Methods</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bainbridge &amp; Wallhagen</td>
<td>2014</td>
<td>Article</td>
<td>Literature Review</td>
<td>Offered review of effect of hearing loss in the aging population in the US</td>
</tr>
<tr>
<td>Barnett</td>
<td>1999</td>
<td>Article</td>
<td>Literature Review/Opinion</td>
<td>Provided the opinion of a hearing family physician on the Deaf and Hard of Hearing Cultures</td>
</tr>
<tr>
<td>Davis</td>
<td>1995</td>
<td>Text Book</td>
<td>Literature Review</td>
<td>Provided insight into the Culture of Deafness</td>
</tr>
<tr>
<td>Dolnick</td>
<td>1993</td>
<td>Article</td>
<td>Periodical Opinion</td>
<td>Provided insight into the Culture of Deafness</td>
</tr>
<tr>
<td>Gopnik et. al.</td>
<td>1999</td>
<td>Book</td>
<td>Literature Review/Theory</td>
<td>Reviewed the neural development of the auditory system and discusses implications for speech and language development</td>
</tr>
<tr>
<td>Humphries</td>
<td>1998</td>
<td>Text Book</td>
<td>Literature Review</td>
<td>Offered review of Deaf culture and offers insight into changes in perspective regarding Deaf culture</td>
</tr>
<tr>
<td>Leigh et. al.</td>
<td>1998</td>
<td>Article</td>
<td>Literature Review/Documents</td>
<td>Provided insight into the development of the Deaf Identity Development Scale (DIDS)</td>
</tr>
<tr>
<td>Author</td>
<td>Year of Publication</td>
<td>Research</td>
<td>Methods</td>
<td>Conclusions</td>
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<tr>
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<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Lennenberg</td>
<td>1967</td>
<td>Text Book</td>
<td>Literature Review/Documents</td>
<td>Reviewed the literature regarding the biological foundations of language and language development</td>
</tr>
<tr>
<td>Moore &amp; Linthicum</td>
<td>2007</td>
<td>Article</td>
<td>Literature Review</td>
<td>Reviewed of the development and maturation of the human auditory system</td>
</tr>
<tr>
<td>Padden</td>
<td>1989</td>
<td>Text Book</td>
<td>Literature Review/Documents</td>
<td>Offered review of cultures encompassing hearing loss</td>
</tr>
<tr>
<td>Sparrow</td>
<td>2005</td>
<td>Article</td>
<td>Literature Review/Documents</td>
<td>Reviewed of controversy of cochlear implants within the Deaf and Hard of Hearing cultures</td>
</tr>
</tbody>
</table>

There is an important distinction in deaf culture between the terms *deaf* and *Deaf*. *Deaf* with an upper-case “D” typically refers to the Deaf culture and community, while *deaf*, with a lower-case “d” is used to refer to the diagnosis of hearing loss (greater than a moderate loss) (Padden, 1989). Barnett went on to say:

When a child is diagnosed with hearing loss, it is sometimes assumed that the child is Deaf. However, one must be cautious of using this term. Padden (1989), as cited in Barnett (1999), stated, “The word *Deaf*, with an upper-case “D,” refers to the culture and community of Deaf people, while the word *deaf*, with a lower-case “d,” refers to the audiologic lack of hearing.” (p. 18) Barnett went on to say:
Not all people who are deaf are members of the Deaf community. Use of [American Sign Language] ASL is more important for membership in the Deaf community than is the inability to hear. People who are deaf but who communicate primarily orally, through voicing and speech reading, are not usually members of the Deaf community. (p. 18)

For the purpose of this study, functional definitions of deaf and hard of hearing will be utilized. People who identify with the deaf community are sometimes referred to as hard of hearing if they function in the hearing world, communicate orally, and do not utilize sign language. It should also be noted there are people who identify with both the Deaf and hard of hearing communities and cultures. These individuals often utilize sign language, but are also able to communicate utilizing spoken language; this communication approach is referred to as a Total Communication Approach.

**Pre-lingual Deafness**

Pre-lingual deafness is that which occurs prior to the individual learning speech and language. Research reports 90 to 95% of children born with a hearing loss have two hearing parents (Barnett, 1995, Mitchell & Karchmer, 2004). Thus, when a child is diagnosed with hearing loss before they learn speech and language (before 3 years of age), families often experience a whirlwind of opinions, information, and emotions. It is not until a communication approach is chosen by the family that they can truly initiate embracing the culture in which they want their child involved. It is important to note that the communication approach may change across one’s lifespan. A child who initially starts out utilizing spoken language may later on choose to pursue learning sign language. A child who initially starts out utilizing sign language may eventually chose to learn spoken language (as long as they have had good access to sound during their critical learning period). A child can also simultaneously learn sign language and spoken language.
As has already been mentioned, hearing is more than simply getting the acoustic signal to the ear. Hearing is about getting the acoustic signal to the brain for interpretation and processing so that subsequent and appropriate learning and communication can take place. As far back as 1967, a critical period for learning speech and language has been hypothesized (Lennenberg, 1967). Moore & Linthicum (2007) note that the auditory system has been found to be functional by the 27th gestational week in prenatal infants. In 1999, Gopnik, Meltzoff, and Kuhl, completed a thorough literature review regarding brain development and noted the following regarding auditory development in infants:

- The six-to twelve-month time span appears the be the critical time for sound organization
- By nine months infants show a preference for listening to sound combinations that are possible in their language, even if the sound combinations do not form real workes in the language but at only potential words
- Infants get the speech prototypes from the adults they hear around them. By six to twelve months of age, infants limit their phonetic inventory to the sounds that are present in their native language only
- The brain keeps rewiring itself depending on new information and on experience. Everything an infant sees hears, tastes, touches, and smells influences the way the brain makes connections

The first three years of a child’s life are critical to speech and language development, and hearing serves as a critical component for learning speech and language. For children who are pre-lingually deafened, parents are often put in a position of making choices for their child when their child is diagnosed with hearing loss. Important choices include whether to utilize hearing technology (hearing aids, cochlear implants) to provide access to sound, and what communication approach is best for language accessibility (e.g. sign language, spoken language, total communication). Often parents are concerned about making choices for their child without the child's input. Deciding whether or not become involved in the Deaf culture and community is also an important consideration. All of these questions and many more are posed and postulated
for families of children with hearing loss. For some these answers are easy, while for others, these questions serve as sources of hours of debate, research, and reflection.

As with many cultures, members of the Deaf community embrace their culture and do not acknowledge hearing loss as a disability (Humphries, 1996; Leigh, Marcus, Dobosh, & Allen, 1998). In 1993, Dolnick noted:

Deafness is not a disability. Instead, many deaf people proclaim they are a subculture like any other. They are simply a linguistic minority (speaking American Sign Language) and are in no more need of a cure for their condition than Haitians or Hispanics. (p.37)

Adults who were pre-lingually deafened are often members of the Deaf community; however, with recent advances in technology, namely the cochlear implant which often provides users the ability to function in the “hearing” world utilizing spoken language as a primary means of communicating, parents are now challenged to make a choice for their child and family. This option is a source of grave debate between the Deaf and hard of hearing communities.

It should be noted that adults who are pre-lingually deafened can receive a cochlear implant; however, because their brains have matured and passed the critical window for learning speech and language, these individuals often continue to be members of the Deaf community and utilize sign language as their primary means of communication. For these individuals, receiving a cochlear implant can be viewed as advantageous because it can provide them with better access to sound, allowing them to identify the presence of environmental sounds (i.e. a car horn blowing, baby crying) and thus help them to feel safer in their environment.

**Post-lingual deafness**

As has previously been mentioned, post-lingual deafness is defined as hearing loss that occurs after a person has learned speech and language. For the purpose of this research, adults who were post-lingually deafened were the focus. Adults who were post-lingually deafened have
brains that have previously had access to sound during the critical period of development (and often for many years since that time). Therefore, their brains are already “wired for sound,” meaning neural connections for hearing have already developed and been utilized. Individuals who are post-lingually deafened typically continue to use their primary language to communicate (opposed to learning a sign language) and chose to utilize hearing technology. As a person ages, the degree of hearing loss often gets worse (Bainbridge & Wallhagan, 2014). When the hearing loss becomes so significant that the use of hearing aids is no longer effective, the individual may then be counseled by their managing audiologist to learn more about cochlear implants (described in the next section). For individuals who were post-lingually deafened, a cochlear implant can serve to reactivate their auditory pathway; allowing for a return into the “hearing” world. It should be noted that the process of obtaining a cochlear implant and “returning to the hearing” world is long and complex.

**Culture and Cochlear Implants**

Cochlear implants have long been a source of debate among the Deaf and Hard of Hearing communities. In 2005, Sparrow, noted:

> Throughout the 1980s and the early 1990s, Deaf people mobilized to protest the use of cochlear implants. In particular, they objected to the choice being made on behalf of young children to insert the implant. These critics reject the very idea of trying to find a “cure” for deafness. Indeed they have compared it to genocide. They argue that [D]eaf people should not be thought of as disabled but as members of a minority cultural group. (p. 135)

He went on to say:

> Cochlear implant technology represents an attack on the culture of the Deaf, because it seeks to ensure that deaf children grow up to use a spoken language rather than the signed languages of the Deaf. Success in this project adversely affects the interests of individual members of Deaf culture by reducing the size of the community with whom they can communicate in their first language. (p. 136)
Those who are hard of hearing often see cochlear implants as an avenue to function better in the hearing world in which they feel most comfortable. Often members of the hard of hearing community and even those in the “hearing” world do not see negative consequences in providing children or adults with cochlear implants.

In summary, the culture of hearing loss is complex. Adults who are pre-lingually deafened are often members of the Deaf community, utilize sign language, and are typically not proactive about cochlear implants. Adults who are post-lingually deafened often function in the hearing world utilizing spoken language and are often open to learning more about and proceeding with cochlear implantation. This section served as a means to briefly explain basic cultures involved for individuals with hearing loss. As is the case with many things, there are exceptions. There are individuals who are Deaf and open to hearing technology and cochlear implants, just as there are people who are Hard of Hearing who are not open to hearing technology and cochlear implants for a variety of reasons. It is the role of the professional to educate families about their options and respect their decision, regardless of whether it involves the use of hearing technology.

**Cochlear Implants**

Cochlear implants have been mentioned in previous sections; however, it is pertinent that a closer look be taken at what these devices are and how one becomes a candidate to receive a cochlear implant in the United States. The purpose of this section was to briefly describe what cochlear implants are, the surgery involved, and how cochlear implants function. This information is crucial because it explains the foundation of the common experience all participants for this study share. All participants for this study were adults who were post-
lingually deafened who elected to pursue cochlear implantation. Literature reviewed for this section is represented in Table 2.3, Reviewed Cochlear Implant Literature, below.

Table 2.3 Reviewed Cochlear Implant Literature

<table>
<thead>
<tr>
<th>Author</th>
<th>Year of Publication</th>
<th>Research Methods</th>
<th>Methods</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bhatia et al</td>
<td>2004</td>
<td>Article</td>
<td>Literature Review/Retrospective Case Review</td>
<td>Reviewed 300 consecutive pediatric cochlear implantation surgeries and discusses surgical complications and management</td>
</tr>
<tr>
<td>Dodson et al</td>
<td>2007</td>
<td>Article</td>
<td>Literature Review/Retrospective chart review</td>
<td>Examined 194 adult and 151 pediatric cochlear implant surgeries among the 3 cochlear implant brands approved in the US and reports complications</td>
</tr>
<tr>
<td>Dutt et al</td>
<td>2005</td>
<td>Article</td>
<td>Literature Review/Retrospective chart review</td>
<td>Reviewed 100 adult cochlear implant surgeries and reports complications</td>
</tr>
<tr>
<td>Faltys et al</td>
<td>2001</td>
<td>US Patent</td>
<td>Experimental</td>
<td>Provided a description of a fully implantable cochlear implant patent</td>
</tr>
<tr>
<td>Fayad et al</td>
<td>2003</td>
<td>Article</td>
<td>Retrospective chart review</td>
<td>Reviewed of facial nerve paralysis as a complication of cochlear implant surgery</td>
</tr>
<tr>
<td>Author</td>
<td>Year of Publication</td>
<td>Research Methods</td>
<td>Conclusions</td>
<td></td>
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<td>----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Gantz et al</td>
<td>2005</td>
<td>Article Literature Review/Experiment</td>
<td>Offered a description of the importance for preservation of residual hearing as well as suggestions for alternative surgical techniques to improve chance of preservation of residual hearing</td>
<td></td>
</tr>
<tr>
<td>Gifford</td>
<td>2011</td>
<td>Article Literature Review</td>
<td>Provided a review of cochlear implant candidacy criteria and suggests need for revision of current criteria to be less stringent</td>
<td></td>
</tr>
<tr>
<td>Gysin et al</td>
<td>2000</td>
<td>Article Retrospective Case Review</td>
<td>Reviewed 104 cases of pediatric cochlear implantation surgeries and discusses complications</td>
<td></td>
</tr>
<tr>
<td>Hoffman &amp; Cohen</td>
<td>1995</td>
<td>Article Retrospective Case Review</td>
<td>Examined over 3,000 adult cochlear implant surgeries and over 1,900 pediatric cochlear implant surgeries with data provided by cochlear implant companies; surgical complications are discussed</td>
<td></td>
</tr>
<tr>
<td>Migirov &amp; Kronenberg</td>
<td>2005</td>
<td>Article Retrospective case review</td>
<td>Offered review of internal magnet displacement cases as a result of cochlear implant surgery</td>
<td></td>
</tr>
<tr>
<td>Author</td>
<td>Year of Publication</td>
<td>Research Methods</td>
<td>Conclusions</td>
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<td></td>
</tr>
<tr>
<td>Migirov et al</td>
<td>2006</td>
<td>Article</td>
<td>Literature Review/Retrospective chart review</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>300 pediatric cochlear implant surgeries were reviewed with surgical and medical complications reported</td>
<td></td>
</tr>
<tr>
<td>Migirov et al</td>
<td>2009</td>
<td>Article</td>
<td>Literature Review/Retrospective chart review</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Provided explanations of possible complications from cochlear implant surgery. Vestibular and wound problems were found to be most prevalent.</td>
<td></td>
</tr>
<tr>
<td>Staecker et al</td>
<td>1999</td>
<td>Article</td>
<td>Case Study</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Described complications with cochlear implant surgery due to infection</td>
<td></td>
</tr>
<tr>
<td>Stamatiou et al</td>
<td>2010</td>
<td>Article</td>
<td>Literature Review/Retrospective chart review</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Over 200 cases of adult cochlear implant surgeries were reviewed with results of complications reported</td>
<td></td>
</tr>
<tr>
<td>USFDA</td>
<td>2014</td>
<td>Website</td>
<td>Regulations</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Offered brief description of requirements before, during, and after cochlear implant surgery</td>
<td></td>
</tr>
</tbody>
</table>

Cochlear implants are surgically implanted devices that bypass the damaged auditory system in the inner ear that impedes the sound signal from reaching the brain. The first multi-channel cochlear implants were approved by the FDA for use in the US in 1985 for adults and subsequently 1990 for children. Though there are currently efforts to create a completely implantable cochlear implant (with no external parts) (Faltys, Kusma, & Gord, 2001), currently
cochlear implants consist of an internal device that is placed by a fellowship-trained, board certified surgeon and an external device that is activated and managed by an audiologist. Figure 2.2 How a cochlear implant works, depicts the placement of the internal device of a cochlear implant and describes how it works. As with many technologies, there are different brands of cochlear implants, all with different accessories and options. In the United States, three cochlear implant companies have been approved by the FDA: Med-El, Cochlear, and Advanced Bionics. In many cases, families are allowed to choose their cochlear implant brand; however, there are times when implant centers do not offer a variety of brands, may choose a specific brand due to the individual’s anatomy, or a particular brand may be chosen over another by the surgeon in an effort to achieve optimal success with the device.

**Figure 2.2 How a Cochlear Implant Works**

1. Microphones on the sound processor pick up sounds and the processor converts them into digital information.

2. This information is transferred through the coil to the implant just under the skin.

3. The implant sends electrical signals down the electrode into the cochlea.

4. The hearing nerve fibers in the cochlea pick up the signals and send them to the brain, giving the sensation of sound.

*Figure 2.2 How a cochlear implant works. Image courtesy of Cochlear Americas, ©2016 (See Appendix D.)*
After the internal device is placed by the surgeon, a recovery time of 3 to 6 weeks is required after surgery to allow time for healing of the incision site as well as time for swelling to diminish. (USFDA, 2014). After this recovery period, the individual who underwent cochlear implant surgery is typically seen by their surgeon for a post-operative visit and then seen by his or her managing audiologist. The audiologist provides the external device and activates the external device so that it is paired with the internal device to produce the digital signal to the brain, thus re-activating the auditory pathway in the brain. Figure 2.3, 2.4, 2.5 and 2.6 are depictions of various external devices (i.e., external sound processors) from various cochlear implant companies.

**Figure 2.3 Advanced Bionics Naïeda CIQ90**

*Figure 2.3 Advanced Bionics Naïeda CIQ90* external cochlear implant processor
Reproduced with the permission from the Advanced Bionics Corporation (See Appendix D.)
Figure 2.4 Advanced Bionics Neptune CI

*Figure 2.4 Advanced Bionics Neptune waterproof external sound processor
Reproduced with permission from the Advanced Bionics Corporation (See Appendix D.)*

Figure 2.5 Med-El Rondo CI

*Figure 2.5 Med-El Rondo external sound processor
Reproduced with permission from the Med-El Corporation. (See Appendix D.)*
Figure 2.6 Med-El Opus 2 CI

![Image of Med-El Opus 2 CI](image1.png)

*Figure 2.6 Med-El Opus 2 external sound processor. Reproduced with permission from the Med-El Corporation. (See Appendix D.)*

Figure 2.7 Cochlear Nucleus 6 CI

![Image of Cochlear Nucleus 6 CI](image2.png)

*Figure 2.7 Cochlear Nucleus 6 external sound processor. Image courtesy of Cochlear Americas © 2016 (See Appendix D.)*
After the initial activation of the device (internal and external paired together), it is up to
the cochlear implant center regarding follow-up care in terms of additional programming for the
device, whether or not there is an auditory rehabilitation component, and additional follow-up
care. It is important to note than after a cochlear implant is inserted into the inner ear, what
residual hearing initially existed, is often reduced or is no longer available after this invasive
surgery. In 2005, Gantz, Turner, Gfeller, and Louder reported:

The residual low-frequency hearing, when it can be used by the patient in addition to
electrical stimulation, has some important advantages compared with traditional “electric
only” [cochlear implants] CIs. Therefore, there are a number of disadvantages that should
be considered before the decision to destroy residual acoustic hearing is undertaken. (p.
796)

In early surgical implantation procedures all residual hearing was destroyed in the
implanted ear; however, changes in technology and surgical procedures offer the promise that at
least some residual hearing can be preserved. Loss of residual hearing is a factor that recipients
of cochlear implants and their families must consider in regards to cochlear implantation. An
audiologist, cochlear implant surgeon, and/or cochlear implant team in unable to tell a potential
recipient of a cochlear implant with absolute certainty the device will function the way it is
intended to function prior to the operation. Therefore, the family must consider that if the surgery
is unsuccessful, what little residual hearing once existed, will likely no longer be useable even
with the use of a hearing aid. As with all invasive surgeries, not all are success stories. There is
always a chance for a complication. Multiple complications with cochlear implant surgeries have
been noted including, but not limited to: infections, allergic reactions, facial nerve paralysis,
 intra-cranial complications, and displacement of the device (Hoffman & Cohen, 1995; Staecker,
Chow, & Nadol, 1999; Gysin, Papsin, Daya, & Nedzelski, 2000; Fayad, Wanna, Micheletto, &
Parisier, 2003; Bhatia, Gibbon, Nikolopoulos, & O’Donoghue, 2004; Dutt, Hadjiabnnas,
Cooper, Donaldson, & Proops, 2005; Migirove, & Kronenberg, 2005; Migirov, Muchnik, Kaplan-Neeman, & Kronenberg, 2006; Dodson, 2007; Migirov, Dagan, & Kronenberg, 2009). Complications from the surgery, reactions to the device, and possible unforeseen complications are all things a candidate for a cochlear implant must consider prior to proceeding with the potentially life-changing decision of obtaining a cochlear implant.

**Candidacy**

What a cochlear implant is and how it works has been reviewed; however, the criterion to become a candidate for a cochlear implant has yet to be discussed. Candidacy for cochlear implantation is the purpose of this section. This is important to discuss in regards to this research because all participants share in this experience.

The criterion for cochlear implantation continues to change with new technologies, research and the United States Food and Drug Administration (FDA) approval. Currently, candidacy for cochlear implantation is determined by a battery of audiological and medical tests. The FDA recommends exams to evaluate the anatomy of the inner ear including a computerized tomography (CT) scan and/or magnetic resonance imaging (MRI). In addition, hearing thresholds are assessed by an audiologist and speech recognition testing is completed. Speech recognition is typically represented as a percentage of correct words identified at a set presentation (decibel dB level). In regards to adults, Gifford (2011) noted that candidacy for cochlear implantation varies from company to company stating that:

With respect to audiometric thresholds, both Advanced Bionics and Med El specify bilateral severe-to-profound sensorineural hearing loss for adult implant candidacy. On the other hand, Cochlear Americas and Medicare specify bilateral moderate-to-profound sensorineural hearing loss—recognizing that individuals with sloping hearing losses will not always obtain the benefit from amplification needed to achieve successful communication. (p. 16)
Gifford reported the importance of completing testing involving limited or no visual cues when determining cochlear implant candidacy. Visual cues are not allowed during the speech assessment to obtain an individual’s true auditory-based speech recognition abilities (Gifford, 2011). Gifford also noted that the cochlear implant companies have various standards for speech perception scores. For example, as of 2011, Advanced Bionics and Cochlear Americas established a criteria of 50% accuracy for speech perception testing (using sentences) in the best aided condition and Med-El established speech perception testing (using sentences) at 40% accuracy in the best aided condition as appropriate cochlear implant candidacy criteria (Gifford, 2011). This means that to be eligible for a cochlear implant the individual must miss at least half of the conversation being communicated to them in sentences with ample contextual clues to be considered a candidate for a cochlear implant.

In summary, cochlear implants are a fairly new and quite controversial technology that were approved for use in the United States in the mid 1980’s (for a multi-channel device in adults). For individuals who meet the criterion of being a candidate for a cochlear implant, there are multiple factors and scenarios to consider prior to pursuing cochlear implantation. The success of the device cannot be guaranteed. It is likely that any current residual hearing that exists prior to surgery will be destroyed or minimally preserved. If the device and surgery are successful (with no complications or infections) there is still the chance that technology does not always function as it should. However, for many, the success of a cochlear implant means the ability to function in the hearing world, to hear and communicate with family members, the ability to interact socially with others who utilize spoken language, and the ability to regain independence and self-confidence. For them, the risk is worth the reward.
Quality of Life (QoL)

The purpose of this section was to discuss how hearing loss impacts the quality of life (QoL), not only of those with the hearing loss, but also of those who interact and care for the person with hearing loss. This information was critical to this study because it was the foundation for justification of treating hearing loss in the first place. One goal of intervention is to improve the quality of life of the individual with hearing loss. To understand the impact intervention services can have on an individual’s quality of life, an examination of the research describing how hearing loss impacts quality of life is imperative. Table 2.4, Reviewed Quality of Life Literature, below provides a list of the reviewed literature for this section.

**Table 2.4 Reviewed Quality of Life Literature**

<table>
<thead>
<tr>
<th>Author</th>
<th>Year of Publication</th>
<th>Research Methods</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castro et al.</td>
<td>2005</td>
<td>Article</td>
<td>Experimental Followed individuals who received Med-El cochlear implants. Used the Glasgow Benefit Inventory (GBI) to demonstrate improved QoL for individuals who received a cochlear implant.</td>
</tr>
<tr>
<td>Chee et al.</td>
<td>2004</td>
<td>Article</td>
<td>Prospective experiment Designed 47-item questionnaire to establish benefits of cochlear implants in adults. Of note, family support, peer support, and prior auditory-verbal therapy were noted to be important factors to success by participants.</td>
</tr>
<tr>
<td>Author</td>
<td>Year of Publication</td>
<td>Research Method</td>
<td>Methods</td>
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<tr>
<td>Cohen et al.</td>
<td>2004</td>
<td>Article</td>
<td>Experimental</td>
</tr>
<tr>
<td>Cummins</td>
<td>1997</td>
<td>Book Chapter</td>
<td>Literature Review</td>
</tr>
<tr>
<td>Dalton et. al</td>
<td>2003</td>
<td>Article</td>
<td>Epidemiology</td>
</tr>
<tr>
<td>De Fruyt &amp;</td>
<td>2009</td>
<td>Article</td>
<td>Literature Review</td>
</tr>
<tr>
<td>Demyttenaere</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gopinath et. al</td>
<td>2009</td>
<td>Article</td>
<td>Cross-sectional study</td>
</tr>
<tr>
<td>Group</td>
<td>1998</td>
<td>Article</td>
<td>Experimental</td>
</tr>
<tr>
<td>Author</td>
<td>Year of Publication</td>
<td>Research Methods</td>
<td>Conclusions</td>
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<tr>
<td>-------------------------</td>
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</tr>
<tr>
<td>Hallberg &amp; Ringdahl</td>
<td>2004</td>
<td>Article Qualitative</td>
<td>Examined the daily experiences of 17 adults who received a cochlear implant.</td>
</tr>
<tr>
<td>Hirshfelder et al.</td>
<td>2008</td>
<td>Article Experimental</td>
<td>56 cochlear implant users were evaluated in terms of speech perception skills as well as a health related QoL questionnaire. Results indicated significant positive effect of cochlear implants on speech perception and HRQoL.</td>
</tr>
<tr>
<td>Hogan et. al</td>
<td>2001</td>
<td>Article Cross sectional survey</td>
<td>Examined HRQoL of 202 adults who received cochlear implants and their partners in Australia and New Zealand. Results indicated improvement in HRQoL for individuals who received cochlear implants.</td>
</tr>
<tr>
<td>Idler &amp; Benyamini</td>
<td>1997</td>
<td>Article Retrospective Review</td>
<td>Reviewed literature to compare global definitions of QoL to that of community-based models (i.e. HRQoL)</td>
</tr>
<tr>
<td>Jorngarden et. al</td>
<td>2007</td>
<td>Article Prospective Longitudinal Study</td>
<td>Research examined HRQoL in adolescent cancer survivors</td>
</tr>
<tr>
<td>Author</td>
<td>Year of Publication</td>
<td>Research</td>
<td>Methods</td>
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<tr>
<td>Looi et. al</td>
<td>2011</td>
<td>Article</td>
<td>Literature Review &amp; Survey</td>
</tr>
<tr>
<td>Petersen &amp; Lupton</td>
<td>1996</td>
<td>Book</td>
<td>Literature Review and Documents</td>
</tr>
<tr>
<td>Mo et. al</td>
<td>2003</td>
<td>Article</td>
<td>Longitudinal Study</td>
</tr>
<tr>
<td>Rapley</td>
<td>2003</td>
<td>Book</td>
<td>Literature Review</td>
</tr>
<tr>
<td>Rebmar et al</td>
<td>2009</td>
<td>Article</td>
<td>Qualitative</td>
</tr>
<tr>
<td>The National</td>
<td>1999</td>
<td>Report</td>
<td>Survey</td>
</tr>
</tbody>
</table>
Table 2.4 Reviewed Quality of Life Literature Cont.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year of Publication</th>
<th>Research Methods</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wolfensberger</td>
<td>1994</td>
<td>Book Chapter Literature Review</td>
<td>Defined and subsequently described 7 problematic uses of the term QoL in research</td>
</tr>
<tr>
<td>Zaidman-Zait et. al</td>
<td>2012</td>
<td>Encyclopedia Literature Review</td>
<td>Reviewed the impact cochlear implants have on the QoL and HRQoL of pediatric and geriatric recipients</td>
</tr>
</tbody>
</table>

In 2009, De Fruyt and Demyttenaere clearly documented the significant increase in research in medical journals related to quality of life. This increase came from health-related disciplines realizing the importance of looking at progress and effectiveness in terms of quality of life rather than solely focusing on direct contact intervention. Treating an individual holistically, rather than simply providing technology, medication, or direct intervention is beneficial. Clinicians and researchers realized the importance of taking quality of life into account when treating an individual.

Quality of life is a complex term with multiple meanings depending on the discipline which is utilizing the term. Researchers must utilize great caution when defining and measuring this term. Rapley (2003), noted, “the term ‘quality of life’ is great in speeches, but when it is given the stature of a research concept, it becomes an uncertain tool unless it is controlled by a precise definition and rigorous discipline in thought and word” (p. 26).

In addition to quality of life, researchers have further focused efforts by looking at health-related quality of life. Some researchers, most notably Cummins (1997), argue for a robust definition of the term ‘quality of life’ and note that “health-referenced QoL definitions impose an overly restricted view of the construct” (p. 124). Still others see value in narrowing the scope of
research to focus on specific measures as they relate to the intervention and/or services provided (Rapley, 2003; Idler & Benyamini, 1997; Petersen and Lupton, 1996). “[Health-Related Quality of Life] HRQoL is generally seen as a multidimensional construct, encompassing physical, psychological, social and functional areas of life and reflecting on the impact of health and illness on these aspects” (Jorngarden et. al, 2007, p. 1953). The following section discussed how hearing loss and cochlear implantation effects the quality of life. For the purpose of this study, quality of life will be defined as a broad, multidimensional construct that includes subjective evaluations of positive and negative aspects of life (Group, 1998).

**Hearing Loss**

In 1999, the National Council on Aging surveyed 2,304 adults (over the age of 65) who reportedly had hearing loss. People who had hearing loss and did not utilize hearing aids were more likely to report feeling anxious and worried as well as being less active socially (The National Council on Aging, 1999). The quality of life for the individuals who had hearing loss and did not utilize hearing aids was negatively impacted by their hearing loss. This survey went on to examine the impact of hearing aid use. Individuals who started using hearing aids reported improvements in relationships at home, self-worth, and their overall life. Interestingly, this survey was also taken by family members of the individuals with hearing loss. Sixty-six percent of family members reported and improvement in [the individual with hearing loss] relationships at home and 62% felt that their family member had an improvement in overall life with the use of hearing aids. In 2009, Gopnik, Meltzoff, and Kuhl completed a cross sectional study of over a thousand adults in Australia and reported that older adults with hearing loss reported signs of depression; however, adults that reported frequent or regular use of hearing aid technology reported lower prevalence of symptoms of depression. This research suggests that hearing aid
use positively impacts the quality of life for individuals with hearing loss; however, it does not address those individuals who do not benefit from hearing aids. In 2003, Dalton, Cruickshanks, and Klein, found that severity of hearing loss can significantly impact the quality of life of individuals. Thus, it is important to explore the impact cochlear implants may have on an individual's quality of life. The following section addressed how the quality of life of a recipient of a cochlear implant is impacted.

**Cochlear Implants**

In 2005, Mo, Lindbaek, and Harris surveyed recipients of cochlear implants who were post-lingually deafened and their relatives using a questionnaire. They found a significant improvement in the quality of life for individuals who were post-lingually deafened after receiving a cochlear implant. Improved quality of life after cochlear implantation in adults is supported in literature (Castro, Lassaletta, Bastarrica, Alfonso, Prim, de Sarria, & Gavilan, 2005; Hallberg & Ringdahl, 2004; Hirschfelder, Grabel, & Olze, 2008; Hogan, Hawthorne, Kethel, Giles, White, Stewart, et al. 2001; Looi, Mackenzie, Bird, & Lawrenson, 2011; Rebmar, Lind, Arnesen, & Helvik, 2009; Zaidman-Zait, 2010). In 2010, Zaidman-Zait noted:

> Cochlear implants[s] have a significant impact on [Health Related Quality of Life] HRQOL for physical, psychological, and social functioning in both prelingually and postlingually deafened adults over time in comparison to deaf adults who are using hearing aids. Improvements in HRQOL consistent with speech perception outcomes; however, benefits are still reported even when speech perception scores are varied. (p. 9)

Zaidman-Zait went on report:

> Overall cochlear implants improve elderly patients’ HRQOL, and these improvements are comparable to the benefits that younger adult recipients experience. It seems that despite age-related changes in their auditory system and prolonged duration of deafness, cochlear implantation for individuals in the over 65 years of age group present HRQOL benefits. (p. 12-13)
In summary, efforts to define and quantify quality of life and health related quality of life have increased in recent years. It is clear that both the quality of life and health related quality of life of individuals are impacted when they have hearing loss. Research has shown that technological intervention in the form of hearing aids and/or cochlear implantation has shown improved scores on these measures; however, the technology is only one component of the auditory rehabilitation process. In 2004, Cohen, Labadie, Dietrich, and Haynes again noted positive outcomes of quality of life of individuals with hearing loss who utilize hearing technology. Hallberg and Ringdahl’s (2004) qualitative study as well as the 2004 study completed by Chee, Goldring, Shipp, Ng, Chen, & Nedzelski provided support for the utilization of auditory rehabilitation after an individual receives a cochlear implant. The following section defined and discussed the concept of auditory rehabilitation as well as the impact it can have on recipients of cochlear implants.

**Auditory Rehabilitation**

The purpose of this section was to describe what auditory (aural) rehabilitation is and why it is important for adult recipients of cochlear implants. This information is pertinent to this study because all participants for this study have completed an auditory rehabilitation program through their cochlear implant surgery center and the research questions for this study pertain to the role of the recipient of the cochlear implant and his/her spouse in the auditory rehabilitation process. Table 2.5, Reviewed Auditory Rehabilitation Literature, below provides a list of the literature reviewed for this section.
Table 2.5 Reviewed Auditory Rehabilitation Literature

<table>
<thead>
<tr>
<th>Author</th>
<th>Year of Publication</th>
<th>Research</th>
<th>Methods</th>
<th>Conclusions</th>
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</thead>
<tbody>
<tr>
<td>Abrams et al.</td>
<td>2005</td>
<td>Article</td>
<td>Literature Review/Experiment</td>
<td>Discussed health-related quality of life (HRQoL) instruments utilization in audiological management and care</td>
</tr>
<tr>
<td>Abrahamson</td>
<td>1991</td>
<td>Article</td>
<td>Literature Review/Experiment</td>
<td>Offered review of literature and details of an Aural Rehabilitation program focusing on communication needs and involvement of spouses</td>
</tr>
<tr>
<td>Boothroyd</td>
<td>2007</td>
<td>Article</td>
<td>Literature Review</td>
<td>Provided insight in to what aural rehabilitation is and why it is beneficial for adults with hearing loss</td>
</tr>
<tr>
<td>Campbell</td>
<td>1991</td>
<td>Article</td>
<td>Retrospective Review</td>
<td>Reviewed of assessments to identify dimensions of adult learning styles/preferences</td>
</tr>
<tr>
<td>Edwards</td>
<td>1994</td>
<td>Master’s Thesis</td>
<td>Literature Review/Documents</td>
<td>Provided comparison of various research in adult learning styles</td>
</tr>
<tr>
<td>Hawkins</td>
<td>2005</td>
<td>Article</td>
<td>Literature Review</td>
<td>Offered a systematic review of the literature concerning group Aural Rehabilitation programs for adults with hearing loss</td>
</tr>
<tr>
<td>Hardick</td>
<td>1977</td>
<td>Article</td>
<td>Literature Review/Opinion</td>
<td>Offered insight into components necessary for successful Aural Rehabilitation programs</td>
</tr>
<tr>
<td>Author</td>
<td>Year of Publication</td>
<td>Research Methods</td>
<td>Conclusions</td>
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<tr>
<td>Hickson et al</td>
<td>2009</td>
<td>Article</td>
<td>Developed a communication program for adults with hearing loss</td>
<td></td>
</tr>
<tr>
<td>Honey &amp; Mumford</td>
<td>1986</td>
<td>Book</td>
<td>Identified adult learning styles and preferences and the impact of those on education</td>
<td></td>
</tr>
<tr>
<td>Hull</td>
<td>2001</td>
<td>Book</td>
<td>Provided rich description of Aural Rehabilitation for children and adults</td>
<td></td>
</tr>
<tr>
<td>Kramer et al.</td>
<td>2005</td>
<td>Article</td>
<td>Completed randomized trial of the effects of a home education program for adults with hearing loss</td>
<td></td>
</tr>
<tr>
<td>Lawler</td>
<td>1991</td>
<td>Article</td>
<td>Offered insight into adult learning styles and learning facilitation techniques</td>
<td></td>
</tr>
<tr>
<td>Ling</td>
<td>2002</td>
<td>Book</td>
<td>Offered description of methods utilized to teach speech to children with hearing loss</td>
<td></td>
</tr>
<tr>
<td>Madell</td>
<td>2007</td>
<td>Article</td>
<td>Described the importance of speech perception and auditory performance</td>
<td></td>
</tr>
<tr>
<td>Madell &amp; Flexer</td>
<td>2008</td>
<td>Book</td>
<td>Offered documentation regarding audiological management of children with hearing loss</td>
<td></td>
</tr>
<tr>
<td>Author</td>
<td>Year of Publication</td>
<td>Research Method</td>
<td>Methods</td>
<td>Conclusions</td>
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<tr>
<td>Montgomery</td>
<td>1993</td>
<td>Book</td>
<td>Literature Review/Documents</td>
<td>Reviewed of literature regarding treatment efficacy in Aural Rehabilitation with adults</td>
</tr>
<tr>
<td>Newberry</td>
<td>2011</td>
<td>Article</td>
<td>Opinion</td>
<td>Offered personal experience of cochlear implantation and post-operative care and services</td>
</tr>
<tr>
<td>Penland</td>
<td>1984</td>
<td>Book</td>
<td>Literature Review/Documents</td>
<td>Documented of the impact adult learning style preference can have in outcome measures</td>
</tr>
<tr>
<td>Pichora-Fuller</td>
<td>2001</td>
<td>Book</td>
<td>Literature Review/Documents</td>
<td>Discussed the provision of Aural Rehabilitation services in a nursing home setting</td>
</tr>
<tr>
<td>&amp; Carson</td>
<td></td>
<td>Chapter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ratner</td>
<td>2006</td>
<td>Article</td>
<td>Literature Review</td>
<td>Reviewed evidence-based practice in the field of Speech-Language Pathology</td>
</tr>
<tr>
<td>Rhoades &amp; Duncan</td>
<td>2010</td>
<td>Book</td>
<td>Literature Review/Documents</td>
<td>Compiled numerous research articles and books to establish the need for aural rehabilitation and the impact aural rehabilitation can have on the QoL of individuals who have hearing loss as well as their frequent communication partners</td>
</tr>
<tr>
<td>Ross</td>
<td>1997</td>
<td>Article</td>
<td>Literature Review/Documents</td>
<td>Provided insight into the history and future of the practice of aural rehabilitation</td>
</tr>
<tr>
<td>Author</td>
<td>Year of Publication</td>
<td>Research Methods</td>
<td>Conclusions</td>
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<tr>
<td>Rossi-Katz &amp; Arehart</td>
<td>2011</td>
<td>Literature Review/Survey</td>
<td>Surveyed audiologists who provide clinical services for cochlear implants and discussed the variation in services provided across the US</td>
<td></td>
</tr>
<tr>
<td>Rubinstein &amp; Boothroyd</td>
<td>1987</td>
<td>Literature Review/Documents/Experiment</td>
<td>Reviewed of literature and efficacy of two approaches utilized to improve speech perception</td>
<td></td>
</tr>
<tr>
<td>Sweetow &amp; Henderson</td>
<td>2006</td>
<td>Literature Review/Documents</td>
<td>Offered review of literature review on speech perception as well as the development of the LACE program</td>
<td></td>
</tr>
<tr>
<td>Sweetow &amp; Palmer</td>
<td>2005</td>
<td>Literature Review/Documents</td>
<td>Provided systematic review of the literature regarding the effectiveness of aural rehabilitation</td>
<td></td>
</tr>
<tr>
<td>Tye-Murray</td>
<td>2015</td>
<td>Literature Review/Documents</td>
<td>Reviewed of literature and insight in to providing Aural Rehabilitation for children, adults, and their families</td>
<td></td>
</tr>
<tr>
<td>Van Vliet</td>
<td>2006</td>
<td>Literature Review/Documents</td>
<td>Documented the need for measurement and documentation of speech perception</td>
<td></td>
</tr>
<tr>
<td>Walden et al</td>
<td>1981</td>
<td>Literature Review/Experiment</td>
<td>Two groups of adults with hearing loss were provided separate trainings. The group that received auditory and visual training demonstrated gains in consonant recognition.</td>
<td></td>
</tr>
</tbody>
</table>
In 2007, Boothroyd defined auditory rehabilitation as “the reduction of hearing-loss-induced deficits of function, activity, participation, and quality of life through sensory management, instruction, perceptual training, and counseling” (p. 63). Auditory rehabilitation is a process by which individuals learn to best utilize the hearing they have through the hearing technology they are using. It is a program that must be flexible in nature to meet the needs of each individual. Auditory rehabilitation is appropriate for both users of hearing aids and cochlear implants. As a clinician, one must take into account adult learning styles, have a thorough knowledge of the typical development of auditory skills, and must understand the role of speech perception, specifically, phoneme perception, as they are key elements in helping an individual to achieve success with their hearing technology.

**Adult Learning**

It is imperative that adult learning styles be taken into account when an individual enters the room to begin their auditory rehabilitation program. Adult learning is spawned by motivation to learn. For example, if one were to notice an odd sound in their vehicle engine and also be unable to pay for a mechanic to look at the engine, that individual would be highly motivated to learn more about how an engine works to try to identify the concern. In 1994 Edwards (p. 45-46), identified 9 principles of adult learning:

1. Adult education requires a physical and social climate of respect.
2. A collaborative mode of learning is central to adult education.
3. Adult education includes and builds on the experience of the participant.
4. Adult education fosters critical reflective thinking.
5. Problem posing and problem solving are fundamental aspects of adult education.
6. Learning for action is valued in adult education.
7. Adult education is best facilitated in a participative environment.
8. Adult education empowers the participant.
9. Self-directed learning is encouraged and enhanced in adult education.
In addition to principles of adult learning, an educator or clinician must also take into account that many adult learning styles also exist. Learning styles and preferences have long been researched and debated, most notably in 1991, Campbell identified 32 assessments of different dimensions of learning styles. Honey and Mumford (1986), as cited in Cartney (2000) identified four learning styles:

**Activists**: operate in the ‘here and now.’ They enjoy the challenge of new experiences but become bored with implementation and consolidation. They are quick to move into action and enjoy activity centered around themselves. [A hands-on experience early in the learning process will likely be most beneficial.]

**Reflectors**: observe and evaluate situations from a range of different perspectives before reaching a definitive conclusion. They draw upon a wide perspective and look at the past as well as the present. They are cautious and seek the observations of others as well as their own before they act. [Introducing information at a slower rate is likely most beneficial for this type of learner].

**Theorists**: integrate observations into complex but logically sound theories. They think through problems in a vertical, systematic manner and assimilate disparate facts into coherent theories. [A structured learning environment with clear connections between concepts and functionality will likely most benefit this type of learner].

**Pragmatists**: enjoy trying out new ideas and theories and testing out how they can be applied in practice. They like to act quickly and adopt a practical, problem-solving approach to situations. An [adult] with this preferred learning style is likely to benefit from learning experiences where theoretical understandings are linked directly to the process and outcome of the work undertaken. (p. 612)

Learning styles are important to consider when working with adults, as achievement and satisfaction have been shown to increase when preferences are taken into consideration (Penland, 1984).

All the participants for this study began their auditory rehabilitation journey after having undergone cochlear implant surgery, healed, and had their device activated for approximately one week. One must consider the support system of the individual who received the cochlear implant. The learning styles of individuals who play primary supportive roles may also need to be taken into account when designing an auditory rehabilitation program for the individual who is utilizing hearing technology.
Auditory Skill Development

One of the primary goals of auditory rehabilitation is the development of auditory (listening) skills. Hearing, or the reception of sound waves, should not be confused with the complex task of listening. Listening is an active process that requires concentration on and attending to the message and then demonstrating understanding of the content of the message (Edwards, 1994). Listening is intentionally focusing on information presented via an auditory modality and can be measured by activity in the prefrontal cortex of the brain (Musiek, 2009). To achieve optimal listening skills, one must first have access to sound. Access to sound is what is provided by the hearing technology; however, access alone does not alone correlate to successful listening. “Hearing aids [or cochlear implants] can enhance the child’s [or adults] hearing, but the act of listening is a behavior that must be learned” (Hull, 2001, p. 119).

There are four agreed on skill categories that are essential to auditory development: (1) detection [awareness], (2) discrimination, (3) identification, (4) comprehension” (Hull, 2001). This is also referred to as the auditory skills hierarchy. Hull (2001) defines each element as follows:

- Detection [awareness] involves children [or adults] becoming aware of sound and learning to attend to sounds. (p. 118)
- Discrimination develops as children [or adults] learn to perceive the difference in sounds. Suprasegmental [vowel] discriminations of intensity, duration, pitch and timing appear first. (p.118)
- Identification is the stage at which children [or adults] can repeat or point to a representation of a specific set of sounds. (p. 118-119)
- Comprehension is the final and most complicated stage of auditory development….the comprehension and understanding that the child [or adult] gives, completes the cycle of connecting sound to meaning. (p. 119)

Figure 2.8 The Auditory Skills Hierarchy below, is a visual representation of the auditory skills hierarchy discussed above.
Figure 2.8 Auditory Skills Hierarchy. This is a representation of auditory skills in a hierarchy from least difficult to most difficult.

It is important to note that auditory skills found in this hierarchy often naturally develop for individuals with normal hearing. Adults who are post-lingually deafened have often acquired these auditory skills at some point in their life when they had hearing within the normal range. However, when hearing loss occurs, these skills are much more difficult to execute. In auditory rehabilitation, the clinician helps the adult to work back through the auditory skills hierarchy to re-activate neural pathways, improve listening skills, and subsequently positively impact the individual’s ability to communicate. A key component to auditory rehabilitation is consistent
practice. While some auditory rehabilitation programs include pre-recorded activities, a live voice can be easier for a new recipient of a cochlear implant to hear than a recorded voice because the voice is familiar to the listener (Tye-Murray, 2015). Familiar voices are easier for the recipient of the cochlear implant to hear. Ideal communication partners, especially early in the auditory rehabilitation program are the frequent communicators in their life (spouse, friend, neighbor, and/or partner).

**Speech Perception**

Speech perception, an important component of the auditory rehabilitation program, is part of the audiologic test battery that specifically tests the individuals' ability to understand speech. (Madell & Flexer, 2008; Madell, 2007; Van Vliet, 2006). Important to note is that speech perception scores are currently one of the main criterion in determining cochlear implant candidacy (USFDA, 2014). Speech perception, or the identification of sounds or words, can improve with better access to sound through technology alone. It has been well documented that speech perception scores have improved through the use of the cochlear implant (Rubinstein & Boothroyd, 1987; Sweetow & Henderson, 2006; Boothroyd, 2007). However, to achieve optimal speech perception scores with a cochlear implant, auditory rehabilitation in conjunction with cochlear implant technology has shown superior results (Tye-Murray, 2015).

Speech reading can aid in helping an individual with hearing loss to understand the message that is being communicated. Many users of hearing aids and cochlear implants rely on speech reading (i.e., lip reading) to understand a complete signal. However, when one considers that many sounds look the same, for example: /b/ and /p/, /n/, /l/ and /d/, and /f/ and /v/ to name a few, it is easy to see how the information being communicated can be misconstrued if too much
emphasis is placed upon speech reading. In 2002, Ling noted, “the type of information provided by speech reading indicates that the eye is a poor substitute for the ear” (p. 39).

**Evidence Based Practice**

There is a limited, but growing, body of research demonstrating the effectiveness of auditory rehabilitation on the auditory skills of individuals with hearing loss. Tye-Murray (2015) defined evidence based practice as the “clinical decision making that is based on a review of the scientific evidence of benefits and costs of alternative forms of diagnosis or treatment, on clinical experience, and on patient values” (p. 21).

One limitation to documenting the success of auditory rehabilitation is the variety of expectations recipients of cochlear implants may have. What one person considers a life-changing success in the program another person may consider to be an expected progress and possibly even a minimized outcome of what they originally foresaw as their performance goal with their hearing technology. Problems with accumulating evidence to support auditory rehabilitation include but are not limited to: the heterogeneity of the patient populations, ethical considerations for designing research studies, the variety of treatment programs provided, the variance in outcome measures that continue to be a debate among practitioners, and at the end of the day, the skill level of the therapist providing the services. In 2006, Ratner noted:

Practitioner skill, interpersonal talents, problem-solving abilities, and so forth are difficult features of intervention to quantify but may be necessary to understand if we are to fully appreciate whether it is therapies, therapists, or both that do the work in achieving our best outcomes. (p.258)

In 2005, Sweetow & Palmer noted, “In order for audiologists to fully embrace the concept of auditory training [or aural rehabilitation], it is essential that the focus be placed on communication, not simply hearing” (p. 503). Though it is difficult to design studies to provide the highest level of evidence for auditory rehabilitation, sufficient evidence for this practice has
mounted over the years with a push in the literature urging clinicians to consider a more holistic approach to aural rehabilitation (Hardick, 1977; Abrahamson, 1991; Montgomery, 1994). By focusing only on speech reading or speech perception scores, the practitioner misses out on how the individual performs in functional settings including how they adjust to their diagnoses of hearing loss and how they communicate with frequent communication partners (Hawkins, 2005). Of note is that there is evidence to support auditory rehabilitation for those who utilize hearing aids (Abrams, Chisolm, & McArdle, 2005; Pichora-Fuller & Carson, 2001; Rhodes & Duncan, 2010; Tye-Murray, 2015); however, this topic has been approached by few researchers concerning people who receive cochlear implants. For example, in 2011, Rossi-Katz and Arehart, completed a study surveying audiologists across the United States who program cochlear implants. Though there was only a 15% response rate, indicative of a need for extreme caution when attempting to generalize results, it is noteworthy that they found greater than 60% of respondents reported no other measure of rehabilitation was provided with the exception of speech perception testing. Respondents most often reported they utilized resources provided via websites, cochlear implant manufacturers, or audio-books, but were not guided through a comprehensive aural rehabilitation program. Gathering evidence to support auditory (aural) rehabilitation is difficult, especially when audiologists often do not have time to provide such services and patients often struggle with reimbursement issues (Rossi-Katz & Arehart, 2011). Despite the difficulty obtaining empirical evidence and the inconsistent use of auditory rehabilitation among clinical settings, the importance of auditory rehabilitation is not to be underestimated. In 1997, when discussing the role of the audiologist Ross noted that “to be an autonomous and respected profession, we must incorporate aural rehabilitation into our efforts and value it as much as we do our technical support role” (p. 22).
The importance of involving families and frequent communication partners in the auditory rehabilitation process cannot be underestimated. In 2011, Newberry (a cochlear implant recipient) noted, “Developing the assessment to explore and understand the family dynamics pre-and post-implantation would significantly enhance the journey and would support the relationships which make our families what they are” (p. 26). In 2014, Maki-Torokko, Vestergren, Harder, & Lyxell surveyed adults who had received their cochlear implant at least 12 months prior regarding their experience pre and post implantation. Participants were also asked to select a significant other to complete this questionnaire. Results were analyzed using a qualitative form of analysis. Results indicated that cochlear implants increase the well-being and satisfaction in life for both the recipients of the cochlear implants as well as their significant others, specifically in the areas of enhanced independence, activities of daily living and social events. The literature is clear that involving family members and frequent communication partners is beneficial both of the auditory rehabilitation process and for improved quality of life for all those involved (Tye-Murray, 2015; Hickson, Worral, & Sarinski 2009; Kramer, Allessie, Dondorp, Zekveld, & Kapteyn, 2005).

Auditory rehabilitation is an involved process that requires commitment and determination on the parts of the interventionist and most importantly the recipient of the cochlear implant and his or her frequent communication partner(s). What is not found in the literature is what recipients of cochlear implants perceive their role as well as their spouse’s role in the auditory rehabilitation process.

**Summary**

In summary, auditory rehabilitation is a complex concept with a foundation of teaching skills within the auditory skills hierarchy, counseling, training, and sensory management. Adult
learning styles must be quickly identified and maximized to encourage optimal progress. Speech perception testing is certainly an important part of auditory rehabilitation; however it is just that, part of the puzzle. It is important that the clinician takes in to account additional auditory identification and auditory comprehension skills when designing an auditory rehabilitation plan for an adult with a cochlear implant. Empirical evidence to support auditory rehabilitation is present in the literature for people who utilize hearing aids, but is scarcely represented for individuals who utilize cochlear implants.

**Communication**

Previous sections have documented the need for auditory rehabilitation programs to focus on more than the testing completed in the audiology booth by the audiologist and to consider a more holistic approach to treatment of adults with hearing loss. A need to focus on the communication needs of patients with hearing loss has been established in the literature (Heine & Browning, 2002; Sweetow & Palmer, 2005). Fey, Warr-Leeper, Webber, and Disher (1988) noted that effective communication is an important component for a variety of important tasks, including the shared understanding of information and the establishment and maintenance of personal relationships. This section described the importance of communication, communication breakdowns experienced by adults with hearing loss, and repair strategies utilized in an effort to improve communication exchange by this group of individuals. Table 2.6, Reviewed Communication Literature, below is a summary of the literature reviewed for this section.
## Table 2.6 Reviewed Communication Literature

**Reviewed Communication Literature**

<table>
<thead>
<tr>
<th>Author</th>
<th>Year of Publication</th>
<th>Research Methods</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binzer</td>
<td>2010</td>
<td>Brochure/Resource Literature Review</td>
<td>Offered brief review of communication styles, communication breakdowns, and communication repair strategies for teens and adults with cochlear implants</td>
</tr>
<tr>
<td>Chisolm et al</td>
<td>2005</td>
<td>Article Literature Review/Experimental</td>
<td>Reviewed the literature regarding rating scales for individuals with hearing loss and describes the application of the World Health Organization(s) Disability Assessment Scale II (WHO-DAT II) for adults with acquired hearing loss</td>
</tr>
<tr>
<td>Christenson et al 1989</td>
<td>Article</td>
<td>Literature Review/Experimental</td>
<td>Reviewed 67 adults over the age of 65 who had hearing loss, were living in housing, and completed the UCLA Loneliness Scale. Implications of the impact of hearing loss on loneliness were discussed.</td>
</tr>
<tr>
<td>Demorest &amp; Erdman</td>
<td>1987</td>
<td>Article Experimental</td>
<td>Offered review of the development of the <em>Communication Profile for the Hearing Impaired</em></td>
</tr>
<tr>
<td>Author</td>
<td>Year of Publication</td>
<td>Research Methods</td>
<td>Conclusions</td>
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</tr>
<tr>
<td>Erber et al</td>
<td>1996</td>
<td>Article, Retrospective Case Review</td>
<td>Reviewed receptive language evaluation procedures of 341 adults in nursing homes and discusses implications of findings</td>
</tr>
<tr>
<td>Gagne &amp; Wyllie</td>
<td>1989</td>
<td>Article, Experimental Study</td>
<td>Examined three different repair strategies (repetitions, synonyms, and paraphrases). Results indicated that synonyms and paraphrases may be more effective communication repair strategies.</td>
</tr>
<tr>
<td>Hallberg et al</td>
<td>1991</td>
<td>Article, Experimental Study</td>
<td>Utilized the Hearing Measurement Scale to investigate coping strategies and perceived handicap due to hearing loss. Concluded coping strategies often focus on the disability thus exacerbating the perceived handicap</td>
</tr>
<tr>
<td>Heine &amp; Browning</td>
<td>2002</td>
<td>Article, Literature Review</td>
<td>Provided a review of literature concerning communication and psychosocial effects of sensory loss in adults</td>
</tr>
<tr>
<td>Kaplan, H.</td>
<td>1988</td>
<td>Article, Literature Review/Documents</td>
<td>Offered review of communication problems experienced by the elderly, specifically discusses impact of presbycusis (hearing loss due to aging)</td>
</tr>
</tbody>
</table>
Table 2.6 Reviewed Communication Literature Cont.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year of Publication</th>
<th>Research Methods</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laforge et al</td>
<td>1992</td>
<td>Article Longitudinal Study</td>
<td>Reviewed over 1,400 elders over a one-year period, measuring multiple facets of well-being and discusses implication for potential policy changes</td>
</tr>
<tr>
<td>Sweetow &amp; Palmer</td>
<td>2005</td>
<td>Article Literature Review/Documents</td>
<td>Offered systematic review of the literature regarding the effectiveness of aural rehabilitation</td>
</tr>
<tr>
<td>Tye-Murray</td>
<td>1994</td>
<td>Article Literature Review/Documents</td>
<td>Reviewed communication strategies and repair strategies utilize by people with hearing impairment</td>
</tr>
<tr>
<td>Tye-Murray</td>
<td>2015</td>
<td>Book Literature Review/Documents</td>
<td>Provided a review of hearing and aural rehabilitation for people with hearing loss and their families</td>
</tr>
<tr>
<td>Weinstein et al.</td>
<td>1982</td>
<td>Article Literature Review/Experimental</td>
<td>Offered review of assessment and management of adults over the age of 65 with hearing loss</td>
</tr>
</tbody>
</table>

Research has found that age-related hearing loss and/or vision loss can frequently interfere with one’s ability to participate in communication (Laforge, Spector, & Sternberg, 1992; Erber & Heine, 1996; Heine & Browning, 2002). Communication is a complex need for people of all ages. Whether the communication is non-verbal (a smile, wink, furrowed brow) or verbal, it is essential for humans to find a way to express their basic needs and wants, regardless
of the form in which that communication takes place (e.g. spoken language, sign language, written language, alternative communication).

Ample research has been completed to create surveys and checklists to evaluate the communication needs and difficulties of those with hearing loss, specifically, adults who utilize hearing aids (High, Fairbanks & Gloring, 1969; Giolas, Owens, Lamb & Schubert, 1979; Demorest & Walden, 1984; Demorest & Erdman, 1987; Chisolm, 2005). This foundation of research exists because it is generally understood that those with hearing loss often struggle with communication. In 1994, Tye-Murray, categorized communication strategies into two sub categories: (1) Facilitation – those strategies that are effected by a person’s speech recognition skills, the communication environment, the speaking style of the communication partner, and the messages (2) Repair – those utilized by speakers when a communication breakdown occurs (p. 194-195).

Breakdowns

Communication breakdowns, situations in which the message received or interpreted is not the original intended message, can be frustrating for all parties involved. These breakdowns occur at all ages and stages of life even for those without hearing loss (Christian, Dluhy, & O’neill, 1989). Individuals with hearing loss often limit their involvement in social activities due to problems communicating with others (Kaplan, 1988).

“Social activities become restricted because of communication problems. Friends and family may inadvertently compound the problem because of lack of understanding” (Kaplan, 1988, p. 12). Communication facilitation (repair strategies) can vary based on the environment in which the communication takes place. The acoustic quality of the communication environment can be crucial for an individual with hearing loss. Additional background noise, low-lighting,
and multiple speakers can all impact the communication signal and be sources for communication breakdowns. Struggling with communication breakdowns can lead to “an increased dependence [on caregivers], loneliness due to decreased socialization, depression, diminished quality of life and increased social isolation” (Weinstein & Ventry, 1982; Christian, Dluhy, & O’Neill, 1989; as cited in Heine & Browning, 2002, p. 767). Literature supports the need for adults with hearing loss to learn communication repair strategies in an effort to alleviate stress and proactively address the aforementioned concerns to which communication breakdowns contribute (Hallberg & Carlsson, 1991).

**Repair Strategies**

Repair strategies, techniques used by a communicator to rectify a communication breakdown (Tye-Murray, 2015, p. 251) are used by all communicators, regardless of whether or not they have hearing loss. Many individuals utilize communication repair strategies such as asking for repetition of an utterance or paraphrasing to check for understanding. In 1989, Gagne and Wyllie, as cited by Heine & Browning (2002) stated:

> Repair strategy selection is determined by numerous factors. These factors include the cause and extent of the communication breakdown, linguistic and contextual cues, the appropriateness of using a substitute stimulus, the ability of the sender to apply repair strategies and the cognitive, sensory and linguistic competencies of the conversationalists. (p. 767)

Tye Murray (2015, p. 252) describes communication repair strategies as being both specific and non-specific. Examples are as follows:
(Specific repair strategies)
- Repeat the entire message.
- Repeat part of the message
- Confirm the message
- Choose between two candidates [options]. (i.e. “Did you want the plate or the pan?”)
- Simplify the message
- Indicate the topic
- Answer a question
- Elaborate the message
- Write [part or all of the message]
- Fingerspell (if possible) or spell a word

(Non-specific repair strategies)
- What?
- Huh?
- Pardon (p. 252)

In 2010, Binzer created a resource for teens and adults who utilize cochlear implants. She recommended the following options for communication repair strategies when a breakdown occurs:

change environments, ask the speaker to gain your attention when speaking, ask the speaker to face you when speaking, ask the speaker to speak at a normal loudness level, guess [at what you think you heard], check/confirm what you heard, ask the speaker to speak slower, ask for the topic or key word, ask the speaker to rephrase, ask the speaker to simplify or shorten the sentence, ask the speaker to spell a work, as the speaker to use gestures, or ask to have [the message] written down. (p. 3-4)

Though some of the aforementioned repair strategies, may seem obvious, it is imperative to understand that these are often strategies that the individual with hearing loss may not think to utilize, may not want to utilize, or may be reluctant to utilize due to a variety of other variables that impact them as an individual (e.g., self-esteem, depression, anxiety).

Summary

In this section communication, communication breakdowns, and communication repair strategies were discussed. The impact communication breakdowns can have on the individual
with hearing loss is difficult to measure, but well documented in the literature. The need for intervention to teach individuals communication repair strategies is evident in the literature. Teaching communication repair strategies is a foundational goal of auditory rehabilitation. The importance of valuing the needs and motivations of each individual throughout the auditory rehabilitation program and process may play a critical role in the progress of the recipient of the cochlear implant.

Chapter Summary

Chapter two provided a synopsis of relevant literature for this study. A description of normal hearing as well as the types and degrees of hearing loss was discussed. This was followed by a brief description of how hearing is assessed. Then, a discussion about deaf culture ensued. Cultural factors related to hearing loss were described. These are all factors an adult with hearing loss must work through and cope with as they complete their decision making journey in whether or not to pursue getting a cochlear implant. This information was followed by a description of cochlear implants as well as cochlear implant candidacy evaluations. The impact of hearing loss on the quality of life of the individual with hearing loss as well as their frequent communication partners followed.

After an individual elects to receive a cochlear implant, they may choose to enroll in auditory rehabilitation. A description of auditory rehabilitation and adult learning styles was presented after discussing quality of life concerns. This was followed by a discussion of communication skills that are ever-so important for individuals with hearing loss and their frequent communication partners. Communication breakdowns and communication repair strategies were discussed. Chapter two served as the infrastructure upon which this study is built. The literature review provided the foundational knowledge of how hearing works, how hearing is
assessed, and how hearing is categorized. A case was made for cochlear implants and the importance of auditory rehabilitation. This foundation of knowledge is critical to gaining a better understanding not only of the research questions, but also of the participants for this research study.
Chapter Three: Methodology

Organization of the Chapter

This chapter focused on the methodology utilized for this study. The focus of the study and research questions were restated. The research design and timeline were clearly discussed with a visual representation provided. The site and sample selection as well as description of participants were thoroughly reviewed. A description of the depth versus breath for the study was discussed and a data collection explanation ensued. This was followed by a brief discussion of the researcher’s role management and a thorough review of the management of data collection. The establishment of trustworthiness for the study was then described followed by a description of evidentiary inadequacies. This was followed by a brief summary of this chapter.

Introduction

A phenomenological research approach was utilized for this study because this research approach is suited to compile a description about a specific and unique experience of a group of individuals. This study can be classified as a phenomenology that analyzes data via a grounded theory approach. Charmaz (2008) noted that grounded theory strategies are “strategies for creating and interrogating our data, not routes to knowing an objective external reality” (p. 401). In 2006, Bowen stated that “grounded theory is a research approach or method that calls for a continual interplay between data collection and analysis to produce a theory during the research process” (p.13). Constant comparison was applied as data was collected and analyzed. Leech and Onwuegbuzie (2007) noted, “Constant comparison analysis likely is the most commonly used type of analysis for qualitative data” (p. 565). Data were analyzed and coded as themes (sometimes referred to as indicators) from which codes were developed. This was followed by the development of selective codes (sometimes referred to as core categories) (Creswell, 2007).
See Figure 3.1 A visual representation for data analysis, for a visual representation of the data analysis plan for this research.

**Figure 3.1 Visual Representation of Data Analysis**

![Visual Representation of Data Analysis](image)

*Figure 3.1 A visual representation for data analysis. Adapted from “Constant Comparisons Procedures in Grounded Theory” (Creswell, 2011, p. 434).*

Spiggle (1997), via Miles and Huberman (1984), stated, “Coding drives the retrieval and organization of data” (p. 493). From initial (raw) data open codes (themes) were identified. These codes were then compared and resulting axial codes will be parsed. From axial codes, selective codes (categories) were derived which led to the development of the resulting theories from this research. Corbin and Strauss (1994) note that “selective coding is the process by which all categories are unified around a central ‘core’ category” (p. 424). These core categories (selective codes) were used to develop theory and postulate how this research may be applied in practice in chapter five. Trustworthiness for this study was established by prolonged engagement, persistent engagement, triangulation of data, peer debriefing, member checks and
an audit trail (Patton, 2015). The method by which evidentiary inadequacies were addressed was also be discussed in this chapter.

**Focus of the study**

The focus of this research is to examine the perceived role of both the recipient of the cochlear implant and his or her spouse in auditory rehabilitation. Cochlear implants are fairly new hearing technology (described previously) that provide access to sound for individuals with hearing loss that is so significant they no longer receive acoustic benefit from hearing aids. Unlike hearing aids, cochlear implants provide a completely different signal to the brain which the brain must learn to interpret. This process takes time and varies from person to person. Significant research exists to describe the impact hearing loss has on the spouses/significant others of those who utilize hearing aids (Lormore & Stephens, 1994; Stark & Hickson, 2004; Stephens, France, & Loromore, 1995). However, this research is limited to those who utilize hearing aids. Very limited research exists about the dynamic between a recipient of a cochlear implant and his or her spouse during the auditory rehabilitation process. The crucial dynamic between the recipient of the cochlear implant and his or her spouse as well as their perceived role(s) in auditory rehabilitation could contribute to improved service provision and have implications for the quality of life experienced by both the recipient and spouse.

A consistent theoretical construct in the study, a variable that can be observed but is difficult to quantify in depth without qualitative inquiry, is quality of life. “Quality of life is not an object or thing but a judgement of the value of life circumstances” (Rapley, 2003, p.141). It is a multi-dimensional construct that can be impacted by a variety of factors and yet play a major role in self-perception. The World Health Organization Quality of Life (WHOQOL) group defines quality of life as an “individual’s perception of their position in life in the context of the
culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns” (WHOQOL, 1995, p. 1570). Individuals with hearing loss and their spouses experience a unique position in life that can impact their value system in relation to their goals, expectations, standards, and concerns. Hearing loss may impact one, some, or all of the aforementioned aspects of quality of life. For the purpose of this study, auditory rehabilitation, the role of the recipient in auditory rehabilitation, the role of the spouse in auditory rehabilitation, communication breakdowns, communication repair strategies, adult learning style(s), and auditory skills are all considered to be factors that contribute to the quality of life for and individual with hearing loss and his or her spouse. It is for this reason that quality of life is a foundational theoretical construct for this research study.

Research Questions

1. What do recipients of cochlear implants perceive their role to be in auditory rehabilitation?

2. What do the spouses of recipients of cochlear implants perceive their role to be in auditory rehabilitation?

Research Design & Timeline

This study focused on the perceived role of recipients of cochlear implants and their spouses in auditory rehabilitation. Twenty to seventy minute structured interviews were completed with adults who were recipients of cochlear implants, a critical case sample, and their spouses, a homogeneous sample. In terms of research design, a phenomenology research method utilizing grounded theory was implemented. This research design is intended to determine if there are additional elements to auditory rehabilitation service provision that need to be explored
further to improve the quality of life of not only the recipient of the cochlear implant but also the quality of life of the family unit (spouse and recipient).

The conceptual framework for this study serves to outline the purpose for this study and how the constructs involved in auditory rehabilitation can impact the quality of life of both the recipient of the cochlear implant and his or her spouse. Figure 3.1 Conceptual Framework for the Study, depicts how these constructs are related.

**Figure 3.2 Conceptual Framework for the Study**

![Conceptual Framework for the Study](image)

*Figure 3.2 Conceptual framework for the study. This figure provides a visual representation of the thought process for how the quality of life of an individual with hearing loss can be impacted by various constructs which serves as a foundation for the rationale of this study.*

**Site and Sample Selection**

Structured interviews took place in one of three places, either in the participant’s home, a familiar location designated by the participant, or in a familiar outpatient medical clinic. The
clinics utilized for this study included an Audiology Clinic at a hospital in a southern state, a location of the participant’s choosing or in the participant’s home. Participants were interviewed in their home or a familiar setting at a time of their choosing to facilitate a comfortable environment. Critical case and homogeneous sampling as discussed by Patton (2015) was utilized for this study. Critical case sampling involves utilizing participants who have a very specific and unique experience so that similar cases can be compared to them in the future. The recipients of the cochlear implant were all considered to be critical cases. The spouses of the recipients of the cochlear implants were a homogeneous group.

**Participants**

The purpose and plan for this study was approved by the University of Arkansas Institutional Review Board (See Appendix A). The homogeneous sample (spouses) and critical case sample (recipients of cochlear implants) of participants were sought in an effort to describe each group of individuals in depth. Participants were required to sign an informed consent form prior to initiating participation in the study (See Appendix B). Participants also completed a brief intake form detailing their basic experience with hearing loss as well as their perceptions of hearing loss (See Appendix C.) No personal identifying information was collected and all participant responses were provided a unique identifier/code for all analytic purposes. Six adults over the age of eighteen who utilized at least one cochlear implant, were post-lingually deafened, and completed an auditory rehabilitation program were recruited by this researcher and/or their managing cochlear implant audiologist to participate in this study. All recipients of cochlear implants were a minimum of 6 months post activation of their cochlear implant device in an effort to allow for program stabilization of their device (as recommended by their managing cochlear implant audiologist). They had also completed an auditory rehabilitation program. The
spouses of the recipients of the cochlear implants also participated in this study. A total of twelve interviews were conducted and analyzed. All participants were made aware that they could discontinue or withdraw from the study at any time with no repercussions. No potential harm was involved or was anticipated for participants in this study. Participation was of the participant’s own free will with no compensation provided.

Data was collected until data saturation was achieved. In 1967, Glaser and Strauss first defined data saturation as being the point at which the researcher could no longer identify additional categories based on the themes that were in the data. Theoretical data saturation occurred when themes identified by participants could be attributed to an existing category and no further categories could be identified from the data. For this study, data saturation occurred after interviews with six couples.

**Depth vs. Breadth**

“Qualitative data provide depth and detail through direct quotation and careful description of program situations, events, people, interactions, and observed behaviors” (1987, Patton, p. 9). Through the interview process, inquiries about perceptions from both the recipient of the cochlear implant and the spouse in regards to auditory rehabilitation were made. Depth for this study was provided through the collection of rich data via observations throughout the data collection process, audio-recorded interviews, and document collection that included observation notes as well as a detailed researcher’s journal compiled by this researcher. During the observation, participant emotions, gaze shifts, non-verbal communication, and environmental factors were all noted. Depth for this study was also generated through using a solid foundation of grounded theory in data analysis so that from open codes axial codes were generated, which gave way to the deduction of selective codes, which formed the foundation for the resulting
theory of this research. The depth for which this study allowed subsequently resulted in answering the research questions originally proposed by this researcher. The results have the potential to impact changes in service provision, policy, program development, and overall quality of life for this group of individuals, their families, and professionals who work with individuals with hearing loss.

**Data Collection**

Interviews, observation documentation, and document collection are all highly recommended components of a well-designed qualitative research study (Creswell, 2007). As cited by Leech in 2002, structural questions ask respondents to “structure their world through such exercises as listing something and how they relate to each other” (p. 667; Spradley, 1979; Werner & Schoepfle, 1987). Each participant completed an intake form detailing their experience with hearing loss as well as how they feel hearing loss has impacted their life. Questions for the intake form were based on Bronfenbrenner’s Ecological Systems Theory (Bronfenbrenner, 1979) in an effort to get a baseline of how hearing loss is perceived by each participant. Semi-structured interviews were completed either in a familiar outpatient medical clinic or in the participant’s home to create a comfortable environment for the participant. Standardized questions are advantageous in the development of themes from data because they allow for all participants to stay on topic. Reja, Manfreda, Hlebec, and Vehovar (2003) as cited by Froddy (1993) noted “open ended questions allow the respondent to express an opinion without being influenced by the researcher” (p. 161). Eleven standardized, open-ended questions regarding the recipient’s perception of their auditory rehabilitation program and their perception of their spouse’s role in the therapeutic process were utilized. These questions were formulated from this researcher’s experience in the field of auditory rehabilitation. Questions were
generated based on the field experience of this researcher and a pilot study completed by this researcher as part of the doctoral program. The interview questions were adapted to appropriately fit the spouse and utilized accordingly. Interviews varied in length from twenty minutes to seventy minutes in duration.

**Interviews**

As Reja and colleagues noted in 2003, there are several advantages to using open ended questions including, “discovering responses the individuals provide spontaneously” and “avoiding [researcher] bias” (p. 161). Open ended questions were utilized for interviews in an effort to deduce themes in data analysis that would aid in answering the research questions. The purpose of interviewing was for the people who participated in an auditory rehabilitation program to reflect on their experience to aid in future research that may help to improve the quality of service provision for this group of individuals and their families in the future. A standardized list of interview questions for the recipient of the cochlear implant is provided in Appendix D. See Appendix E for interview questions for the spouse of the recipient of the cochlear implant. See Figure 3.3 Question and Interview Construction, for a visual representation of steps taken to construct the questions and format of the interview as recommend by Creswell (2011).
**Figure 3.3 Question and Interview Construction**

1. **Identify the participants** - For this study:
   (1) Recipients of cochlear implants
   (2) Spouses of recipients

2. **Determine the type of interview** - For this study:
   Each interview will be a one-on-one interview. Questions are formulated based on researcher’s field experience.

3. **Audiotape questions and responses** - For this study:
   All interviews will be audiotaped by utilizing a hand-held audio recorder.

4. **Take notes** - For this study: A researcher's journal will be utilized to take notes during all interviews as well as to take notes before and after each interview as needed.

5. **Determine appropriate location** - For this study: Caution to identify a location that is quiet and comfortable in the medical clinic or participant’s home will be taken in to account.

6. **Obtain consent** - For this study: All participants will be required to sign a consent form prior to participating in this research study.

7. **Determine an interview plan** - For this study: Ten standard open-ended questions will be utilized for all participants. Time will be allowed for each question topic to be exhausted to facilitate gathering of rich data and to contribute to the depth of this study.

8. **Encourage additional information** - For this study: Probe questions or prompts that include but are not limited to encouraging elaboration and asking for clarification will be utilized.

9. **Maintain professionalism** - For this study: Professionalism will be maintained throughout this study regardless of the viewpoints of the participants or their reported experiences.

**Figure 3.3 Question and Interview Construction.** Describes a summary of how questions were constructed and the plan for implementing the interviews for this study.

All interviews were audio and video recorded with the consent of each participant. Interviews were transcribed by this clinician utilizing the Dragon NaturallySpeaking 13.0 computer software. Time was allowed for the saturation of each question topic. Each interview was individually coded to maintain confidentiality and no personal health identifying information was collected other than signatures on the consent forms, which remained in a
locked filing cabinet separate from the data collected to be analyzed for this study. To ensure privacy, all interviews and transcriptions were kept in a locked filing cabinet to which only this researcher had access.

**Observations**

Observations help to improve the validity of a qualitative study (Yin, 2011). Many communicative interactions occur without a word being uttered. Research suggests that nonverbal language (including eye gaze, shifts in body weight, and mannerisms) significantly contributes to the overall message conveyed by the speaker and should be recorded and analyzed as their co-occurrence contributes to the overall message (Kendon, 1994; Jones & LeBaron, 2002). It is for this reason that observation notes were taken down during all interviews. An interaction form (coded with the participant code and completed after each interview) with the following headers: location of interview, environment, participant mood, noticeable changes during the interview process, and length of the interview) were compiled. During the interview, participant gaze shifts, the interview environment, and any other potentially pertinent factors such as non-verbal behaviors that may have influenced, aided, or contributed to a participant’s response were noted. In addition to this, a researcher’s journal was maintained throughout all data collection as a means for this researcher to reflect on observations and data collected at each interview as recommended by (Oliver, Serovich, & Mason, 2005). The researcher’s journal as well as the interaction forms were kept in the same locked filing cabinet as the interview transcriptions to which only this researcher had access.

**Document Collection**

In addition to interviews and observations, data collection in numerous forms including but not limited to transcribed interviews, pictures, letters, newspaper articles, and ticket stubs are
recommended by numerous renowned qualitative researchers (Patton, 1990; Loftland & Loftland, 1984; Hansen, 1995; Hoepfl, 1997). For this study, the following documents were collected:

- Intake form
- Transcribed interviews
- Observation notes
- Interaction form
- And a researcher’s journal

These documents contain data relevant to answering the research questions for this study. All documents collected were coded specifically to each interviewee and no personal health identifiers were collected or documented. Each page of each document collected was labeled with the page number, date of collection, and the participant’s code. The intake form served as a baseline of written data by each participant regarding their personal experience with hearing loss. Transcribed interviews, observation notes, and interaction forms served to help with triangulation of the data in addition to establishing trustworthiness. The researcher’s journal aided in the development and establishment of trustworthiness throughout the study.

**Researcher’s Role Management**

As a participant observer for this study, the researcher served as the sole research instrument. “By participant observation we mean that method in which the observer participates in the daily life of the people under study, either openly in the role of researcher or covertly in some disguised role, observing things that happen, listening to what is said, and questioning people, over some length of time” (Becker & Greer, 1957, p. 28). Participants of the study completed an intake form as well as a structured interviews that varied in length based on their responses. All data and documents were collected and analyzed by this clinician. Participants were provided with no reciprocity other than the knowledge that their insight for this study could potentially lead to policy change and improvements in current service delivery models for people
who receive cochlear implants and their families. Ethics and integrity were maintained at all times during this study. A neutral position of inquiry was maintained during all interviews and no efforts to lead or influence participant responses will be made.

**Managing & Recording Data**

Barnes (1996), noted that, “grounded theory’s major difference from other qualitative methods is its emphasis on theory development” (p. 431). In an effort to develop theory from the data, careful consideration was given to managing and recording the data. All interviews were audio and video recorded and then transcribed. Mills, Bonner, & Francis (2006) noted, “Open coding is the initial step of theoretical analysis” and that “this form of coding ends when it locates a core category” (p. 29). For this study, each interview was reviewed for meaningful units (words, phrases) of information which were then documented as open codes and analyzed by hand. Hand coding data is recommended to gain an in depth and thorough knowledge of the data (Creswell, 2011). From open codes/themes, (axial) codes were derived. “In axial coding, categories are related to their subcategories and….further development of categories takes place” (Strauss & Corbin, 1990, p. 423). Axial codes were further analyzed to create (selective codes) categories which aided in the development of the final theory proposed in chapter five. In 1990, Strauss & Corbin noted, “Selective coding is the process by which all categories are unified around a central ‘core’ category” (p. 427). The selective codes derived from this study are described and discussed in chapter five as theory for how these codes interacted and contributed to answering the research questions is established. All discrepant data was initially provided an open code and subsequently an axial code; discrepant data. Discrepancies were analyzed with careful consideration of the researcher’s journal and interaction forms for the interviews in which
the data occurred. Inter-rater reliability will not come in to question as this researcher will be the only one collecting and analyzing data.

All data was managed and maintained by this clinician in a locked filing cabinet to maintain confidentiality for all participants in the study.

**Trustworthiness**

Since the researcher is the sole research instrument for this study; it is paramount that the reader is able to trust the data and conclusions drawn by the researcher. The importance of trustworthiness has long been lauded by renowned qualitative researchers (Patton, 1990; Guba, 1981; Silverman, 2001; Shenton, 2004). Trustworthiness can be entrenched a number of different ways; however, for this study the primary means of establishing trustworthiness were prolonged engagement, persistent engagement, triangulation, peer debriefing, member checks, and an audit trail. By establishing trustworthiness, a greater chance of transferability may be likely to occur. Graneheim and Lundman (2004, p. 110), via Polit and Hungler (1999) noted, “Transferability refers to the extent to which the findings can be transferred to other settings or groups.” Transferability of findings from this research to other settings, service providers, policy makers, and people with hearing loss is of the utmost importance because it allows for the possibility of improvement in the quality of service provision for individuals with hearing loss across multiple disciplines.

**Prolonged Engagement**

Prolonged engagement is recommended as a critical component of qualitative research (Lincoln & Guba, 1985; Shenton, 2004). Prolonged engagement, “texts in which rich descriptions are salient and in harmony with analytic interpretations,” aides in the compilation of thick description of the data (Cho & Trent, 2006, p. 328). This helps to facilitate relationships
between the researcher and participants and contributes to a holistic assessment of the participants’ reported experience. Participants completed one interview each that varied in length based on their responses in addition to an intake form. The format of the intake form and interview questions promotes prolonged engagement because both allow for opportunities to expound on the insight provided by the participant and both contribute to the depth and trustworthiness of this study.

**Persistent Engagement**

Persistent engagement involves revisiting the data multiple times to ensure that conclusions drawn from the data are accurate. “The goal of persistent observation is to identify characteristics, attributes, and traits that are most relevant to the phenomena under investigation and focus on them extensively” (Onwuegbuzie & Leech, 2007, p. 239). In addition to the breath prolonged engagement provides, persistent engagement allows for the development of rich data to contribute to the depth of the study (Lincoln & Guba, 1985). The data was reviewed and revisited multiple times as comparisons, codes, and themes were developed. Discrepant data, data that is inconsistent with established themes, was first compared to observations in the researcher’s journal as well as interaction forms to determine if any external, environmental, or observable factors may have contributed to its existence. Open codes that appear less than three times across all data sets were coded as a discrepant theme and analyzed accordingly.

**Triangulation**

Data triangulation is a means of validating the findings in a qualitative research study. The internal validity of a qualitative study can be addressed by the utilization of triangulation which involves using multiple methods of data collection to answer the research question(s) (Barbour, 2001; Guion, Diehl, & McDonald, 2002). “Triangulation is the process of
corroborating evidence from different individuals, or methods of data collection in descriptions and themes” (Creswell, 2011, p. 259). For this study, triangulation was achieved through the use of transcribed interviews, observations, and document collection. Clear patterns in the data lead the researcher to concise conclusions contributing to the resulting theory for this study. Triangulation helped the researcher to establish a report that is credible and to interpret data as the participants had intended (Creswell, 2011).

**Peer Debriefing**

Peer debriefing is an element of qualitative research that involves the researcher disclosing their research to a disinterested peer in an effort to expose themes or exposit questions that were not initially apparent to the researcher (Lincoln & Guba, 1985). Creswell & Miller (2000, p. 129) noted:

“A peer review or debriefing is the review of the data and research process by someone who is familiar with the research or the phenomenon being explored. A peer reviewer provides support, plays devil’s advocate, challenges the researchers’ assumptions, pushes the researchers to the next step methodologically, and asks hard questions about methods and interpretations.”

Data for this study was reviewed by doctoral students, all of whom were in the process of completing research projects, dissertation proposals, or dissertations. All peer reviewers were respected in their health related fields and appropriately reviewed and scrutinized the details of this study. Opportunities to increase the validity of this study were identified (i.e. increased prolonged engagement, additional member checks) and necessary steps were taken by this researcher to comply with the recommendations of peer reviewers. Efforts were made to complete peer debriefing to increase the validity of this study in an effort to provide grounds for the plausibility of this study and to aid in transferability.
Member Checks

“Member checking occurs throughout the inquiry, and is a process in which collected data is ‘played back’ to the informant to check for perceived accuracy and reactions” (Cho & Trent, 2006, p. 322). All cochlear implant recipients and spouses who participated in this study were allowed to review their data collection and the conclusions drawn by this researcher from their data. Their insight was audio recorded and transcribed. This data was analyzed by this researcher. This information was included in this report because it will aided in the validation of this study. The importance of member checks is not underestimated as it is imperative that the researcher develops theory based on accurate conclusions drawn from the interviews and interviewees. In addition, as data is analyzed, any questionable or unclear comments were reviewed with the participant(s) to be certain that intent and content is being appropriately documented as the interview participant intended. In addition to contributing to validity, member checking also allows for additional rich data to be gathered about the research question(s).

Audit Trail

An audit trail is imperative so that conclusions drawn from the data can be traced back to the source of the original open codes and comments of participants. Shenton (2004) noted an audit trail, “allows any observer to trace the course of the research step-by-step via the decisions made and procedures described” (p. 72). For this study, each interviewee was provided a specific code that was on each page of all documentation for this study. Each page of transcription was dated and coded with the interviewee’s code. Observations as well as the researcher’s journal notes from each interview were assigned the interviewee’s code and dated on each page. All documents collected were clearly labeled so that each conclusion drawn and each open code
originally identified could be easily tracked back through documentation via the audit trail maintained by this researcher.

**Evidentiary Inadequacies**

Evidentiary inadequacies are themes identified at the onset of analyzing the data that do not fall in to the patterns or codes and categories identified by the rest of the data. Freeman, DeMarris, Preissle, Roulston, and St. Pierre, (2007) wrote about five types of evidentiary inadequacies that occur in qualitative research:

- inadequate amounts of evidence
- inadequate variety in kinds of evidence
- faulty interpretative status of evidence
- inadequate disconfirming evidence
- inadequate discrepant case analysis (p. 29)

The amount of evidence accumulated was documented in transcriptions and the audit trail carefully compiled during the course of the study. An effort to avoid inadequate variety of evidence was made by recruiting participants from a variety of locations and also interviewing spouses and recipients of cochlear implants of both genders. As Lincoln & Guba suggested (1985), member checks were utilized throughout the study to avoid faulty interpretative status of the evidence compiled. Member checks were employed to ensure that the conclusions drawn from the data gathered were in fact the intended responses of the participants. Disconfirming (or discrepant) evidence, is that which refutes the general conclusions drawn from the data collected. Though some have questioned the existence of disconfirming evidence, namely Lather (1993) and Scheurich (2001), this potential evidentiary inadequacy was not be overlooked by this researcher. Disconfirming evidence was managed by acknowledging its existence and validating the responses of the participants through persistent engagement. In general, evidentiary inadequacies were managed through careful document collection, consistency in the audit trail,
prolonged engagement with the participants, and persistent engagement with the participants. In 1994, Wilson noted, “evidence should be consistent with a researcher's chosen epistemology or perspective” (p. 26), "evidence should be observable" (p. 28), "evidence should be gathered through systematic procedures"(p. 29), "evidence should be shared and made public" (p. 30), and "evidence should be compelling"(p. 30). Efforts to maintain this high standard for gathering and interpreting data were made for the duration of this study and therefore, evidentiary inadequacies were appropriately accounted for, addressed, and reported.

Summary

Chapter three described the methodology used for analyzing the data for this study. A brief introduction to the chapter was provided followed by a description of the focus of the study. The research questions were stated as well as the research design and timeline. Site and sample selection were discussed as well as the participants for this study. Depth versus breath of the study was described. An explanation of data collection was provided which included a discussion of the interview process, observations, and document collection. This was followed by a review of the researcher’s role management and how the data is to be managed and recorded. A foundation of trustworthiness for this study will be built on evidence of prolonged engagement, persistent engagement, triangulation, peer debriefing, member checks, and an audit trail. Evidentiary inadequacies and how they will be addressed were then described as they related to this study. Chapter four will present the data that was collected as described in chapter three.
Chapter Four: Presentation of the Data

Organization of the Chapter

Chapter four presents key findings and interpretations of the data collected from interviewing the twelve participants in this study. The first section discusses participants involved in the study and their experience with hearing loss and cochlear implantation. This is followed by a description of the interviews collected from each participant. Lastly, the deduced themes from data analysis will be provided and discussed. This format will be followed twice to address each of the research questions for this study.

Participants were asked eleven standard questions (see Appendix C) as well as follow-up questions as need based on the responses provided. Responses where deduced to meaningful words, phrases, and sentences relative to the questions asked. No coding software was utilized. All data were hand-coded to allow for persistent engagement with the data collected. Ten hours of coding and analysis was required to discern axial and selective codes from the data collected. From meaningful responses, general themes were identified based on commonalities in the responses provided by the participants. From themes axial codes were developed. The axial codes were further analyzed to develop selective codes (also known as categories) that contributed to the resulting theory proposed. This purpose of this approach to data analysis is to gain a deeper understanding of the experience of recipients of cochlear implants and their spouses in auditory rehabilitation. This study can contribute to the gap in research that exists regarding the experience of recipients of cochlear implants and their spouses in auditory rehabilitation. This may function to guide professionals who work with individuals with hearing loss, especially those considering a cochlear implant, to develop and assess their intervention
methodology and components. This may also guide policy makers and stakeholders to establish policies that improve the quality of service provision for individuals with hearing loss.

**Participants**

A critical case sample in the case of the recipients of cochlear implants in addition to a homogenous sample in the case of the spouses of the recipients of the cochlear implants was utilized for this study. The participants were recruited and recommended for this study by their managing audiologist who was provided an informed consent form by this researcher. Creswell (1998) recommends between five and twenty-five interviews when completing phenomenological research. Literature also suggests that data saturation occurs when no further categories can be established based on the data collected (Glaser & Strauss, 1967). An exact number of needed participants was not established prior to recruitment, but rather participants were recruited until “valid inferences [could] be made about this population” (Marshall, p. 522). Valid inferences were made when responses were duplicated among participants. When no further categories could be developed, data saturation was determined by this researcher. Utilizing constant comparison as data were gathered, it was clear that multiple responses were duplicated after six couples had been interviewed. Therefore, six couples, one member of each was required to have undergone cochlear implantation at least once, participated in this study.

The researcher notified a cochlear implant audiologist of the study and provided the audiologist with an electronic copy of the informed consent for the study. The audiologist contacted potential participants via phone, email, or face-to-face interactions at which time they were instructed to contact this researcher if interested in participating in the study. Seven couples contacted this researcher to participate. After learning more about the research, one couple decided to decline participation, so six couples were interviewed. All participants were over the
age of eighteen and all couples were male/female married couples who had been married a minimum of 2 years. Five of the six recipients of cochlear implants were male. The female participant was the only participant to also have bilateral cochlear implants. All participants were from the same southern state and had participated in the same auditory rehabilitation program. All were managed audiologically by the same audiologist as well as provided auditory rehabilitation by the same speech-language pathologist in the southern state in which they resided. Recipients of cochlear implants experienced receiving a diagnosis of hearing loss and then having the hearing loss progress to the point of no longer receiving benefit from hearing aids. Recipients ultimately decided that a cochlear implant was the best option for them and their family. Spouses involved in this study also experienced trials and successes experienced by their loved one. Spousal participants contributed best to this study because they lived through the experience with the individual who received the cochlear implant. They were able to provide first-hand knowledge and accounts of this phenomenon that directly contributed to the research questions posted by this study. Member checks were conducted as needed for clarification throughout the data collection process.

**Confidentiality**

A qualitative approach allowed this researcher to have interesting conversation and discussion with participants about their experiences as it related to hearing loss and cochlear implantation. The following descriptions are designed to help the reader gain insight into the experiences of the participants. Pseudonyms are utilized to ensure participant confidentiality. Each couple is described as a pair below.
Participant Narratives

The following section serves as a foundation of knowledge regarding the experience of the recipient of the cochlear implant and his/her spouse. This is reported in an effort to allow for increased understanding of the unique experience of all the participants as well as a foundation for the themes and codes ultimately developed in data analysis. The following section presents the participants as pairs because they often reported similar experiences and all presented as units of support for each other. Data described in subsequent sections is representative in nature and serves to elucidate how resulting themes and codes were developed. Representative components were presented in an efforts to clearly demonstrate the development of the resulting theory of this research.

Couple #1 - Mark & Maria

Mark and Maria had a long history together. They had been married for well over ten years, had children, and had grandchildren. Mark reported his hearing loss made it “impossible to interact with people in a social situation” prior to receiving his cochlear implant. Maria reported that daily interactions were “difficult” prior to Mark receiving his cochlear implant. She reported she “got in the habit of never really wanting to talk to him while we were driving because it was dangerous” referring to his need to look at her to lip-read in order to participate in conversation while driving. Mark reported the process of choosing to undergo cochlear implantation was much easier after he and Maria started attending a support group for individuals who were interested in receiving or individuals who had cochlear implants. He reported the group meetings, “provide(s) an opportunity to meet and hear firsthand from many people and their experience.” After making the decision to undergo cochlear implantation, Mark reported he and Maria consistently attended audiology and auditory rehabilitation appointments.
Mark reported, “She was with me 100% of the way.” They both reported diligently practicing recommendations provided by their managing speech-language pathologist in their auditory rehabilitation program. Maria, while discussing interactions with grandchildren after Mark received his cochlear implant and completed his auditory rehabilitation program, reported, “I think he feels more connected to them now because he can sit and talk to them about school or sports and he can get more out of their conversations.” She reported that since Mark received his cochlear implant, “it’s a totally different world” for both of them.

**Couple #2 – Thomas & Tara**

Thomas and Tara also had a long history of marriage, family and experiences together. Both were retired and Thomas reported enjoying playing golf as much as possible with friends. After years of working at a tractor dealership, Thomas reported his hearing loss was evident. He reported his hearing loss prior to receiving a cochlear implant caused communication to be “tough out on the golf course” and “tough” between him and his wife. She reported you had to “repeat yourself” consistently prior to Thomas receiving his cochlear implant and that he would “get annoyed” when he did not understand what was being communicated. Thomas reported he “didn’t really want to go places” prior to receiving his cochlear implant. He reported it was ultimately his frustration with the lack of benefit from hearing aids and his struggle to communicate socially and with grandchildren that made the decision of undergoing cochlear implantation an easy one for him. After receiving his cochlear implant, Thomas reported he and Tara attended all audiology and auditory rehabilitation appointments together. He reported “she encouraged me all the way.” Thomas reported, “When I first heard that speech therapy, I thought, ‘uh, this ain’t gonna work,’ but they proved me wrong.” He reported Tara helped him to follow through with the recommendations of his auditory rehabilitation program. Tara reported
she felt a spouse “should always go’ to the appointments following cochlear implantation because it helps the spouse to “understand it a lot better too.” She reported that since receiving his cochlear implant, Thomas has been eager to play golf with his friends, has been more willing to participate socially with friends, and has been more engaged with his grandchildren.

**Couple #3 – Hank & Helen**

Hank and Helen had been married for over twenty years and lived in a quaint retirement village. Hank reported enjoying to go on walks with friends who also lived in the village and working in the garden. Prior to receiving his cochlear implant, Helen reported daily conversations were very difficult. She reported she would often attempt to write down information she needed to convey to Hank which caused consistent frustration for both of them. Hank reported his hearing loss, “made the whole world uncomfortable” and “frustrating.” He went on to say that he “had a negative attitude” about his hearing loss and the potential for a cochlear implant to help in the beginning. He reported, “If it hadn’t been for Helen….encouraging me, I probably wouldn’t have done it.” Regarding social situations prior to Hank receiving his cochlear implant, Helen reported he would frequently say, “Don’t worry about it. I can’t hear. Just carry on a conversation.” She reported the hearing loss was source of worry for her because he “doesn’t know what’s going on.” After receiving the cochlear implant Hank reported he and Helen worked together through the recommendations of his auditory rehabilitation program. Helen explained, “you had to [make sure] he understands the words and you had to teach him again” referring to re-training his brain how to process the input from the cochlear implant. Hank reported, “If you decide you want the implant, you are going to have to do the work.” Regarding his experience after cochlear implantation and the completion of his auditory rehabilitation program, Hank reported, “it’s a world of difference from what I had.”
Couple #4 – James & Jennifer

James and Jennifer had been married over 20 years and though both were of retirement age, they were both still involved in running their personal business as well as being active in several community groups and organizations. Jennifer reported she first started noticing a regression in her hearing as a teenager and she received her first set of hearing aids at the age of thirty-five. She reported her initial diagnosis of hearing loss “seemed so devastating” and had “social connotations.” She reported she was often able to “fake it’ by being “intent on lip reading” and “intent on body language.” Her hearing continued to progress and ultimately she no longer received benefit from hearing aids. James reported, “The worst part was just her being frustrated and lashing out at me.” He went on to say, “It got so we didn’t go to do things because it was too….it was just too uncomfortable.” After attending support groups and doing her own research, Jennifer ultimately decided a cochlear implant was the best option for her. She elected to undergo cochlear implantation for each ear over the course of six years. For her first cochlear implant, an auditory rehabilitation program was not available through her cochlear implant center. An auditory rehabilitation program was available with the activation of her second cochlear implant. She spoke to her experience with each cochlear implant. She reported, “I think I would have progressed better and more fully if I had [auditory rehabilitation] the first time.” She also reported James was much more involved in her experience with the second cochlear implant, largely in part due to his involvement in the auditory rehabilitation program. James reported auditory rehabilitation was “a job for both of us”, that “she was diligent”, and that it was worth the “positive reward.” Jennifer reported that she is now “more relaxed because I hear” and she “can do many of the things I couldn’t before” such as talking on the phone and handling
operations associated with their family business. With better access to sound and improved auditory skills, Jennifer reported, “You get more adventuresome. You get more gratification.”

**Couple #5 – Matthew & Mary**

Matthew and Mary had been married for over 10 years and were still actively working. Matthew had a diagnosis of a degenerative disease that led to his ultimate decision to pursue cochlear implantation. This was reportedly after a period of time of significant frustration at work and at home with family members. Matthew reported, “It was a nightmare trying to talk to everybody.” Mary reported that Matthew was already “deaf in one ear” when they started dating; however, she reported they were able to communicate well when he had good access to sound with one ear. When Matthew’s hearing progressed Mary reported he, “could not communicate with anybody” and “it was just unbearable.” After meeting with several physicians and doing research, Matthew decided a cochlear implant was the best choice for him. After receiving his cochlear implant he reported, “It was hard. I’ll never forget that.” He reported he and Mary earnestly worked through the recommendations of the auditory rehabilitation program today. Matthew reported, “It was time well spent, you know, it was worthwhile effort.” He went on to say, “I just remember it being a whole lot of work.” When discussing the auditory rehabilitation program, Mary reported, “It was a family thing. We all practiced.” Mary reported she was not sure if spousal support was necessary in auditory rehabilitation, however, Matthew reported, “It would be much harder” without the assistance of a spouse or partner in auditory rehabilitation and he credited her with being a key component and contributor to his ultimate success. After initially reported his hearing loss to be embarrassing and humiliating, Matthew later reported that since receiving his cochlear implant and completing his auditory rehabilitation program, “It’s a remarkable change.”
Couple #6 – Brian & Betty

Brian and Betty had been married for over 20 years and were of retirement age. Brian reported he continued to work in a factory because he enjoyed working. Betty reportedly cared for the home. Prior to receiving his cochlear implant, Brian reported, “I had a whole lot of trouble.” Betty reported communication with Brain prior to the cochlear implant as being “next door to impossible.” She reported, “We would end up getting angry at each other and that wasn’t normal for us” when describing communication prior to the cochlear implant. Brain reported his frustration with communication ultimately led him choosing to undergo cochlear implant surgery. After the cochlear implant was activated, Brian reported Betty inconsistently attending audiology and auditory rehabilitation appointments with him. He reported that in general, “he was alone” and that he most often followed through with recommendations for auditory rehabilitation at his own leisure. Betty reported, “I did help him when he first got the implant.” She reported she would help him follow through with recommendations of the auditory rehabilitation program by helping him to “keep his mind on it.” Betty reported that since Brian has received his cochlear implant, “He’s got to where he’s pretty good. He talks to people more.” Brain reports that he is “getting better and better” when it comes to the improvement of his auditory and communication skills.

Presentation of Axial Codes for Recipients of Cochlear Implants

Through the process of code development by hand, four axial codes corresponding to research question one regarding the perceived role of recipients of cochlear implants in auditory rehabilitation were identified and four additional axial codes corresponding to research question number two regarding the perceived role of the spouse of the recipient of the cochlear implant in auditory rehabilitation were identified. From raw data, four-hundred and thirty-two themes were
identified. These were further analyzed and assigned to corresponding axial codes in an effort to describe the experiences of the participants. The researcher identified the names of axial codes based on experiences communicated by participants. To address the first research question, the following axial codes were identified: spousal support, group support, improved social interaction, and auditory rehabilitation. To address the second research question, the following axial codes were identified: pre-operational experience, positive mentality, actions, persistent support. Descriptions and summaries of codes are reported below.

**Code One: Spousal Support**

All recipients of cochlear implants discussed the importance of spousal support during their decision making and auditory rehabilitation processes. For recipients of cochlear implants, part of their perceived role was to establish support from their spouse. This support was a source of strength and commitment for recipients. Some of the evidence to support the development of this code is reported below based on experiences of the recipients of cochlear implants.

“I can’t imagine strictly doing it on your own.” – Matthew

“It was her that was much better and helpful.” – Mark

“Your partnership is what’s going to make the best result.” – Jennifer

“If it wasn’t for Helen, I won’t say pushing, encouraging me, I probably wouldn’t have done it.” – Hank

“There are no substitutes for that talk that have happen between you.” – Jennifer

Spousal support was a consistent theme discussed by all the recipients of cochlear implants. Many recipients described appreciation for the support from their spouse in a variety of situations, settings, and across their entire experience from their initial diagnosis of hearing loss or the diagnosis of a progression in hearing loss through the completion of their auditory rehabilitation program.
Code Two: Group Support

Four of the six couples reported attending a support group for adults who were considering or who had at least one cochlear implant. Those that attended the group consistently mentioned it as being a key factor in their progress in their auditory rehabilitation program. Those that did not attend the support group referenced it as something they wish they had attended. Some of the evidence to support the development of this code is reported below based on the report from recipients of cochlear implants.

“Attending those meetings and visiting with her and some other folks probably helped.” – Matthew

“The group’s been gratifying to me in the outreach.” - Jennifer

“Attend the support group meetings because that to me was a Godsend.” – Mark

“I would never have done this without having talked to many people.” – Mark

“Come to group therapy.” - Thomas

For those who attended support group meetings, they played a major role in their progress. All who attended also reported they felt having their spouse attend the support group meetings was helpful because it helped the spouse to have a better understanding of what they (the individual with hearing loss) were experiencing. Brain, who was unable to attend the support group meetings due to work obligations, later recommended that a person interested in a cochlear implant needed to talk “with anybody and everybody.” When asked about attending support group meetings, Hank responded, “I probably should have and that’s my fault.” All recipients of cochlear implants felt that having group support either did play a major role or could have impacted their progress in their overall auditory rehabilitation program.
Code Three: Improved Social Interaction

All recipients reported a key component of their progress through their auditory rehabilitation program as being improved social interaction. Their role in the auditory rehabilitation program to create this was to initiate social interactions that they otherwise would not have prior to receiving their cochlear implant. Some of the evidence compiled to support the development of this code is reported below.

“You get more adventuresome. You get more gratification.” – Jennifer

“Things began to get better, or different, or more comfortable.” – Hank

“If somebody is in a situation where they can’t function in the real world, you don’t have anything to lose [in receiving a cochlear implant].” – Matthew

“I can do many of the things that I couldn’t before.” – Jennifer

“It’s a different world from what I had.” – Hank

All recipients of cochlear implants had to take the first step of attempting to communicate in social situations before they were able to assess their improvement in those situations. Many reported that background noise (multiple speakers, music, and traffic noise) had a negative impact on their communication in social settings; however, all reported an improvement in their confidence and communicative ability in social settings since receiving their cochlear implant and completing an auditory rehabilitation program.

Code Four: Experience in Auditory Rehabilitation

As previously mentioned, all participants completed an auditory rehabilitation program as part of their cochlear implantation process. It is important to note that not all cochlear implant surgery centers require or offer an auditory rehabilitation program. For these individuals, participating and diligently working through the recommendations provided by their managing
speech-language pathologist in their auditory rehabilitation program was essential. Some of the evidence gathered to support the development of this code is reported below.

“Figure that you are gonna have to work your tail off.” – Hank

“Well, I thought speech therapy was extremely good and helpful. It pinpointed some areas and some words that I couldn’t understand.” – Mark

“She had a list...of words and sentences and stuff, you know, to read, [to listen to], repeat, and we did that a lot. Oh yeah, no doubt it helped.” – Matthew

“They’d talk [positioned] behind your back, it’s so you could hear them...so you could understand what they were saying. It’s entirely different.” - Thomas

“There was a progression that you didn’t get just by turning it on.” – Jennifer

Consistent participation and determination to work through recommendation provided in the prescribed auditory rehabilitation program was mentioned by all recipients of cochlear implants. All reported the auditory rehabilitation program as being beneficial. Their role was to participate and be diligent in their auditory rehabilitation program.

**Summary of Data for Recipients of Cochlear Implants**

This section presented the evidence to support the development of four key axial codes to address research question number one. Each code was discussed and some of the evidence to support the development of the axial code, as decided by this researcher, was provided. From raw data over 400 themes were identified which were further analyzed into four axial codes as they pertained to the perceived role of recipients of cochlear implants in auditory rehabilitation: spousal support, group support, improved social interaction, and auditory rehabilitation. Axial codes were further analyzed to determine their alignment with possible categories to contribute to the development of the resulting theory of this study. A discussion of the development of categories and theory development ensues in chapter five.
Presentation of Axial Codes for Souses of Recipients of Cochlear Implants

Through the process of coding the data by hand, four axial codes corresponding to research question two regarding the perceived role of spouses of recipients of cochlear implants in auditory rehabilitation were identified in addition to the codes listed above to address research question number one. From raw data, four-hundred and thirty-two themes were initially identified. These were further analyzed and assigned to corresponding axial codes in an effort to describe the experiences of the participants. The researcher identified the names of axial codes based on experiences communicated by participants. To address the second research question, the following axial codes were identified: spousal support, group support, improved social interaction, and auditory rehabilitation. To address the second research question, the following axial codes were identified: pre-operational experience, positive mentality, actions, persistent support. Descriptions and summaries of codes are reported below.

**Code One: Pre-Operational Experience**

All spouses described experiences with hearing loss for both themselves and their spouses prior to their spouse receiving a cochlear implant or electing to complete an auditory rehabilitation program. These experiences contributed to the role of the spouse being that of a partner throughout the entire process. Some of the evidence to support the development of this code is reported below.

“He felt very self-conscious about it because he know we was missing a lot of someone’s conversation and that was uncomfortable for him.” – Maria

“He was frustrated all the time, and he would get frustrated when we tried to talk to him...It just got really, really bad.” - Mary

“Your world gets smaller....and you do less.” – James

“He was uncomfortable. And, he’d just kinda be stand-of-ish with people cause he didn’t understand what they were sayin’.” – Betty
“We got in the habit of never wanting to really talk to him while we were driving because it was dangerous to be blunt.” – Maria

One of the first roles of the spouse as a precursor to direct involvement in the auditory rehabilitation program is to help with individual with hearing loss navigate through these preoperational experiences. The negative experiences were a foundation for the development of positive mentality, persistent support, motivation to pursue hearing technology, and the actions associated with auditory rehabilitation.

**Code Two: Positive Mentality**

Having a positive mentality or positive approach to the thought of receiving a cochlear implant and the process of auditory rehabilitation was consistently described by spouses of recipients of cochlear implants. They described their role as needing to help the individual with hearing loss to stay positive about the possibilities of hearing technology as well as the work they were putting in with their auditory rehabilitation program. Evidence to support the development of this code is reported below.

“I figured it was going to be an improvement no matter how good, and I was gonna run with it no matter what.” – Maria

“Ya know, she did a lot of research, and her hearing aids got so bad. It was kind of like, well, there’s nothing else to lose, so it was worth a shot.” – James

“I had done some research also on it and found out that it was possible for him to get an implant which was, you know, encouraging.” – Mary

“Sooner or later it gets better.” - Betty

“I almost think she is still improving on things.” – James

All spouses reported being encouraged at the opportunity for their loved one to receive a cochlear implant. They reported having varying expectations, but all were open-minded and encouraged by the potential of the process. This role contributed to auditory rehabilitation
because it was this foundation of hope that the recipients of cochlear implants could stand on as they progressed through their cochlear implant candidacy evaluation and auditory rehabilitation program.

**Code Three: Actions**

Spouses of recipients reported they often participated in the auditory rehabilitation process. Some of the ways they participated included attending audiology appointments, attending speech-language pathology appointments for auditory rehabilitation, reviewing word lists, reading materials for the individual with hearing loss to listen to facilitating auditory skill development, and documenting progress. Evidence to support the development of this code is reported below.

“I’d circle, kind-of like getting a score, seeing how [she’s] doing which was getting better.”
– James

“He continually worked with it. I did too. [I had to] Keep his mind on it.” – Betty

“It probably helped me with my speech because I worked harder at saying the words correctly so he understood better.” – Maria

“The spouse should always go, either if it’s a man or a woman, they should always participate.” – Tara

“I’m always…trying to help him hear or to pay attention.” – Mary

This code provided a summation of the actions that spouses perceived as part of their role in auditory rehabilitation. The recipients of cochlear implants experienced different types of actions by their spouses at different times based on their need. It was clear that that spouses of recipients of cochlear implants perceived part of their role in auditory rehabilitation to serve as an interceding agent as necessary to help their spouse improve their auditory skills and their ability to communicate.
**Code Four: Persistent Support**

As the participants shared their stories it was clear that over time, the spouses consistently supported the individual with hearing loss. The support may have come in the form of having a positive mentality, it may have come in the form for actions through the auditory rehabilitation program, and regardless of its form it was clear that spouses perceived one of their primary roles in auditory rehabilitation to be that of persistent supporter of their spouse with hearing loss. Evidence to support the development of this code is reported below.

“Well, it’s going to be a lot of work. And you got to be ready to travel and spend time and do the tests, or the word sheets, or whatever it is. And, I mean, you just gotta do it. It’s going to be frustrating as hell for both of you. And, even if the one getting [the cochlear implant] doesn’t want to do it, you got to be the big person and tell them they got to do it.” – James

“I don’t regret being involved. I would have done it all over again exactly the same way.” – Maria

“Be supportive to him.” – Tara

“I wouldn’t have wanted to be less involved because I wanted to know what was going on.” – Mary

“I did a lot of repeating.” – Betty

Whether it was having a positive mentality, assisting in reading word lists, completing research, or simply engaging in conversation, spouses of recipients of cochlear implants perceived one of their primary roles in the auditory rehabilitation program to be that of a consistent supporter of their spouse. The support came in many forms, but it was a constant for the recipients of cochlear implants. The support was not a requirement, but was perceived by recipients of cochlear implants to be a catalyst for improvement in auditory skills and confidence with communication.
Summary of Data for Spouses of Recipients of Cochlear Implants

This section presented the evidence to support the development of four key axial codes to address research question number two. Each code was discussed and some of the evidence to support the development of the axial code, as decided by this researcher, was provided. From raw data over 400 themes were identified which were further analyzed into four axial codes as they pertained to the perceived role of spouses of recipients of cochlear implants in auditory rehabilitation: pre-operational experience, positive mentality, actions, and persistent support. Axial codes were further analyzed to determine their alignment with possible categories to contribute to the development of the resulting theory of this study. A discussion of the development of categories and theory development ensues in chapter five.

Summary

This chapter presented axial codes derived from themes identified from raw data obtained from interviews completed by this researcher with a total of twelve participants (six couples). The first section of this chapter presented information about the participants. This was followed by a brief narrative of each couple in an effort to allow the reader to develop a more thorough knowledge of each couple’s experience. Lastly, the codes developed and evidence to support them were discussed. The following chapter will present how the aforementioned codes contribute to the subsequent theory of this research. The connection of literature to the selective/category codes that contribute to the theory of this research are discussed in chapter five.
Chapter Five: Discussion

Organization of the Chapter

This chapter serves as a compilation of analyzed data, theory development, and connections to literature to support theory development. In this section the total of eight codes from chapter four are interconnected to form the resulting theory of this research. The theory is then supported by a connection to the literature. This is then followed by a discussion of implications for the field, limitations of this study, and recommendations for future research.

Theory Development

Eight axial codes were derived from themes developed from raw data collected from this study. Four (axial) codes were developed to address the research question: What do recipients of cochlear implants perceive their role to be in auditory rehabilitation? Four additional (axial) codes were developed to address research question: What do spouses of recipients of cochlear implants perceive their role to be in auditory rehabilitation. The axial codes further contributed to the development of selective/category codes. See Figure 5.1, Theory Development, for a visual representation of the development of the resulting theory of this research. A connection of the literature to the resulting selective/category codes is discussed below.

The selective code of auditory rehabilitation was formed because all participants discussed their experience in auditory rehabilitation. For recipients, this involved being diligent in following the program’s recommendations and for the spouses this often involved completing actions such as helping their loved one follow through with recommendations of the auditory rehabilitation program. Thus, the actions of the spouses and the overall experience in the auditory rehabilitation program by the recipients of the cochlear implants led to the development of the selective code: auditory rehabilitation.
Spouses and recipients described the need for support throughout their journey of cochlear implantation and auditory rehabilitation. Many participants reported group support and spousal support as being primary contributors to their decision to pursue cochlear implantation. Spouses often reported it was the pre-operational experience they endured with their loved one that provided the foundation for pursuing cochlear implantation. Spouses consistently reported they felt the need to stay positive and be persistent in how they supported their loved one, regardless of the outcome of the surgery. Therefore, the “support” selective code was formed from the following axial codes from spouses: pre-operational experience, positive mentality, and persistent support and the following axial codes from the recipients: group support and spousal support.

The axial code of “Improved Social Interaction” was most consistently contributed to by recipients when they discussed what they life was like after cochlear implantation and completion of their auditory rehabilitation program. Spouses also routinely commented on improved social interactions; however, they were hesitant to report that improved social interactions occurred quickly. All participants commented that cochlear implantation and auditory rehabilitation took time. Therefore, there was a need to develop another selective code and the “process” code was established.

As data was further analyzed it was clear that support was necessary throughout the entire process and was especially important to all the participants during their auditory rehabilitation program. All axial codes were able to be aligned with the “support” and “auditory rehabilitation” selective codes. Since all participants discussed their experience as being a process, it evident that the “support” and “auditory rehabilitation” selective codes be separate, but listed as contributing to the process as a holistic entity. The encompassing “process” and reaming
selective codes contributed to the development of the selective code of “Improved Quality of Life.”

The data suggest that support and auditory rehabilitation can be contributing factors to progress and quality of life for an individual who utilizes cochlear implants as well as their spouse. It is important to note that the auditory rehabilitation experienced by these participants was holistic in nature. The program involved counseling prior to cochlear implant surgery, consistent appointments following cochlear implantation and activation, clearly defined objectives that aligned with auditory skill development via the auditory skills hierarchy as discussed in chapter two, and training on communication repair strategies. This is important for professionals who work with individuals with hearing loss to be aware of because the relationship between the person for whom they are providing services and their frequent communication partner may also impact outcomes and progress in the related field in which services are being provided; therefore, a referral for auditory rehabilitation may be appropriate. The individual with hearing loss and/or their frequent communication partner may need additional counseling to understand that cochlear implantation alone does not mean automatic improved auditory or communication skills. The connection between the selective codes developed in this study and existing research is further discussed below.

In the initial conceptual framework for this study (see Figure 3.2), communication breakdowns, communication repair strategies, and adult learning styles were hypothesized to be primary contributors to the roles of the spouse and recipient of the cochlear implant in auditory rehabilitation. As data was analyzed, it was clear that communication breakdowns were aligned with the “pre-operational” axial code of the spouses and the “AR (Auditory Rehabilitation) experience” code for the recipients. Communication repair strategies were part of the “AR
experience” for recipients and thought to be a means of “persistent support” by the spouses. Adult learning styles were aligned with the “positive mentality” axial code for spouses and the “AR experience” for recipients. Recipients reported being in a place of desperation and frustration prior to cochlear implantation. They were open to trying what was recommended by their managing professionals due to their frustrated state.

**Figure 5.1 Theory Development**

*Figure 5.1 Theory Development. A visual representation of the development of the theory for this research. Axial codes further analyzed to selective/category codes: Support, Auditory Rehabilitation, Process, and ultimately Improved Quality of Life.*
Connection to the Literature

Chapter two presented a foundation of literature for the need for this study. Research exists to support the involvement of family in auditory rehabilitation programs for individuals who utilize hearing aids (Tye-Murray, 2015; Hickson, Worral, & Sarinski 2009; Kramer, Allessie, Dondorp, Zekveld, & Kapteyn, 2005); however, there is limited support research regarding auditory rehabilitation programs for individuals who utilize cochlear implants. This study highlighted the importance of auditory rehabilitation programs for individuals who utilize cochlear implants as well as the need to involve a spouse or frequent communication partner in the auditory rehabilitation process. This section serves to parallel research findings in this study to that of existing literature.

The information presented below provides an extrapolation from data to elucidate the development of codes and categories as well as the implications for this study. Each category is discussed as well as implications for each category as it relates to this study. Data to support the development of categories were provided.

Category One: Support

Regardless of what stage of their experience with hearing loss what discussed, all recipients of cochlear implants referenced a need for support from a frequent communication partner. For example, Hank reported,

“Hearing loss is kind-of a tough thing to deal with. It’s something nobody really talks about and if you’ll notice, well, I thought about the general public’s idea of hearing loss and they are really naive about it. They don’t understand.”

This referenced his need of social support for someone to understand his experience with hearing loss. Thomas advised spouses of individuals considering cochlear implantation by saying,

“I say push them, cause I know how strenuous it is when you cannot communicate with your spouse or anybody.”
When discussing the potential of someone completing an auditory rehabilitation program without the support of a spouse, Matthew commented,

“It would be much harder. ...I can’t image doing it [auditory rehabilitation] strictly on your own.”

The support came in various forms. For example, a spouse might be needed to simply listen, or encourage, or help practice recommendations of the auditory rehabilitation program. All recipients of cochlear implants reported that involving their spouse in the auditory rehabilitation program was beneficial. An interesting note was that not all spouses interviewed for this study realized their support was considered to be a key factor to the success of their partner by their partner. This parallels research in other areas such as cognitive-behavioral therapy where research has documented that even if the individual needing treatment is not motivated to attend treatment sessions, “working with the spouse or other family member can effect change” (Rhoades & Duncan, 2010, p 119). For some participants in this study, spouses were involved and did not realize the positive impact they were having for the recipient of the cochlear implant. Involving family members in treatment is not a new concept and is well supported in other fields the literature (Cottrell & Boston, 2002; Kochkin, 2005; Sprenkle, 2007); however, this study brings to light the need to incorporate a spouse or frequent communication partner in auditory rehabilitation programs for individuals who have received a cochlear implant.

**Category Two: Auditory Rehabilitation**

Both the recipients of cochlear implants and the spouses of recipients of cochlear implants reported they perceived their auditory rehabilitation program to have played a role at improving their quality of life. As mentioned previously, participants felt that the effort to work through recommendations of their auditory rehabilitation program, as a compliment to their
audiological management by an audiologist well-trained in working with individuals who utilized cochlear implants, was worthwhile. Hank recalled there being a distinct difference between his ability to hear and listen.

“All hearing aids did is make things louder. It’s a hard thing to explain to somebody that hasn’t had to depend on (paused). It’s really just a frustrating thing to do. It made the whole world uncomfortable and I still didn’t seem to hear any better. I might hear it, but I didn’t understand it.” – Hank

Hank’s comment is the foundation for why auditory rehabilitation is needed. When an individual receives a cochlear implant their brain must be retrained to listen to the new electrical impulses the brain receives from the cochlear implant so they can understand what is being communicated and respond appropriately. This correlates with Musiek’s (2009) study demonstrating that listening is a different brain function that can be documented in the frontal lobe of the brain rather than in the auditory area of the brain where the process of hearing takes place. Brian recalled his experience in his auditory rehabilitation program. He commented that his managing speech-language pathologist,

“Was the meanest sweeting thing I’ve ever met” and followed with “to me that’s what it takes. The people that work with you to start gotta be good.” – Brian

Hank and other participants felt the auditory rehabilitation program was a critical piece in their improvement in listening skills. The program helped to reactive neural pathways in the brain. This evidence supports the development of this selective code in that auditory rehabilitation contributes to improved quality of life for individuals who utilize cochlear implants. As mentioned previously, research has shown auditory rehabilitation to be effective with individuals who utilize hearing aids and research documents there is a resurgence in the desire to utilize auditory rehabilitation with individual with cochlear implants (Bloom, 2004; Pomaville, & Kladopoulos, 2013; Rossi-Katz & Arehart, 2011). This study provides documentation that recipients of cochlear implants and their spouses perceive auditory rehabilitation to have a
positive impact on their ability to listen and communicate with each other which subsequently contributes to overall quality of life for both members of the couple.

Category Three: Process

Recipients of cochlear implants and their spouses acknowledged that through support they were motivated to work through their auditory rehabilitation program, which they realized was a work in progress, a process.

“I think she feels better about the whole process. And, almost from day one she recognized that I could hear her much better and was pleased, I think, with that fact.” – Mark

“One of the first things he realized was that there was a progression that you didn’t just get by turning it on.” – Jennifer

“You’re not going to instantly get this turned on and be able to hear.” – Mark

The idea that training or retraining the brain to learn to listen takes time is not a new concept (Pantev, Dinnesen, Ross, Wollbrink, Knief, 2006; Tye-Murray, 2015). This study provides support that retraining the brain to listen does take time. Additionally, this study found that recipients of cochlear implants, when involved in an auditory rehabilitation program and counseled appropriately, were aware that learning to listen was a process, one that they desired to be actively engaged in to improve over time. A perceived role of both recipients of cochlear implants and their spouses was that they should participate in the process of working to improve the listening skills of the recipient of the cochlear implant in their auditory rehabilitation program.

Category Four: Improved Quality of Life

Improved quality of life after cochlear implantation in adults is supported in literature (Castro, Lassaletta, Bastarrica, Alfonso, Prim, de Sarria, & Gavilan, 2005; Hallberg & Ringdahl, 2004; Hirschfelder, Grabel, & Olze, 2008; Hogan, Hawthorne, Kethel, Giles, White, Stewart, et
al. 2001; Looi, Mackenzie, Bird, & Lawrenson, 2011; Rebmar, Lind, Arnesen, & Helvik, 2009; Zaidman-Zait, 2010). This study helped to add depth to this research base by providing examples of how recipients of cochlear implants perceive their quality of life to be impacted by their auditory rehabilitation program and by the involvement of their spouse in the process. When commenting on his quality of life prior to receiving his cochlear implant, Mark noted,

“It [hearing loss] was always exacerbated by the fact that whenever there was any background noise or anything like that I would just sort of nod my head and act like I was hearing what they were saying but I really wasn’t. It [hearing loss] had a tendency to diminish my participation.”

When commenting on his participation in social settings prior to receiving his cochlear implant, Hank noted,

“Before the device...in a community type situation, a community meeting, I’m just occupying space.”

After receiving his cochlear implant, attending audiology appointments on a consistent schedule determined by his managing cochlear implant audiologist, and completing his auditory rehabilitation program, Hank reported,

“For the most part, I think the quality of my life is better and I think it was a good thing to do.”

Jennifer added,

“I can do many of the things that I couldn’t before, so that improves our quality time together.”

Recipients of cochlear implants and their spouses were keenly aware that the support they provided one another and the effort they put forth in the auditory rehabilitation program were all part of a larger process of improving listening skills and self-discovery that ultimately led to improved quality of life for both parties involved. They reported improved communication, less frequent communication breakdowns, improved confidence at home and in social settings, and improved ambition to participate in activities involving family and friends.
Implications for the Field

A wide variety of professionals may work or interact with individuals who have hearing loss. Professionals need to be aware of the challenges an individual with hearing loss as well as their spouse may face. It is important to acknowledge these challenges and recognize their potential impact on additional professional treatment received. The relationship between the individual with hearing loss and their spouse can be critical to progress in a variety of health-related fields. Additionally, professionals need to be aware of when to make appropriate referrals as a referral to address concerns with hearing or for auditory rehabilitation may positively impact additional outcomes and case closures. The theory developed by this study identified four selective/category codes, three of them leading ultimately to improved quality of life as defined and discussed in chapter two and chapter three, focus of the study. It is important for rehabilitation counselors, audiologists, speech-language pathologists, and other health professionals and policy makers be knowledgeable about the experiences of individuals with hearing loss as well as what they perceive to be contributors to improved quality of life. It is also notable that spousal support was perceived to be a primary pillar to success in auditory rehabilitation and subsequently rehabilitation. Implications for health related professionals who work with individuals with hearing loss are described below through the four selective/category codes discovered in this study.

Implication, Category One: Support

Recipients of cochlear implants expressed that spousal support was a key element not only in their auditory rehabilitation, but also throughout the initial hearing loss identification, diagnosis, and subsequent decision making process. Some of the spouses in this study were aware of their key role, while others were unaware of their impact. Nonetheless, a supportive
environment was instrumental in the decision to pursue hearing technology and auditory rehabilitation. Rehabilitation counselors can utilize this information by first recognizing the importance of sustaining a supportive environment for the individual to which they are providing treatment. Additionally, counselors, professionals, and policy makers can acknowledge the experience of the individual with hearing loss. It can be frustrating, fatiguing, and it can have major vocational and social implications.

When providing treatment, it is important that rehabilitation counselors and health related professionals are aware of the impact a spouse or frequent communication partner can have on progress. There may be a need to bring a spouse in to treatments sessions or a need to counsel a spouse on the potential impact they could have on the success of treatment. If a spouse is not supportive, there may be a need to refer the spouse for individual counseling services.

**Implication, Category Two: Auditory Rehabilitation**

Auditory rehabilitation can be beneficial for individuals who utilize hearing aids as well as those who utilize cochlear implants. Professionals need to be knowledgeable about what auditory rehabilitation is as well as how to refer for these services. Auditory rehabilitation falls within the scope of practice for both an audiologist and speech-language pathologist. Information about auditory rehabilitation should be utilized in training programs for rehabilitation counselors so they become knowledgeable about what it is, how to refer, and the impact it can have on the quality of life of the individuals with hearing loss they serve and their frequent communication partners. Professionals need to be aware of support groups for individuals with hearing loss; as many of the participants in this study reported that as being a big factor in their experience.

The first step in an auditory rehabilitation program is making sure the individual has good access to sound. For an individual with hearing loss, hearing aids, cochlear implants, or an
assistive listening device may be needed to achieve good access to sound. Rehabilitation counselors and health related professionals need to be aware of the importance of good access to sound for optimal hearing and communication abilities. For an individual with hearing loss who utilizes spoken language as their primary communication approach, inconsistent or no use of hearing technology can be detrimental to their quality of life and progress in treatment. Professionals working with individuals with hearing loss who utilize hearing technology need to make sure the individuals are consistently utilizing their technology, they are knowledgeable about care and maintenance of their technology, and feel comfortable communicating with their counselor or managing audiologist regarding any concerns they might have with their hearing or hearing technology.

Implication, Category Three: Process

Rehabilitation counselors and health professions need to be aware than when an individual receives a cochlear implant, it does not mean they automatically have the access to sound necessary to be able to communicate. There currently is no established standard amount of time that it takes the brain to acclimate to the sound a cochlear implant provides. Research has shown us due to neuroplasticity, brains do have the ability to continue to form and cultivate connections for the duration one’s life (Bloom, 2004; Kilgard, Vasquez, Engineer, & Pandya, 2007; Tye-Murry, 2015). Whether an individual is utilizing a hearing aid or a cochlear implant, they need time to acclimate to the sound the hearing technology provides. This is something that may need to be communicated with employers, colleagues, family members, frequent communication partners, and health care providers.

Additionally, it is important that rehabilitation counselors understand that communication breakdowns will happen more frequently for an individual with hearing loss. There may be a
need to counsel the individual with hearing loss, their employer, colleagues, frequent communication partners, and health care providers on communication repair strategies to ensure the intended message is being conveyed. Utilizing hearing technology, completing an auditory rehabilitation program, and utilizing communication repair strategies involves a learning process of which the individual with hearing loss and their frequent communication partners and health care providers should be made aware. This knowledge could impact case closures, outcomes, and satisfaction with job placements. Hearing technology does not automatically guarantee hearing success, but when utilized and managed appropriately, can increase successful communication, satisfaction, and motivation for individuals with hearing loss and their frequent communication partners.

**Implication, Category Four: Improved Quality of Life**

It is important that rehabilitation counselors and health care providers be aware of the literature of how hearing loss can have on an individual’s quality of life (Dalton, Cruickshanks, & Klein, 2003; Gopnik, Meltzoff, & Kuhl, 2009). When providing treatment to an individual with hearing loss, a holistic approach should be utilized that takes into account hobbies, interpersonal relationships, and vocational aspirations. If the individual with hearing loss noticed a decrease in their ability to hear, it is important to refer them to their managing audiologist. If the individual is consistently utilizing optimal hearing technology, per the report of their managing audiologist, and the individual continues to struggle with communication at work or listening in a variety of environments, a referral to an audiologist or speech-language pathologist for auditory rehabilitation services may be appropriate.

Rehabilitation counselors and health care providers need to be aware of the impact spouses and frequent communication partners can have on motivation to participate in treatment
and follow treatment recommendations. When designing treatment plans, consider involving the individual’s spouse or frequent communication partner(s) when possible to facilitate carry over of skills to a variety of environments with various individuals. When not managed appropriately, hearing loss can be a source of decreased quality of life. If this concern is not addressed, supplemental goals (e.g., vocation, social interactions) will be hindered. A summary of categories and implications for each category is provided below in Table 5.1.

### Table 5.1 Category Codes & Implications

**Category Codes and Implications**

<table>
<thead>
<tr>
<th>Category Code</th>
<th>Implications</th>
<th>Supportive Data</th>
</tr>
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</table>
| Support       | • supportive environment can be foundation for improved quality of life  
• hearing loss has social implications that may lead the individual to feel less supported  
• spouse may have positive impact on outcome of treatment  
• spouse may be able to participate in treatment  
• spouse may need counseling to be aware of their impact in treatment  | “Hearing loss is kind-of a tough thing to deal with. It's something nobody really talks about and if you'll notice, well, I thought about the general public’s idea of hearing loss and they are really naive about it. They don’t understand.” – Hank  
“I say push them, cause I know how strenuous it is when you cannot communicate with your spouse or anybody.” - Thomas |
<table>
<thead>
<tr>
<th>Category Code</th>
<th>Implications</th>
<th>Supportive Data</th>
</tr>
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</table>
| Auditory Rehabilitation| • Recipients of cochlear implants and their spouses view auditory rehabilitation as a beneficial process  
• Good access to sound with appropriate hearing technology is key to progress  
• Consistent technology use is key to success  
• May need to counsel individuals to ask questions and reach out to the managing audiologist if they are dissatisfied with audiological treatment | “All hearing aids did is make things louder. It’s a hard thing to explain to somebody that hasn’t had to depend on (paused). It’s really just a frustrating thing to do. It made the whole world uncomfortable and I still didn’t seem to hear any better. I might hear it, but I didn’t understand it.” – Hank |
|                        |                                                                                                                                                                                                             | The people that work with you to start gotta be good.” – Brian                                                                                                                                 |
| Process                | • An individual can hear with good access to sound, but listening is a skill that must be developed (relearned in the case of a recipient of a cochlear implant). It takes time.  
• Communication breakdowns will happen and counselors should be ready to discuss communication repair strategies with individuals with hearing loss as well as their frequent communication partners, employers, and co-workers. | “One of the first things he realized what that there was a progression that you didn’t just get by turning it on.” – Jennifer  
“You’re not going to instantly get this turned on and be able to hear.” – Mark |
Table 5.1 Category Codes & Implications Cont.

<table>
<thead>
<tr>
<th>Category Code</th>
<th>Implications</th>
<th>Supportive Data</th>
</tr>
</thead>
</table>
| Improved Quality of Life | • Research clearly demonstrates that hearing loss can significantly impact the quality of life of the individual with hearing loss and their frequent communication partners  
                          • Frequent communication partners may serve as motivation to seek treatment  
                          • Good access to sound and auditory rehabilitation have been documented as contributing to improved quality of life for recipients of cochlear implants and their spouses | “It [hearing loss] was always exacerbated by the fact that whenever there was any background noise or anything like that I would just sort of nod my head and act like I was hearing what they were saying but I really wasn’t. It [hearing loss] had a tendency to diminish my participation.” – Mark  
“Before the device...in a community type situation, a community meeting, I’m just occupying space.” - Hank  
“For the most part, I think the quality of my life is better and I think it was a good thing to do.” - Hank  
“I can do many of the things that I couldn’t before, so that improves our quality time together.” - Jennifer |

Limitations

As is common in qualitative research, an inherent limitation of this research is its lack of generalizability. Patton (2015) notes, “while one cannot generalize from single cases or very small samples, one can learn from them – and learn a great deal” (p. 53). All participants in this study were from the same region of the same southern state and participated in an auditory rehabilitation program with the same speech-language pathologist and managing audiologist.
Individuals with cochlear implants from different regions, states, or countries as well as those who experience a different auditory rehabilitation program might have different experiences and perspectives.

Only one recipient of a cochlear implant in this study was a female. Most of the accounts provided were of that from a male recipient of a cochlear implant and his female spouse. All participants were married and had been married for a minimum of ten years. Younger married or unmarried couples may have different accounts.

The health status of recipients of cochlear implants and their spouses was not taken into a focused account as participation criteria for this study. If the participant reported they were willing to participate, they were included in this study. However, an individual who has a diagnosis of a degenerative disease or who has experienced a stroke might have a condition that could impact the reporting of their experience. Individuals with no co-occurring health conditions may report their experience differently.

Only one recipient of a cochlear implant in this study had bilateral cochlear implants. She reported having a significant difference when she gained better access to sound via her second cochlear implant. Individuals with two cochlear implants might report experiences in their auditory rehabilitation programs differently than those who have only experienced cochlear implantation and auditory rehabilitation once. The reported experience of their spouses could be quite different as well.

The etiology of the hearing loss was not taken into account for this study. For example, one participant lost their hearing due to a diagnosis of Meniere’s disease, while another felt their hearing dropped when a gun was fired at close range, while another participant felt the hearing loss was the result of old age. The etiology of the hearing loss may have impacted the
participant’s decision process in getting a cochlear implant as well as their experience with their cochlear implant, interactions with their spouse, and their experience in auditory rehabilitation.

Another variable not accounted for in this study was the recipients’ use of hearing assistive technology or assistive listening devices. The use of these technologies could have impacted not only the experience of the recipient of the cochlear implant, but also the experience of their spouse. These technologies should be accounted for in future studies.

In qualitative analysis, the development of codes for the data by the researcher is inherently a limitation because inter-rater reliability can be of concern as well as the possibility of researcher bias contributing to the theory development. This is a consistent concern in the literature regarding qualitative research. Despite every possible foreseeable precaution being taken in to consideration by the researcher to improve inter-rater reliability and the removal of potential bias, this is a limitation that must not be ignored for this study.

Lastly, the amount of time needed to make the decision to pursue cochlear implantation was not taken in to account for this study. For example, as was the case of the participant with a diagnosis of Meniere’s disease, the cochlear implant surgery occurred quickly after the individual realized the change in hearing. For another participant, the report was that there was little benefit received from hearing aids for over ten years before the decision was made to follow through with cochlear implantation. A brain that does not receive stimulation in specific areas, those associated with hearing in this case, may react differently to the stimulation a cochlear implant provides than a brain that has a small time gap between when the individual had access to sound and when they did not. This could impact the perceived experiences and progress by the individual with hearing loss and their frequent communication partners.
**Recommendations for Future Research**

As described in chapter two, ample research exists to provide an evidence-base for auditory rehabilitation for individuals who utilize hearing aids. Research also supports utilizing frequent communication partners in the auditory rehabilitation program for individuals with hearing loss. This phenomenological qualitative study provided a foundation upon which future research can expound regarding the use and efficacy of auditory rehabilitation with adults who utilize cochlear implants.

This study provided a theoretical research hallway from which many doors are left unopened. Limitations of this study included a lack of generalizability, participants from the same region and auditory rehabilitation program, a majority of only male participants, a lack of control for the variables of health status, etiology of the hearing loss, and amount of time between being determine an appropriate candidate for a cochlear implant and actually receiving the device. Additional research is needed to determine the efficacy of auditory rehabilitation with a variety of participants from various regions, states, and countries. Is the experience of recipients of cochlear implants who are married and complete an auditory rehabilitation program different from those who complete an auditory rehabilitation program who are unmarried? Many of the participants in this study touted the support group as being a major factor in the success of their auditory rehabilitation program. What is the experience of those who are unable or unwilling to attend group meetings? Social implications of attending group support meetings for individuals who utilize cochlear implants needs to be further examined. Lastly, is the experience of an individual who receives a cochlear implant shortly after a drop in their hearing different from that of an individual who waits a longer period of time before electing to undergo cochlear implant surgery? This also should be examined in future research.
Implications from this study may also drive future research. Additional research is needed to examine the outcomes of progress in rehabilitation counseling and case closures for vocational rehabilitation counselors who involve family members in treatment as well as counsel individuals with hearing loss on establishing a good relationship with their managing audiologist. Individuals with hearing loss who are employed but dissatisfied should consider enrollment in auditory rehabilitation as a means to identify areas of need and possible changes in audiological management; rehabilitation counselors can help to initiate this process. This collaborative approach to providing treatment and management for adults with hearing loss in a holistic manner needs to be further examined. This study serves as a stepping stone from which additional research is invited and encouraged.

Conclusions

This phenomenological study utilized a grounded theory approach to data analysis to allow for the development of a theory regarding the perceived roles of recipients of cochlear implants and their spouses in auditory rehabilitation. The experiences shared by the participants were examined and constantly compared throughout data analysis which led to axial codes for the perceived role(s) of recipients of cochlear implants to be identified as spousal support, group support, auditory rehabilitation experience, and improved social interactions. Axial codes for the perceived role(s) of spouses of recipients of cochlear implants in auditory rehabilitation were discovered to be pre-operational experiences, positive mentality, actions, and persistent support. This study is one of the first of its kind to examine the use of auditory rehabilitation with individuals who utilize cochlear implants. Additionally, this study highlighted the importance of involving the spouse of the recipient of the cochlear implant in the auditory rehabilitation process. The axial codes were further compared and analyzed to develop selective/category
codes to contribute to the overall theory of this research being improved quality of life. The selective codes identified were support, auditory rehabilitation, process, which were all identified as contributing to improved quality of life for the recipient of the cochlear implant as well as their spouse. The implications of this study are far reaching for rehabilitation counselors, professionals who work with individuals with hearing loss, and policy makers.

This study has shown that a holistic and collaborative approach to working with individual with hearing loss and their families may improve the quality of life of these individuals and could subsequently improve the quality of service as well as speed of case closures for rehabilitation counselors. Rehabilitation counselors and health care providers should be aware of the impact hearing loss can have on the quality of life not only of the individual with hearing loss, but also their spouse or frequent communication partners. Capella (2003) noted that “a substantially higher percentage of persons with hearing loss were accepted for [vocational rehabilitation] services compared to persons with other disabilities” (p. 43). However, Capella (2003) went on to note that the “percent of consumers with hearing loss closed successfully by [vocational rehabilitation] VR consistently decreased during a recent 10-year period.” Possible ways to combat this trend include a collaborative approach including referrals to audiologists for audiological management as well as referrals to speech-language pathologists or audiologists for auditory rehabilitation. Additionally, this study provided evidence of the importance of involving spouses in the rehabilitation process, this should also be considered and utilized by rehabilitation counselors. Future research is needed to determine why there has been a decrease in the number of successfully closed cases for individuals with hearing loss who receive vocational rehabilitation counseling. A holistic, inter-disciplinary approach to providing treatment for individuals with hearing loss is necessary to provide an environment where the individual with
hearing loss is set up to improve their quality of life and gain successful and competitive employment.
References


Erickson, F. (1986). *Qualitative methods in research on teaching*. In M. C. Wittrock (Ed.), Handbook of research on teaching (3rd ed., p. 119-161). New York: Macmillan.


MEMORANDUM
TO: Rachel Glade
   Brent T. Williams
FROM: Ro Windwalker
       IRB Coordinator
RE: New Protocol Approval
IRB Protocol #: 16-06-792
Protocol Title: Role of Spouse of Cochlear Implant Recipient in Auditory Rehabilitation
Review Type: ☑ EXEMPT ☐ EXPEDITED ☐ FULL IRB
Approved Project Period: Start Date: 06/14/2016 Expiration Date: 06/13/2017

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form Continuation Review for IRB Approved Projects, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (https://vpred.uark.edu/units/rscp/index.php). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 20 participants. If you wish to make any modifications in the approved protocol, including enrolling more than this number, you must seek approval prior to implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 109 MLKG Building, 5-2208, or irb@uark.edu.
Appendix B

Informed Consent

Title: Perceived Role of Recipients of Cochlear Implants and Their Spouses in Auditory Rehabilitation

Researcher(s): Rachel Glade, Doctoral Candidate
Brent Williams, Faculty Advisor

Administrator(s): Ro Windwalker, CIP
Institutional Review Board Coordinator

Program in Communication Disorders
University of Arkansas Research Compliance

College of Education and Health Professions
University of Arkansas

Department of RHRC
303 Graduate Education Building
Fayetteville, AR 72701-1201

Institutional Review Board Coordinator
University of Arkansas Research Compliance

109 MLK G Building
Fayetteville, AR 72701-1201
479-575-4910
irb@uark.edu

Description: The purpose of this study is to investigate the perceptions of recipients of cochlear implants and their spouses in the rehabilitation process that takes place after the cochlear implant has been activated. Participants will complete a brief 30 to 60 minute interview in either a clinical or familiar setting of their choosing. Interviews completed in the clinical setting will be video and audio recorded. Interviews completed in home-based or settings outside the clinic will be audio recorded only.

Risks and Benefits: There are no known risks associated with this study. The information gathered in this study may contribute to the development of improved protocols and practices to be utilized by a variety of professions including but not limited to audiology, speech pathology, rehabilitation counseling, and otolaryngology. By identifying what is successful and what is not successful from the point of view of the individuals going through the rehabilitation process, we can improve the quality of service provision which may in turn positively impact the quality of life of the individual with hearing loss and their spouse.

Voluntary Participation: If you do not wish to participate in this study, you may discontinue at any time. You will not be punished or discriminated against in any way if you refuse to participate in this study.

Confidentiality: All information will be kept confidential to the extent allowed by applicable State and Federal law and University Policy.

Right to Withdraw: Your participation in this research study is completely voluntary. You are free not to participate in the project and to withdraw from the study at any time.

If you have questions about the research study: You have the right to contact the Principle Researcher or Faculty Advisor as listed below for any concerns that you may have.

Rachel Glade, Principle Researcher
Telephone: 479-575-3575
Email: rglade@uark.edu

Brent Williams, Faculty Advisor
Telephone: 479-575-8696
Email: btwilli@uark.edu

IRB #16-06-792
Approved: 06/14/2016
Expires: 06/13/2017
You may also contact the University of Arkansas Research Compliance office listed below if you have questions about your rights as a participant, or to discuss any concerns about, or problems with this study.
Ro Windwalker, CIP
Institutional Review Board Coordinator
Research Compliance
109 MLK G Building
Fayetteville, AR 72701-1201
479-575-2208
irb@uark.edu

Informed consent: (please print)
I, ______________________________, have read the description, including the purpose of the study, the procedures to be used, the confidentiality, as well as the option to withdraw from the study at any time. Each of these items has been explained to me by the investigator. The investigator has answered all of my questions regarding this study, and I believe I understand what is involved. My signature below indicates that I freely agree to participate in this study and that I have received a copy of this agreement from the investigator.

I agree to participate in this study. [ ] Yes [ ] No

<table>
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<tr>
<th>Participant Signature</th>
<th>Date</th>
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Appendix C
Intake Form for Recipient of Cochlear Implant

When did you receive your cochlear implant (list 2 dates if 2 implants were received)?
_____________________________________

Please circle YES or NO to the following statements:

(1) Were you enrolled in an auditory rehabilitation program (listening therapy) prior to receiving your cochlear implant:

YES  NO
If yes, approximately, how long: ______________________________________
If yes, who provided the auditory rehabilitation (please circle or explain)?

Audiologist  Speech-Language Pathologist  Self  Other __________

(2) Were you enrolled in an auditory rehabilitation program (listening therapy) after receiving your cochlear implant:

YES  NO

(3) Was your spouse involved in the auditory rehabilitation (listening therapy) program?

YES  NO

(4) Do you feel that your current cochlear implant programming is optimal for your daily functions?

YES  NO

To better understand how hearing loss has impacted your life, please first read through the following questions and then provide answers (You are welcome to use addition paper if needed. Please label the number of the question you are answering if you choose to utilize additional paper.):

(1) What role has hearing loss played in your life?
_____________________________________
_____________________________________
_____________________________________

(2) How do you feel your hearing loss has affected your family? Friends? If at all?
_____________________________________
_____________________________________
_____________________________________

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Approved: 06/14/2016
Expires: 06/13/20
(3) What was it like for your friends and family when you first received your cochlear implant?
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
(4) How do family members who do not live with you view your hearing loss?
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
(5) In your opinion, what does society think about hearing loss?
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(6) How would you describe your life before you were diagnosed with hearing loss?
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_________________________________________________________________________
_________________________________________________________________________
Intake Form for Spouse

To better understand how hearing loss has impacted your family unit, please first read through the following questions and then provide answers (You are welcome to use additional paper if needed. Please label the number of the question you are answering if you choose to utilize additional paper.):

(1) What role has hearing loss played in your spouse’s life?

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

(2) How do you feel hearing loss has affected your family? Friends? If at all?

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

(3) What was it like for your friends and family when your spouse first received their cochlear implant?

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

(4) How do family members who do not live with you view your spouse’s hearing loss?

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

(5) In your opinion, what does society think about hearing loss?

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

IRB #16-06-792
Approved: 06/14/2016
Expires: 06/13/2017
(6) How would you describe your spouse’s life before they were diagnosed with hearing loss?

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

IRB #16-06-792
Approved: 06/14/2016
Expires: 06/13/2017
Hi Rachel,

I’ll reiterate again – the images available in our Press Room are intended for download for uses such as you describe below. Unless you have requested special images not available on the Press Room at our company website, you do not need special permission from MED-EL to use those images in your dissertation. It is exactly the reason they are hosted there for download in a variety of file types and resolutions.

I hope this helps,

Darla

Darla Franz
Vice President, Education and Corporate Communications

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Dear Rachel,

Thank you for your interest in including Advanced Bionics in your dissertation:

_Perceived Role of Recipients of Cochlear Implants and Their Spouses in Auditory Rehabilitation_

Per your request I’ve been authorized to grant you permission to use the following information in your literature review:

1. Photo of Naieda CIQ 90 (external processor)

2. Photo of Neptune (external processor)

3. Audiogram of Familiar Sounds

Thank you for your patience and consideration of our technology. Please let me know if you have any additional questions.

Thank you,

Olivia Duarte
Sr. Manager of Communications and Marketing
Advanced Bionics LLC
28515 Westinghouse Place
Valencia, CA 91355
LICENSE AGREEMENT

This License Agreement is entered into between Rachel Glade, ABD, CCC-SLP, LSLS Cert. AVT (“Author”) and Cochlear Americas, along with its parent and affiliates (collectively “Cochlear”) as of the Effective Date. In consideration of the mutual promises contained herein, which the parties agree, represent sufficient consideration, the parties agree as follows:

Cochlear hereby grants to Author, a non-transferable license to use the images as described in Exhibit A ("Pictures"). The Pictures will be included in Author’s dissertation entitled Perceived Role of Recipients of Cochlear Implants and Their Spouses in Auditory Rehabilitation ("Publication"). This License grants Author the right to use the Pictures throughout the world in any language in Publication, in future editions of Publication, in print or electronic format, and in Publication-related marketing and promotional materials (facsimiles, including screen shots). Any further or additional uses require an additional License Agreement.

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This agreement is governed and shall be interpreted by Colorado law, without regard to its conflict of law principles. This is the entire agreement regarding this matter between the parties.

Agreed upon effective as of the later of the signature dates below ("Effective Date") by the following authorized representatives of the parties.

AUTHOR:
Name: Rachel Glade
Signature: 
Title: Clinical Instructor, Doctoral Candidate
Date: 10/19/2016
Address: VA Speech & Hearing Clinic
901 N. Razorback Rd.
Fayetteville AR 72701

Name: Patti Trautwein
Signature: 
Vice President, Marketing
EXHIBIT A

List of Pictures

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<tr>
<td>Photo of Cochlear Nucleus 6 (external processor)</td>
<td>Image courtesy of Cochlear Americas, ©2016</td>
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