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POLICIES AND CLINICAL PRACTICES REGARDING CANDIDACY AND  
AUDITORY TREATMENT FOR HISPANIC PEDIATRIC PATIENTS IN  
COCHLEAR IMPLANT CENTERS IN THE UNITED STATES  
[Políticas y prácticas clínicas relacionadas con candidatura y tratamiento auditivo para pacientes  
hispanos pediátricos en centros de implantes cocleares en los Estados Unidos]

by  
Matthew Ryan Ehrenburg

An Independent Study Thesis  
Presented in Partial Fulfillment of the Course Requirements of  
Senior Independent Study: The Departments of Communication and Spanish

March 28, 2016

Advisors: John P. Gabriele, Ph.D. &  
Donald M. Goldberg, Ph.D.

## ABSTRACT

This research sought to investigate the policies and clinical practices regarding candidacy and auditory treatment for Hispanic pediatric cochlear implant patients at cochlear implant centers in the United States. More specifically, the study investigated treatment services provided to pediatric patients who are raised in monolingual Spanish, English as a second language (ESL), and bilingual English-Spanish speaking homes. The study made use of survey research to examine cochlear implant centers regarding their policies, clinical practices, and their referral processes for this specific group of cochlear implant recipients. The survey was distributed electronically through the online survey software Qualtrics via email to audiologists and auditory-based therapists at major cochlear implant centers across the United States who serve a large Hispanic population. Email addresses of all participants were identified from the three cochlear implant manufacturers' websites (Cochlear Americas, Advanced Bionics, and MED-EL), the American Cochlear Implant Alliance (ACIA) website, and individual cochlear implant centers' websites. The survey was also posted on the websites of the Special Interest Group 9 (SIG-9) of the American Speech-Language-Hearing Association (ASHA) and the Alexander Graham Bell Association for the Deaf or Hard of Hearing. Results from the study found that audiologists and auditory-based therapists significantly differ on certain survey items related to candidacy and issues of bilingualism. The more important conclusion, however, was that no cochlear implant clinic had a written or formalized policy regarding how to conduct auditory-based therapy with Hispanic pediatric cochlear implant patients.

**Keywords:** cochlear implants, bilingualism, pediatric, auditory treatment, cross-cultural competence

## ABSTRACTO

Esta investigación trató de investigar las políticas y prácticas clínicas en relación con la candidatura y el tratamiento auditivo para los pacientes hispanos pediátricos con implantes cocleares en los centros de implantes cocleares en los Estados Unidos. Más concretamente, el estudio investigó los servicios ofrecidos por el tratamiento de los pacientes pediátricos que son monolingües en español, Inglés como Segundo Lengua (ISL), y bilingües en Inglés-Español. El estudio usó encuestas para examinar centros de implantes cocleares con respecto a sus políticas, prácticas clínicas, así como sus procesos de referencia para este grupo específico de receptores de implantes cocleares. La encuesta fue distribuida electrónicamente a través de Qualtrics, un software de encuestas en línea por correo electrónico a los audiólogos y terapeutas auditivos en los principales centros de implantes cocleares que sirven a una gran población hispana. Las direcciones de los correos electrónicos de todos los participantes fueron identificados a partir de los sitios web de los tres fabricantes de implantes cocleares (Cochlear Americas, Advanced Bionics, y MED-EL), el sitio web de American Cochlear Implant Alliance (ACIA), y los sitios web de algunos centros de implantes cocleares individuales. La encuesta también fue publicada en los sitios web del Grupo de Interés Especial (SIG 9) del American Speech-Language-Hearing Association (ASHA) y la Asociación de Alexander Graham Bell. Los resultados del estudio descubrieron que los audiólogos y terapeutas auditivo-verbales difieren significativamente en ciertos puntos de la encuesta relacionados con la candidatura y los asuntos del bilingüismo. La conclusión más importante, sin embargo, fue que ningún centro de implantes cocleares tiene una política formalizada con respecto a cómo llevar a cabo la terapia auditiva-verbal con los pacientes hispanos pediátricos con implantes cocleares.

**Palabras claves:** implantes cocleares, el bilingüismo, tratamiento auditivo para los pediátricos

## ACKNOWLEDGEMENTS

To my professors, advisors, and mentors: Dr. Goldberg & Dr. Gabriele

To Dr. Goldberg: A man who ignited my passion for Speech-Language Pathology and Audiology and transcends what it means to teach. Because teaching to him is more than just an opportunity to spread knowledge to young minds, but rather, a chance to challenge students to apply their knowledge for the greater good.

To Dr. Gabriele: A mentor who showed me that life is full of irony and unanswerable questions. But even though many questions may not have answers, it does not detract from the beauty that comes with searching for them.

To my family: Dad, Mom, Scott, John, and Michael

To my parents: For everything—the hours on the phone, the sleepless nights, the encouraging words, the dollars spent, and ultimately, the belief you both had in me. You two truly are the embodiment of sacrifice.

Mom: For always picking up and making time for me

Dad: For showing me that hard work does pay off

To my brothers: “I sought my soul, But my soul I could not see. I sought my God, But my God eluded me. I sought my brother, And I found all three.”

Scott: For your unparalleled love for me and the rest of us

John: For your kindness and willingness to help regardless of circumstance

Michael: For being who you are and not having any qualms about it

To my friends:

To Kaitlin Banko: For showing me that life has never been about what others can do for you, but rather, what you can do for others. That being a good listener will always supersede being a good talker and to always be generous.

To Patrick Pickering: For reminding me that life is to be enjoyed and not to be suffered through. And that the present moment should always be the most important.

To Sandip Sahota: For always being a source of wisdom and shaping me into the person I am today.

Mr. Bill Sheron, Dr. Alexander Glickman, Dr. Howard Francis  
Apartment Kennedy B, Jersey Crew Tornadoes,  
And all family and friends past and present.

## **PREFACE**

Even before I began my journey at The College of Wooster, I had always looked forward to writing and completing my Independent Study. For many Wooster students, this yearlong project is a culmination of a four-year expedition, providing students the opportunity to not only enter the depths of a selected topic, but also to discover the nature of one's "self" simultaneously. Though this journey of self-exploration is a pursuit that often brings personal joy, I strived to make this Independent Study valuable for as many people as possible. Once I decided to discuss the current issues regarding candidacy and auditory treatment of Hispanic pediatric cochlear implant patients, I tried to realize my goal of making this work accessible to a diverse audience. In order to reach both English and Spanish speakers, this text is written in both languages. For those who would prefer to read an abridged version of the study in Spanish, see page 173.

## **PREFACIO**

Incluso antes de que comenzara mi tiempo en The College of Wooster, siempre tenía ganas de escribir y completar mi estudio independiente. Para muchos estudiantes en Wooster, este proyecto es la culminación de una expedición de cuatro años, dando a los estudiantes la oportunidad de no sólo entrar en lo más profundo de un tema elegido, sino también para descubrir la naturaleza del propio "yo" a través del proceso. Aunque este viaje de auto-exploración a menudo trae alegría personal, me esforcé a hacer este estudio independiente valioso para el mayor número posible de personas. Cuando decidí investigar sobre los asuntos asociados con la candidatura y el tratamiento auditivo de los pacientes hispanos pediátricos con implantes cocleares, he tratado de realizar mi objetivo de disponer esta obra a un público diverso. Para extender a los que hablan inglés y español, este texto está escrito en ambos idiomas. Para aquellos que prefieren leer una versión abreviada del estudio en español, véase la página 173.

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## CHAPTER I

### INTRODUCTION

For most parents, the thought of bringing a baby into their lives results in a multitude of emotions and expectations. For many of them, their greatest concern is the newborn's health. Unfortunately for some, there are assorted complications or issues that affect some newborns. One of the most common impairments related to neonates is hearing loss, with one to three infants in every 1,000 born having a sensorineural hearing loss (Joint Committee on Infant Hearing [JCIH], 2007, p. 907). For parents, hearing that their child is deaf can be a crushing blow to their hopes, dreams, and aspirations for their child (Young & Tattersall, 2007, p. 213). Health-care professionals can, however, assure these parents that all hope is far from lost.

Provided the child meets all of the required criteria, cochlear implants may be a viable option for the prelingually deafened infant. Cochlear implants enable children who are deaf to learn to listen and develop spoken language like most of their peers (Cosetti & Waltzman, 2012, p. 165). Although the technology exposes these children to the "hearing world," cochlear implants certainly do not "cure" deafness. In order for these children to have successful listening and spoken language outcomes, they should ideally be referred from the cochlear implant centers to professionally trained clinicians such as speech-language pathologists, audiologists, and auditory-based therapists in order to be taught how to listen and talk. Oftentimes, the clinicians support these children to gain fluency in English, despite many families whose native language is not English. As a result, some children whose native language is not English may be forced to learn English because the therapists do not have the knowledge or resources to deliver therapy in the child's native language, or the responsibility falls on the parents to teach their child their native language.

## **Purpose Statement**

The purpose of this study was to examine cochlear implant centers' policies and clinical practices regarding candidacy and auditory treatment for Hispanic pediatric cochlear implant patients. More specifically, the study investigated treatment services provided to pediatric patients who are raised in monolingual Spanish, English as a second language (ESL), and bilingual English-Spanish speaking homes. The study made use of survey research of cochlear implant centers around the United States regarding their policies, clinical practices, and their referral processes for this specific group of cochlear implant recipients. Moreover, the study also highlighted what auditory (re)habilitation techniques were implemented during therapy and how these practices were implemented during therapy sessions. Also, the study emphasized the importance of dual-language acquisition, or learning two languages simultaneously; usually prior to 3 years old, and how hearing professionals may assist in the development of pediatric patients as dual-language learners.

## **Rationales**

Identifying the policies and clinical practices used in candidacy and auditory treatment therapy for pediatric cochlear implant recipients who are monolingual Spanish, English as a Second Language (ESL), and bilingual English-Spanish speakers is considered extremely valuable for both scholarly and practical reasons. First, this study is significant because it reflects two growing trends in the United States; one, the increase of Spanish speakers in the United States and two, the growing trend of cochlear implantation for children at earlier ages.

The immigration of Hispanics into the United States reportedly fluctuates between 350,000 and 1.3 million per year with 47.7 million residents expected to be in the U.S. in the year 2010 (Douglas, 2011b, p. 20). It is estimated that about 308.7 million people live in the

United States. The largest minority group in the U.S. is the Hispanic/Latino population, which consists of 50.5 million people or 16.3% of the total population (U.S. Census Bureau, 2010). According to the U.S. Census Bureau, the Hispanic population is projected to increase to 29% by the year 2050, which will reflect 60% of the total growth of the United States population (as cited in Douglas, 2011a, p. 4). Since there is a higher incidence of hearing loss in the pediatric Hispanic population compared to other minority groups, it has been suggested that bilingual pediatric cochlear implant patients will continue to grow in number (Mehra, Eavey, & Keamy, 2009, p. 469). Moreover, with the advancement in technology related to cochlear implants, the effort to implant children at ages younger than 12 months continues to also increase (Heman-Ackah, Roland, Haynes, & Waltzman, 2012, p. 57). Universal Newborn Hearing Screening (UNHS) programs are detecting children who are deaf at younger ages, which has presumably prompted the push for cochlear implantation at ages prior to 12 months old for some patients (the current FDA-approved age necessary to obtain a cochlear implant) (Heman-Ackah et al., 2012, p. 57).

The second rationale for this study is that the work may serve as a springboard for the creation of a set of clinical guidelines for clinicians on how to effectively recommend and/or provide treatment services to pediatric cochlear implant recipients from a Spanish speaking background. “Although laden with presumptions, there remains a paucity of research, recommendations, and guidelines for working with children who are deaf or hard of hearing and from linguistically diverse backgrounds” (Guiberson, 2005, p. 30). Since the overwhelming majority of professionals in the United States who work with children who are deaf or hard of hearing are female, monolingual English, Caucasians, it is essential for these professionals to have some specific guidelines to conduct effective therapy with children from culturally and

linguistically diverse backgrounds (Rhoades, Price, & Perigoe, 2004, p. 290). In order for therapy to be delivered effectively by speech-language pathologists and audiologists, they need more knowledge on the speech productions of Spanish-speaking children with cochlear implants (Moore, Prath, & Arrieta, 2006, p. 338). The current study is also significant because this study addresses the implementation of specific therapy techniques (listening and spoken language teaching) used around the United States for Spanish speaking pediatric cochlear implant patients.

A third reason why this study is important is because the results from the study will help contribute to the scholarship supporting dual-language acquisition for pediatric cochlear implant patients. For many years, parents noted that some listening and spoken language specialists strongly suggested dual-language support would cause a delay in the child's language acquisition (Bunta & Douglas, 2013, p. 281; Genesee, 2008, p. 17; Waltzman, McConkey Robbins, Green, & Cohen, 2003, p. 757). According to recent studies, however, there is no reason to believe dual-language support causes language delay (McConkey Robbins, Green, & Waltzman, 2004, pp. 644-645; Moore et al., 2006, p. 322; Thomas, El-Kashlan, & Zwolan, 2008, p. 230; Waltzman et al., 2003, p. 757). As a result, the above-noted scholarship appears to have settled the "debate" that dual-language support offers more advantages than disadvantages. In fact, one of the many benefits of dual-language learning is that these children appear to demonstrate cognitive advantages compared to monolingual speakers (Genesee, 2008, p. 17). Although the auditory-based therapist contributes significantly to the child's linguistic growth, it is the parents who play a much larger role in their child's success of using two or more languages (Nevins & Garber, 2007, pp. 1-2; Rhoades et al., 2004, p. 645; McConkey Robbins, 2007, pp. 2-3). Conducting the current study was expected to support that dual-language is an opportunity all children and their families should be encouraged to take advantage of, even for those with hearing loss.

A fourth rationale for this study is that it will help promote the scholarship relating to the importance of the Spanish language's contribution to Hispanic cultural identity in the United States. Hispanic immigrants involved in cultural transitions as a result of migration must learn the nuances of the societal norms, pressures, and standards affiliated with the United States (Padilla & Perez, 2003, p. 42). Each individual must establish his/her own ethnic identity in order to determine to what extent he/she is willing to acculturate. As cited in Phinney (1991), ethnic identity is a construct used to clarify one's self-identification (e.g., attitudes about being a group member, extent of ethnic knowledge, ethnic behaviors and practices, etc.) within a particular group (p. 194). Language is a vital aspect of ethnic identity that contributes to individuals' socialization and emotional, behavioral, and social self-regulation (Dale, 1996, p. 5). Considering an individual's home language is a major contributing factor to a person's ethnic identity, Hispanics in the United States are often faced with a difficult decision as to how and to what capacity they speak Spanish compared to English (Portes & Zhou, 1993, p. 88). According to Ghavami and colleagues, minority individuals who identify more strongly with their minority group report greater psychological well-being (Ghavami, Fingerhut, Peplau, Grant, & Wittig, 2011, p. 79).

The fifth justification for this study is that there exists limited scholarship about cochlear implant centers' policies regarding the referral process for auditory treatment for pediatric cochlear implant patients in general, let alone in cases where English is not the primary language. The majority of the available literature presents case studies about pediatric patients and their pursuits of dual-language acquisition post-cochlear implantation; however, none of the identified studies have addressed where these patients are being served for auditory-based



therapy. Few studies have provided statistics regarding qualified bilingual auditory-verbal therapists who assist their patients or even how to conduct therapy when bilingual therapists are not available. There also appear to be no data clarifying whether or not the therapy provided is privately funded or if insurance covers the fees. The research in this area is devoid of facts and figures of how prevalent these cases are across the country. Overall, this study plans to address the aforementioned topics and bring some clarity to this important issue in the research.

Although there are numerous scholarly rationales that substantiate the purpose of this study, there is one practical rationale that is rooted in personal interest. Throughout my undergraduate education, I have been fascinated by the processes and constructions used in communication and languages. My interest grew as I explored the apparent “symbiotic” relationship between audition and language through the various courses offered in the Communication Sciences and Disorders major. Over the years, my passion for these two areas of study has afforded me several opportunities to employ my knowledge in “real world” situations.

As a student medical assistant at a leading cochlear implant hospital-based clinic, I was able to see firsthand some of the issues Hispanic pediatric cochlear implant patients face during auditory-based therapy and (re)habilitation. One particular case was with an inquisitive Hispanic 3-year-old boy, who was a bilateral (two ears) cochlear implant recipient. Each and every week, at 10:00 a.m., the boy would come to clinic with his mother and sister for his weekly auditory habilitation session. His mother and I would chat in Spanish about her son as we waited for the speech-language pathologist to greet us in the lobby. After the medical interpreter arrived, we would all congregate in one cramped therapy space. The session would begin and the interpreter would translate what the speech-language pathologist was saying in English to the mother, and sometimes the child, into Spanish and would then translate their responses from Spanish to

English. As each therapy session passed, I contemplated more and more what would happen if this hospital's clinic did not have medical interpreters. What would therapy be like for auditory-based therapists who could not make use of interpreters and only speak English? Are there any bilingual auditory-based therapists? As I continued to muse, the boy's mother abruptly interrupted my thought process. She looked at me and with a smile said, "It is just so nice to see a young, white man like yourself care so much about my son. It means the world to me that you are not only concerned about my family, but also strive to help other Latino families like ours." As a Caucasian, male, nonnative bilingual English-Spanish speaker interested in cochlear implants, I would definitely say I am part of a niche group in the field of speech-language pathology and audiology. Thus, several experiences similar to the aforementioned, have only added to my desire to serve the Hispanic pediatric cochlear implant population.

### **Definitions**

In order to gain a better understanding of this study, it is necessary to provide several definitions of terms. First, a *cochlear implant* is a medically implanted device that provides direct electrical stimulation to the 8<sup>th</sup> cranial nerve (vestibulocochlear) by means of an electrode array, which then transmits electrical signals to the auditory cortex to provide the sensation of hearing (Vincenti et al., 2014, p. 72). The usage of cochlear implants is rapidly growing as a result of *Early Hearing Detection and Identification* (EHDI) programs, which are programs that require the practice of screening every newborn for hearing loss prior to hospital discharge. Infants that do not pass screening should ideally receive a diagnostic evaluation before three months of age and, when necessary, be enrolled in an early intervention programs by six months of age (ASHA, 2015b, para. 1). The growth of EHDI programs has resulted in other developments such as *Universal Newborn Hearing Screening*, a policy mandated by the National

Institutes of Health (NIH) in 1993 which stated “that all newborns should be screened for hearing loss prior to hospital discharge or within the first three months of life” (National Institutes of Health [NIH], 1993, p. 3). Though many children are screened and referred for their hearing loss, a much smaller percentage present with the necessary degree/severity of hearing loss in order to be a cochlear implant candidate. *Degree of hearing loss* refers to a classification system used to demonstrate the severity of the patient’s hearing loss (Clark, 1981, p. 497). Cochlear implant candidacy criteria have been established by the United States *Food and Drug Administration* (FDA), a federal regulatory agency “responsible for protecting the public health by assuring the safety, efficacy and security of human and veterinary drugs, biological products, medical devices and our nation’s food supply, cosmetics, and products that emit radiation” (U.S. Food and Drug Administration [FDA], 2014, para. 1).

If the patient qualifies, an interdisciplinary group of medical and medically-related professionals comprise a *cochlear implant team*, including but not limited to, “audiologists, speech-language pathologists, educators, surgeons, medical specialists, psychologists, and counselors” (ASHA, 2015a, para. 6). The parents and family of the patient play an integral part of the team, who should advocate and ensure the best possible outcomes for the patient. The American Speech-Language-Hearing Association defined an *audiologist* as “healthcare professionals who provide patient-centered care in the prevention, identification, diagnosis, and evidence-based treatment of hearing, balance, and other auditory disorders for people of all ages” (ASHA, 2015d, para. 2). *Speech-language pathologists* are healthcare professionals who “prevent, assess, diagnose, and treat speech, language, voice, cognitive-communication, and swallowing disorders in children and adults” (ASHA, 2015c, para. 1). After a patient receives a cochlear implant, he/she should be enrolled in therapy, that is, auditory (re)habilitation. *Auditory*

*habilitation* is a “particular methodology used to develop the auditory, speech, and language skills through a child’s use of his or her residual hearing” whereas *auditory rehabilitation* requires audiological management of adults whose hearing impairments are usually more gradual (Johnson, 2012, pp. 348-349; Martin & Clark, 2015, p. 428).

Terms surrounding language acquisition must also be defined. *Language acquisition* is the process by which humans acquire the capacity to perceive and comprehend language, as well as produce and use words and sentences to communicate (Goldfield, Snow, & Willenberg, 2013, pp. 257-258). *First-language acquisition* studies infants’ acquisition of their native language whereas *second-language acquisition* investigates the processes involved with developing additional languages in both children and adults (Deacon, 1997, p. 107, p. 127). *Monolingualism* is the ability of only being able to communicate in a single language whereas *bilingualism* is “proficient conversational fluency in at least two languages” (Rhoades, 2012, p. 237; Thordardottir, Cloutier, Ménard, Pelland-Blais, & Ravachew, 2015, p. 287). In regard to this particular study, the focus of bilingualism is on patients who are *Hispanic*—“an ethnonym to people of country heritage that speak the Spanish language, which roughly comprised the Iberian Peninsula including the contemporary states of Spain, Portugal, Andorra, and Gibraltar” (Vega, 2001, p. 166). The Hispanics who then learn English could then be considered *English Language Learners* (ELL), which are people who are learning the English language, in addition to their native languages, but not necessarily from infancy (Collins, 2014, pp. 389-390). Many ELLs, however, can also be considered *dual-language learners* or *simultaneous bilinguals*, who are infants and toddlers who learn two languages from birth (Genesee, 2008, p. 17). *Cultural identity* refers to a person’s sense of belonging within a particular culture or group (Tajfel & Turner,

1986, pp. 15-16). More information about the aforementioned terms will be provided in the literature review.

### **Description of Method**

For this study, the researcher utilized quantitative survey research to help better understand cochlear implant centers' policies and clinical practices regarding the candidacy and auditory treatment for pediatric cochlear implant recipients whose primary language is Spanish. The survey posed questions to highlight and clarify the policies and clinical practices audiologists and auditory-based therapists implement with children who have cochlear implants and come from monolingual Spanish, ESL, and bilingual English-Spanish speaking families. The survey distributed electronically through the online survey software Qualtrics via email to audiologists and auditory-based therapists at major cochlear implant centers across the United States who serve a large Hispanic population. The cochlear implant centers were selected from online "Find a Clinic" directories on Cochlear America, Advanced Bionics, and MED-EL's websites. The survey was also posted on the websites of the Special Interest Group 9 (SIG-9) of the American Speech-Language-Hearing Association (ASHA) and the Alexander Graham Bell Association for the Deaf or Hard of Hearing. Based on the response rates obtained from these centers, the survey was redistributed on follow-up dates. The participants in the study were targeted based on a convenience sampling technique. The survey contained varied demographic, Likert, and open-ended questions.

### **Conclusion**

This study intends to expand on the available knowledge concerning the policies and clinical practices from cochlear implant centers regarding candidacy and auditory treatment for children whose native language is Spanish. This study will also investigate the therapy

techniques used for these children. The researcher plans to accomplish this by surveying professionals at cochlear implant centers around the United States regarding how they refer and provide therapy or facilitate treatment services for these patients.

For monolingual Spanish, English as a Second Language (ESL), and bilingual English-Spanish speakers who have a hearing impairment, the United States can be a difficult environment to navigate. The social expectation for these pediatric patients to linguistically assimilate to English is both presumptive and ignorant and this study hopes to dispel any thoughts attesting otherwise. In order for the United States to truly fulfill its social “melting pot” moniker claim, it first needs to accept all Americans regardless of race, ethnicity, religion, sexual orientation, handicap, etc. among other *differences* and *qualities*. The following chapter will discuss and analyze the previous scholarship related to dual-language acquisition for cochlear implant patients and the therapy techniques used in typical auditory-verbal or auditory-based intervention or treatment services.

## CHAPTER II

### LITERATURE REVIEW

Nearly one to three out of every 1,000 babies are born with a permanent hearing loss, making hearing loss one of the most common birth defects in the United States (Joint Committee on Infant Hearing [JCIH], 2007, p. 907). Since Universal Newborn Hearing Screening programs have been established across the U.S., it has been estimated that there are about 12,000 newborns born with a hearing loss every year (JCIH, 2007, p. 912). As stated previously, some of these children who are born deaf or hard of hearing can qualify to become cochlear implant recipients. According to the U.S. Food and Drug Administration (FDA) in 2010, there were approximately 219,000 people worldwide who had received a cochlear implant(s) (National Institute on Deafness and Other Communication Disorders [NIDCD], 2013, p. 2). In the United States alone, around 42,600 adults and 28,400 children had received a cochlear implant(s) by the year 2010 (NIDCD, 2013, p. 2).

Although there has been a large amount of research conducted on infants and hearing loss, there still exists areas of study that still need to be explored. In order to assist in this exploration, the current study will investigate cochlear implant centers' policies and clinical practices regarding candidacy and auditory treatment/habilitation for children from monolingual Spanish, English as a Second Language (ESL), and bilingual English-Spanish speaking children. There are several aspects of the scholarship that need to be considered before undertaking this study. Such information includes the anatomy and physiology of the ear and audition, hearing loss, treatment options, modes of communication, multicultural issues, therapy practices used by hearing healthcare clinicians, and outcomes of bilingual pediatric cochlear implant patients. Each of these areas will be examined in this chapter to provide context and direction for this study.

## **Anatomy and Physiology of the Ear**

In order for the reader to understand the nature of hearing and hearing loss, it is essential to comprehend the anatomy and physiology of the ear and hearing. There are three main divisions of the ear, which all contribute to the way in which sound is perceived. In order for the auditory stimuli to be processed effectively in the brain, all of the parts of the auditory pathway must work in conjunction to propagate the signal. Therefore, being able to hear a sound as it is presented is highly dependent on the proper functioning of the anatomy and physiology of the ear.

### **Anatomy of the Ear**

The human auditory system is a very intricate sensory system and has the incredible ability to process a wide range of sounds. It is sensitive enough to distinguish between pressure wave amplitudes of acoustic signals with miniscule magnitudes. The auditory system discerns between different frequencies with tremendous precision and can process acoustic signals from a wide range of intensities as well (Stach, 2009, p. 52). In order to gain a better understanding how the human ear and brain can interpret sounds with such acuity, it is necessary to understand the structures responsible for making it feasible. There are three main anatomical sections of the ear—the outer, middle, and inner portions, which all help transmit the acoustic signal from the vibrating air molecules into an electrochemical signal to a person’s brain (Dalebout, 2009, pp. 26-27; Stach, 2009, p. 52).

**Outer Ear.** When most people think of the ear, the outer ear is normally the portion that typically comes to mind (Martin & Clark, 2015, p. 219; Welling & Ukstins, 2015, p. 18). Though the vast majority of people believe that the outer ear is only home to the external protrusions of the ear, the outer ear also includes anatomical structures that continue internally in the human



head. The primary functions of the outer ear are to collect and funnel vibrating air molecules from the outside environment into the internal portions of the ear, assist with sound localization, and protect the middle ear mechanism (Cranford, 2008, p. 17; Dalebout, 2009, pp. 29-30; Seikel, King, & Drumright, 2010, p. 480; Stach, 2009, p. 52).

The main appendage responsible for this collection of sounds is the *pinna* or *auricle* (Martin & Clark, 2015, p. 219; Stach, 2009, p. 52). The pinna is a cartilaginous structure that has several characteristic ridges, folds, and grooves that assist in the collection of sounds (Debonis & Donohue, 2008, p. 56; Welling & Ukstins, 2015, p. 18). Some of the landmarks of the pinna include: the upper rim of ear known as the *helix*, the lower loose portion known as the *lobule*, or *lobe*, and the bowl at the entrance of the external auditory meatus known as the *concha* (Dalebout, 2009, pp. 29-30; Stach, 2009, p. 52; Welling & Ukstins, 2015, p. 18). The concha is a particularly important structure because it aids in humans' abilities to localize sound sources from in front, behind, below, and above the head (Martin & Clark, 2015, p. 219). Another important role of the concha is that it helps amplify the resonant frequencies of 2,700 Hz because of its anatomical structure (Cranford, 2008, p. 20; Seikel et al., 2010, p. 480; Stach, 2009, p. 52).

The sounds then enter the *external auditory canal (EAC)* or *external auditory meatus (EAM)*, which is a narrow tube completely lined with skin beginning at the concha that funnels sounds to the *tympanic membrane* or *T.M.* The external auditory canal typically measures 23-29 mm in length (Cranford, 2008, p. 20; Martin & Clark, 2015, p. 219; Stach, 2009, p. 53). The first third of the external auditory canal is cartilaginous; whereas, the other two-thirds of the canal are made up of bone contributed by the temporal bones of the skull (Cranford, 2008, p. 20; Dalebout, 2009, p. 30; Debonis & Donohue, 2008, p. 57). In the first third of the external auditory canal, ceruminous glands produce an oily substance called *cerumen*, better known as *earwax*, which

helps repel foreign bodies and bacteria from entering the ear (Cranford, 2008, p. 20; Debonis & Donohue, 2008, p. 57). The external auditory canal ends at the tympanic membrane—commonly referred to as the *eardrum*—which acts as the anatomic boundary between the outer and middle ear (Debonis & Donohue, 2008, p. 58; Welling & Ukstins, 2015, p. 19). The tympanic membrane is a structure made up of several layers of tissue is embedded in the bony portion of the external auditory canal (Debonis & Donohue, 2008, p. 58; Stach, 2009, p. 53). The membrane is taut, similar to that of a drum (Stach, 2009, p. 53). The tympanic membrane is responsible for transducing acoustic energy from vibrating air molecules into mechanical energy when the molecules crash into the membrane and propagating the signal into the middle ear space (Dalebout, 2009, p. 32; Martin & Clark, 2015, p. 221; Welling & Ukstins, 2015, p. 19).

**Middle Ear.** The middle ear is an air-filled space (about 2 cm<sup>3</sup>) that begins with the tympanic membrane, contains three small ossicles, and the eustachian tube (Dalebout, 2009, p. 33; Martin & Clark, 2015, p. 239; Welling & Ukstins, 2015, p. 19). One of the main reasons as to why the middle ear remains an air-filled space is due to an important anatomical structure called the *eustachian tube*. This passageway connects the middle ear with the nasopharynx, or the back of the throat (Dalebout, 2009, p. 33; Stach, 2009, p. 56; Welling & Ukstins, 2015, p. 20). The two main functions of the eustachian tube are to equalize atmospheric pressure between the middle ear cavity and the nasopharynx and help drain any fluids that might gather in the middle ear space into the nasopharynx (Martin & Clark, 2015, p. 240; Welling & Ukstins, 2015, p. 20). The eustachian tube is normally closed and opens regularly when we yawn, chew, or swallow, in order to keep the pressures between the middle ear and the nasopharynx in equilibrium (Debonis & Donohue, 2008, p. 58; Martin & Clark, 2015, p. 240).

The middle ear and the structures inside it form a critical link between the outer ear and the inner ear (Dalebout, 2009, p. 32). The three smallest bones in the body, referred to as the *ossicles* or the *ossicular chain*, transmit mechanical energy from the tympanic membrane into the oval window of the cochlea (Carter, 2008, p. 25; Dalebout, 2009, p. 32; Martin & Clark, 2015, p. 241; Stach, 2009, p. 53). The three ossicles within the chain are the *malleus*, *incus*, and *stapes* are suspended in space by the *stapedius muscle* and the *tensor tympani muscle* (Dalebout, 2009, p. 32; Martin & Clark, 2015, p. 244). The malleus is slightly embedded into the tympanic membrane at its *manubrium*; its point of attachment on the tympanic membrane is referred to as the *umbo* (Martin & Clark, 2015, p. 241; Welling & Ukstins, 2015, p. 19). At the opposite end of this first bone is the head of the malleus, which is connected to the body of the second ossicle, the incus (Martin & Clark, 2015, p. 241; Stach, 2009, p. 56). The incus has a long process, or *crus*, which leads to a smaller crus also known as the *lenticular process* (Seikel et al., 2010, p. 455; Stach, 2009, p. 56). The lenticular process articulates with the head of the *stapes*, the smallest bone of the ossicular chain and the human body (Welling & Ukstins, 2015, p. 19). On the opposite side of the stapes lays the *stapedial footplate*, which articulates with the oval window space of the cochlea—the beginning of the inner ear (Martin & Clark, 2015, p. 241; Seikel et al., 2010, p. 455; Stach, 2009, pp. 56-57).

**Inner Ear.** There are two different sensory systems that share the inner ear space: the *cochlea* or the auditory labyrinth dedicated to hearing, and the *semicircular canals*, the vestibular labyrinth used to maintain balance and posture (Cranford, 2008, pp. 30-33; Dalebout, 2009, p. 34; Debonis & Donohue, 2008, p. 63; Seikel et al., 2010, p. 460). The cochlea is a fluid-filled space within the temporal bone that is the sense organ of hearing and resembles the shape of a snail shell (Dalebout, 2009, p. 34; Debonis & Donohue, 2008, p. 65; Stach, 2009, p. 58). If the

cochlea were to be “unrolled” it would be about 1 cm wide and 5 mm long from the base to the apex in humans (Martin & Clark, 2015, p. 278). There are three main sections of the cochlea. In order from the most superior area to the most inferior section are the *scala vestibuli*, *scala media*, and *scala tympani* (Dalebout, 2009, pp. 34-35; Debonis & Donohue, 2008, pp. 65-66; Stach, 2009, p. 58; Welling & Ukstins, 2015, p. 21). The *scala media* is separated from the *scala vestibuli* by *Reissner’s membrane* and from the *scala tympani* by the *basilar membrane* (Debonis & Donohue, 2008, p. 66; Martin & Clark, 2015, p. 278; Stach, 2009, p. 58). The *oval window* is the entranceway/exit into the *scala vestibuli* whereas the *round window* acts as the entrance into the *scala tympani* (Martin & Clark, 2015, p. 278). Both of these channels terminate at the apical end of the cochlea called the *helicotrema* (Martin & Clark, 2015, p. 278; Welling & Ukstins, 2015, p. 21).

Both of these canals are filled with a fluid that has a higher concentration of sodium ions (Na<sup>+</sup>) than potassium ions (K<sup>+</sup>) called *perilymph* (Martin & Clark, 2015, p. 278; Welling & Ukstins, 2015, p. 21). *Endolymph*, on the other hand, is a fluid laden with potassium ions compared to sodium ions and fills the *scala media* (Debonis & Donohue, 2008, p. 66; Martin & Clark, 2015, p. 278; Welling & Ukstins, 2015, p. 21). This difference in ionic concentration between endolymph and perilymph creates *endocochlear electrical potentials*, or electrical stimulation that helps conduct neural transmission of sound (Welling & Ukstins, 2015, p. 21). These electrochemical potentials all occur in the *scala media* along the full length of the basilar membrane in the end organ of hearing, the *organ of Corti*, which contains all of the sensory cells of hearing (Debonis & Donohue, 2008, p. 66; Martin & Clark, 2015, p. 278; Stach, 2009, p. 58).

There are two different types of sensory cells within the organ of Corti, both of which are unique, but contribute to humans’ abilities to hear in distinct manners. These cells are known as

both *outer hair cells* and *inner hair cells* (Dalebout, 2009, p. 35; Debonis & Donohue, 2008, p. 67; Stach, 2009, p. 61; Welling & Ukstins, 2015, p. 21). There are 3-5 rows of about 12,000-15,000 outer hair cells, many of which have their stereocilia embedded in the *tectorial membrane*, a gel-like membrane that forms a type of “roof” over the basilar membrane (Martin & Clark, 2015, p. 279; Stach, 2009, p. 61; Welling & Ukstins, 2015, p. 21). Inner hair cells, on the other hand, are in one row of about 3,000-3,500 hair cells, which are proximally, but not in direct contact with, the tectorial membrane (Debonis & Donohue, 2008, p. 68; Stach, 2009, p. 62; Welling & Ukstins, 2015, p. 22). The outer hair cells are innervated mostly by efferent, or motor, fibers of the nervous system, whereas, the inner hair cells are innervated by the afferent, or sensory, fibers of the nervous system (Stach, 2009, pp. 61-62).

**Central Auditory Pathway.** The auditory system is primarily an afferent system that transmits electrochemical signals from the cochlea to the central auditory cortex of the brain (Stach, 2009, p. 66). In order for these signals to be propagated to the central auditory cortex, auditory nerve receptors located just beneath the hair cells in the cochlea need to stimulate the 8<sup>th</sup> cranial nerve, or the *vestibulocochlear nerve* (Dalebout, 2009, p. 37). There are about 30,000-50,000 auditory fibers that come from the cochlea that make up the auditory portion of the vestibulocochlear nerve (Breedlove, Watson, & Rosenzweig, 2010, p. 255). The vestibulocochlear nerve stems from the *cochlear nucleus*—a site where bundles of nerves are located at the junction of the pons and medulla of the brainstem, and runs through the *internal auditory canal (IAC)* to the base of the brainstem (Debonis & Donohue, 2008, p. 73; Martin & Clark, 2015, p. 316). There are two separate portions of the vestibulocochlear nerve. Around 30,000 nerve fibers from auditory portion of the nerve travels inferiorly to the *dorsal cochlear nucleus*, whereas the 20,000 nerve fibers from the vestibular section of the nerve move

superiorly to the *ventral cochlear nucleus* (Martin & Clark, 2015, p. 317). The internal auditory canal serves as a channel that connects the cochlear nuclei to the thalamus allowing sensory information from cranial nerves VII, VIII, and the internal auditory artery to be passed (Martin & Clark, 2015, p. 316).

As auditory information continues to travel toward the primary auditory cortex, there are several “stations” along the path that modify the incoming auditory nerve impulses before they reach their destination. The first station is the *superior olivary complex*, which receives sensory input from both ipsilateral and contralateral cochlear nuclei (Breedlove et al., 2010, p. 255; Dalebout, 2009, p. 37; Stach, 2009, p. 67). The superior olivary complex is the site that localizes the direction of the sound source by analyzing differences between time and intensity of sounds in both ears (Martin & Clark, 2015, p. 317). The superior olivary complex also plays a major role in another key idea concerning the brain, the notion of *decussation*. Decussation is described as the crossing-over of nerve fibers through *commissures*—specialized bundles of nerve fibers that unite similar structures on both sides of the brain (Debonis & Donohue, 2008, p. 73; Martin & Clark, 2015, p. 317). The first commissure is found in the *trapezoid body*, which is a specific portion of the superior olivary complex (Breedlove et al., 2010, p. 255; Debonis & Donohue, 2008, p. 73; Martin & Clark, 2015, p. 317; Welling & Ukstins, 2015, p. 23). After the sensory information is processed at the superior olivary complex, the electrical impulses are transmitted both ipsilaterally, same side of the brain, and contralaterally, opposite side of the brain, to the *lateral lemniscuses*, *inferior colliculi*, and finally to the *medial geniculate bodies* of the *thalamus* (Breedlove et al., 2010, p. 255; Debonis & Donohue, 2008, p. 73; Welling & Ukstins, 2015, p. 23). The medial geniculate body is the last subcortical relay “station” found in the thalamus, where the ventral portion is supposedly responsible for auditory processing. There are no

commissural neurons at the level of the medial geniculate body so no decussations occur beyond this “station” (Martin & Clark, 2015, p. 317). After the thalamus receives all of the auditory information, nerve fibers fan out as *auditory radiations* and ascend to the temporal lobe, or more specifically, the *auditory cortex* (Martin & Clark, 2015, p. 317; Stach, 2009, p. 69; Welling & Ukstins, 2015, p. 23).

The auditory cortex is located in the temporal lobes of the brain and can be divided into the three basic areas: primary, secondary, and tertiary. The primary auditory cortex is the first cortical region of the auditory cortex that is broadly responsible for discrimination of frequency and intensity of the incoming auditory stimuli and sound localization (Welling & Ukstins, 2015, p. 24). Within the primary auditory cortex is situated in a particular area known as *Heschl’s gyrus*, (transverse temporal gyri) which is the first cortical structure to receive and process incoming auditory information from the auditory radiations (Kolb & Whishaw, 2012, p. 332; Martin & Clark, 2015, p. 318). The second and tertiary auditory cortices contain vital areas that control language production, speech processing, and speech perception. The first structure is *Broca’s area* (inferior frontal gyrus), which is broadly linked to motor production of language and the processing of sentence structure, grammar, and syntax (Welling & Ukstins, 2015, p. 24). The other major region is *Wernicke’s area* (inferior temporal lobe), which directs language comprehension and speech perception (Welling & Ukstins, 2015, p. 24).

Though the central auditory cortex is generally perceived as a sensory system, there are both afferent (sensory) and efferent (motor) systems. The afferent sensory fibers are responsible for ascending information from the periphery to the auditory cortex (Martin & Clark, 2015, p. 318; Welling & Ukstins, 2015, p. 24). While the descending efferent fibers from the auditory cortex provide inhibitory feedback along the central auditory pathway, which improves

processing by decreasing background noise that may be interfering with the signal (Martin & Clark, 2015, p. 318; Welling & Ukstins, 2015, p. 24).

### **Physiology of the Ear**

Hearing is an obligatory function; it is a sensory system that is constantly functioning and cannot be “turned off” (Stach, 2009, p. 52). Sound is only audible to us if we have an auditory system that is able to support and utilize the physical characteristics of sound—its frequency and intensity—to understand the world around us (Welling & Ukstins, 2015, p. 18). In order to better understand the way in which sound is transduced from the vibrating air molecules within the external auditory meatus to electrical action potentials in the brain, it is necessary to detail the entire auditory pathway and how we hear as humans.

**How We Hear.** Before any signal can be interpreted by the brain, there first needs to be a stimulus. In the case of audition, that signal is known as a *sound*, which can be defined as a psychological or physical phenomenon. From a psychological perspective, a sound is the sensation of hearing something. In the physical sense, however, a sound is a condition of disturbances in molecules that are propagated through a medium, such as air (Lass & Woodford, 2007, p. 5; Martin & Clark, 2015, p. 31). There are three components necessary in order to produce a sound: a source of energy, an agent capable of vibration, and a medium able to transmit energy (Lass & Woodford, 2007, p. 5). As these air molecules are pushed together, *compression*, and then are pulled apart, *rarefaction*, the air pressure creates a motion known as *waves* (Martin & Clark, 2015, p. 31).

As the acoustic waves travel towards the pinna of the human ear, the vibrating air molecules create pressure waves, which are collected by the pinna of outer ear (Debonis & Donohue, 2008, p. 57). The acoustic energy then receives some natural amplification from the



resonant frequencies associated with the concha (Cranford, 2008, p. 20; Seikel et al., 2010, p. 480; Stach, 2009, p. 52). The air molecules are then funneled into the external auditory canal, where the air pressure waves vibrate the tympanic membrane, setting it in motion (Stach, 2009, p. 52). The elasticity of the tympanic membrane helps to convert the acoustic energy into mechanical energy as it sets the malleus, incus, and stapes of the ossicular chain in motion (Debonis & Donohue, 2008, p. 60). The buckling of the tympanic membrane and the lever-like action of the ossicles increases the vibrational amplitude as the mechanical energy moves across each bone, terminating at the stapes (Stach, 2009, p. 57; Welling & Ukstins, 2015, p. 19).

The pressure from the stapedial footplate being pushed in and out of the oval window makes the fluid-filled cochlea move in a wave-like motion, creating hydrodynamic energy (Stach, 2009, p. 65). The traveling wave advances growing in magnitude through the scala of the cochlea until it reaches a point of maximum displacement, bending the basilar and tectorial membranes of the cochlea (Kolb & Whishaw, 2012, p. 329; Stach, 2009, p. 65). The basilar membrane bends according to which frequency at which it is most responsive (Stach, 2009, p. 65). Traveling waves of faster frequencies, displace maximum peaks at the base of the cochlear. Waves of slower frequencies, however, displace maximum peaks in the bony apex of the cochlea (Kolb & Whishaw, 2012, p. 329). As a result, the amount of displacement along the tonotopically-organized membrane is dependent and corresponds with certain frequencies of the sound wave. When a wave frequency travels down the basilar membrane, tips of the inner hair cells are stimulated at the point of maximum displacement, resulting in an electrochemical and eventually a neural response (Kolb & Whishaw, 2012, p. 329; Stach, 2009, p. 65).

Both the inner and outer hair cells are attached inferiorly to the basilar membrane. One major distinction though is that at the opposite end, the tips of the outer hair cells are rooted in

the tectorial membrane above (Kolb & Wishaw, 2012, p. 330). The main function of these cells is to contract and relax, varying the stiffness of the tectorial membrane, which has huge implications on the inner hair cells (Breedlove et al., 2010, p. 253; Kolb & Wishaw, 2012, p. 330). The inner hair cells act as the auditory receptor cells of the cochlea (Stach, 2009, p. 65; Welling & Ukstins, 2015, p. 21). The movement of the basilar and tectorial membranes creates a shearing force that bends the tips of the inner hair cells when they come in contact with the overlying tectorial membrane (Kolb & Wishaw, 2012, p. 330). The movement of the tips of the inner hair cells results in an electrochemical response, which then synapses with neighboring axons from the vestibulocochlear nerve (Breedlove et al., 2010, pp. 253-254; Kolb & Wishaw, 2012, p. 331). From the vestibulocochlear nerve, electrical impulses are then transferred up the central auditory pathway (see pages 8-11) and are then transferred to the auditory cortices of the brain (Vincenti et al., 2014, p. 72).

Although this is the better-known auditory pathway, it should be noted that there are two distinct pathways in which humans hearing can be tested—*air conduction* and *bone conduction*. The air conduction pathway describes the course sounds take using the outer and middle ear to transmit auditory signals to the inner ear (Martin & Clark, 2015, p. 17). In this sense, air conduction employs all of the divisions of the hearing mechanism described above. Bone conduction, however, directly stimulates the inner ear by vibrating the bones of the skull, bypassing both the outer and middle ears (Welling & Ukstins, 2015, p. 31).

### **Hearing Loss**

Approximately 48 million people in the United States have hearing loss in one or both ears (Martin & Clark, 2015, p. 7). Hearing impairment may occur at any point along the auditory pathway and due to the complexity of the hearing mechanism, there is a large scope of types,

causes, and etiologies of hearing loss (Stach, 2009, p. 91; Welling & Ukstins, 2015, p. 19). The following section will describe the most common types, assessments, and tests associated with diagnosing and treating hearing loss in order to provide the reader with the necessary knowledge of the implications hearing loss may have on the lives of individuals surrounded by a predominantly “hearing world.”

### **Types of Hearing Loss**

Hearing loss is categorized according to the site of lesion: outer ear, middle ear, inner ear, and/or the auditory portion of the vestibulocochlear nerve. The following section will detail the three major types of hearing loss: conductive, sensorineural, and mixed. Some other important types of hearing loss that do not have specified sites of lesion will also be discussed.

**Conductive.** Hearing loss may occur at any point along the auditory pathway. When there is an issue that disturbs the air conduction pathway through the outer and/or middle ear, the lesion is classified as a *conductive hearing loss* (Debonis & Donohue, 2008, p. 41). In the case of a conductive hearing loss, the auditory signal is *attenuated*—or the strength of the signal is reduced (Stach, 2009, p. 92). Conductive losses cannot exceed approximately 60 dB HL because at that intensity, the auditory signal stimulates the cochlea via bone conduction (Stach, 2009, p. 126). Nevertheless, if the sound is presented via bone conduction, the obstacle would be bypassed and stimulate the cochlea directly.

Since the inner ear and central auditory pathway do not exhibit any impairment with a conductive hearing loss, the individual’s hearing by bone conduction is within normal limits (Dalebout, 2009, p. 55; Martin & Clark, 2015, p. 19). Conductive hearing losses can typically be treated with medical or surgical intervention to amend the obstruction (Debonis & Donohue, 2008, p. 41; Welling & Ukstins, 2015, p. 25). If medical treatment does not improve the loss,

amplification technology such as hearing aids typically increase the patient's hearing by increasing the intensity of the sounds (Martin & Clark, 2015, p. 368).

**Sensorineural.** Sensorineural hearing loss emanates from damage to the inner ear and/or the central auditory pathway (Dalebout, 2009, p. 56; Stach, 2009, p. 94). Most sensorineural hearing losses involve loss of outer hair cells due to genetics or prenatal complications (Cranford, 2008, p. 70; Welling & Ukstins, 2015, p. 25). Though many of these components are *congenital*—present at birth, sensorineural hearing loss can also be acquired through exposure to ototoxic drugs, noise exposure, and aging, all of which damage the outer hair cells in the cochlea (Cranford, 2008, p. 70). Since the lesion lies in the inner ear and/or central auditory pathway, the auditory signal will be attenuated in both the air conduction and bone conduction pathways (Stach, 2009, p. 94). The attenuation of the auditory signal, however, is not the only implication of this type of hearing loss. Sensorineural hearing losses additionally cause a decreased ability to understand clear speech (Welling & Ukstins, 2015, p. 25). Medical, surgical, and amplification interventions typically do not usually resolve sensorineural hearing losses (Martin & Clark, 2015, p. 19).

***Auditory Neuropathy Spectrum Disorder (ANSO).*** Though most sensorineural hearing losses have a cochlear site of lesion, there are a few cases that the central auditory pathway is affecting the individual's hearing. One particularly complicated audiological disorder, Auditory Neuropathy Spectrum Disorder (ANSO), continues to puzzle hearing healthcare professionals. Though it was once considered uncommon, ANSO has been cited as contributing 8-15% of all childhood hearing losses (Roush, Frymark, Venediktov, & Wang, 2011, p. 159). Individuals with ANSO demonstrate normal outer hair-cell function within the cochlea, but appear to have a dys-synchronous flow of electrical signals to the vestibulocochlear nerve (DeBonis & Donohue,

2008, p. 259; Martin & Clark 2015, p. 326; Roush et al., 2011, p. 159). The degree that the transmission of the signal is disrupted varies from individual and often fluctuates daily (Martin & Clark 2015, p. 326). Those who have ANSD find it especially challenging to hear speech when in the presence of background noise (DeBonis & Donohue, 2008, p. 259; Roush et al., 2011, p. 159). ANSD does not benefit much from amplification from hearing aids; however, speechreading cues and cochlear implants are oftentimes more helpful rehabilitative tools (Martin & Clark, 2015, p. 326).

**Mixed.** Mixed hearing losses occur when both the conductive and sensorineural components contribute to the hearing loss (Dalebout, 2009, p. 57; Welling & Ukstins, 2015, p. 26). Consequently, mixed hearing losses present issues in the outer and/or middle ear, as well as lesions in the inner ear and/or central auditory pathway. This not only causes a hearing loss in the bone conduction pathway, but also provokes an even greater loss in air conduction pathway (Martin & Clark, 2015, p. 19; Stach, 2009, p. 98). Treatment for mixed hearing losses combines the interventions used for conductive and sensorineural hearing losses individually. The conductive component can be addressed medically or surgically, whereas the sensorineural portion can benefit from auditory (re)habilitation therapy (DeBonis & Donohue, 2008, p. 42).

**Other.** Though most hearing impairments can be measured through a series of tests, some hearing losses cannot be identified by a specific issue in the auditory system. Two examples of these impairments will be described below.

***(Central Auditory Processing Disorder [C]APD).*** Individuals who demonstrate typical hearing, but have difficulty understanding auditory information typically have (Central) Auditory Processing Disorder (Dalebout, 2009, p. 94; Stach, 2009, p. 99). The disorder suggests that some idiopathic dysfunction exists in the perceptual processing of auditory information in the central

auditory pathway (Stach, 2009, p. 100; Welling & Ukstins, 2015, p. 274). Due to the complexity of the central auditory pathway, there is a vast range of auditory processing disorders (Dalebout, 2009, p. 94). Individuals with (C)APD can struggle with a variety of areas such as: sound localization, auditory discrimination, auditory pattern recognition, auditory performance in competing acoustic signals, and auditory performance with degraded acoustic signals (Debonis & Donohue, 2008, p. 378). Although (C)APD is oftentimes comorbid with other disorders such as Attention Deficit Hyperactivity Disorder (ADHD), language delays, and learning disabilities, (C)APD is its own disorder and should be treated as such (Stach, 2009, p. 101; Welling & Ukstins, 2015, p. 274).

*Nonorganic.* Most cases of hearing loss are rooted in some sort of physical basis. Nonorganic hearing loss, however, refers to when the individual reports a hearing loss without any organic disorder or underlying pathological evidence to show the extent of the loss (Debonis & Donohue, 2008, p. 362; Martin & Clark, 2015, p. 344). One of the most common symptoms of a nonorganic hearing loss is inconsistent performance on audiological tests (Martin & Clark, 2015, p. 348). Although there is no indication that a hearing impairment does truly exist, the audiologist needs to identify potential rationales as to why the patient could demonstrate such symptoms. Though each individual's motivation or reason for demonstrating a hearing loss is different, it should be noted that there is a distinction between those that purposefully "feign" hearing losses between those rooted in psychological factors.

Two similar terms used to describe nonorganic hearing loss are functional hearing loss and malingering. Functional hearing loss and malingering insinuate that there is a deliberate exaggeration of hearing loss, usually for compensatory strategies such as desiring attention or monetary gain (Debonis & Donohue, 2008, p. 362; Stach, 2009, p. 103). Psychogenic hearing

losses, on the other hand, indicate an exaggerated hearing loss of unconscious origin, which differs greatly from those who are purposefully deceitful in the cases of functional hearing loss and malingering (Martin & Clark, 2015, p. 345). Though patients with nonorganic hearing loss may demonstrate an array of different symptoms or motivations regarding their hearing loss, they ultimately should be referred to psychological professionals, who are more adept at helping patients resolve their potential psychological issues than hearing healthcare professionals (Debonis & Donohue, 2008, p. 367; Martin & Clark, 2015, p. 357).

To ensure that hearing healthcare professionals accurately assess and diagnose various disorders associated with hearing loss, a wide range of audiometric, electrophysiological and behavioral assessment tools is used. These tests will be reviewed in the following section.

### **Assessing Hearing Loss**

Audiologists are generally interested in two kinds of measurements: those that determine the individual's hearing ability and those that focus on the noise levels in the environment (Martin & Clark, 2015, p. 54). The basic goal of assessing an individual's hearing is to ensure that it is within normal limits. If there is any chance that there is a hearing loss, determining the type, symmetry, configuration, and severity of the loss is vitally important in establishing where the problem may exist (Dalebout, 2009, p. 44). If the issue is pinpointed, oftentimes professionals can gain a better understanding of how the hearing loss is affecting the individual's life and can help create a plan on how to minimize those issues (Dalebout, 2009, p. 44).

**Audiogram.** One of the most basic hearing tests is known as *pure-tone audiometry testing*. Pure-tone audiometry is performed using a pure-tone audiometer, an electronic device designed to deliver sounds at a selected *frequency*, also known as “pitch” and measured in Hertz (Hz), and a selected *intensity*, also known as “loudness” and measured in decibels hearing level

(dB HL), to determine the patient's hearing sensitivity through bone and air conduction (Martin & Clark, 2015, pp. 54-56). In order to determine the lowest possible sound that the individual can hear, audiologists try to find the very softest level at which the patient can barely hear the pure-tones of various frequencies (Debonis & Donohue, 2008, p. 79). A patient's *thresholds*, are based on a 50% criterion for hearing a given pitch, are then placed on an *audiogram*—a graphic representation of the patient's audibility across the audiometric frequency range (Martin & Clark, 2015, p. 54; Stach, 2009, p. 73; Welling & Ukstins, 2015, p. 25).

**Severity/Degree of Hearing Loss.** One reason pure-tone audiometry is so useful is because it can help determine if there is a difference in hearing loss severities between a patient's ears, meaning one ear could have better or worse hearing than another. Table 1 offers the scale used for children to determine the severity/degree of hearing loss.

Table 1

<i>Scale of Severity/Degree of Hearing Impairment Based on Pure-tone Audiometry</i>	
Pure-tones (dB HL)	Severity/Degree of Hearing Loss
-10 to 15	Within Normal Limits (WNL)
16 to 25	Slight
26 to 40	Mild
41 to 55	Moderate
56 to 70	Moderately severe
71 to 90	Severe
>90	Profound

(Adapted from Martin & Clark, 2015, p. 83).

### **Pediatric Hearing Loss**

Approximately 12,000 infants are identified every year with having hearing loss according to the National Institute on Deafness and Other Communication Disorders (JCIH, 2007, p. 912). Additionally, estimates state approximately 4,000 to 6,000 infants and toddlers



between the ages of birth and 3 years of age who passed the newborn screening test acquire late onset deafness (Flexer & Madell, 2008, p. xix). Therefore, approximately 16,000 to 18,000 infants and toddlers are detected with hearing loss every year in the United States. Though hearing impairment is an issue by itself, numerous studies have verified that when hearing loss is not accurately diagnosed and treated, it can negatively affect the speech, language, academic, emotional, and psychosocial development of young children (Flexer & Madell, 2008, p. XIX).

**Early Hearing Detection and Identification.** Over the past few decades, there has been a significant growth of information and technology about managing hearing loss in infants and children. One of the main explanations of this development is the introduction of *Early Hearing Detection and Identification (EHDI)* programs. The purpose of these programs is to improve policies relating to screening all newborns for hearing loss in the United States (Flexer & Madell, 2008, p. 32). As a result of the institution of *Universal Newborn Hearing Screening (UNHS)*, the percentage of newborns screened for hearing loss has risen from 3% to 95% in the past 15 years (p. 31). It has been recommended that all infants be screened for hearing loss within 1 month of age; receive a diagnosis of hearing loss by 3 months of age; and if needed, clinical intervention should be by 6 months of age (Johnson, 2012, p. 56). The majority of tests utilized for UNHS are electrophysiological, which are useful for testing infants who cannot consciously participate (DeBonis & Donohue, 2008, p. 169).

**Electrophysiological Testing.** Electrophysiological assessments are useful tools for audiologists because they can add more specific information about aspects of the individual's hearing that behavioral measures cannot. For example, infants who are born in hospitals are required by law to have their hearing screened prior to discharge (Madell & Flexer, 2008, p. 45). Though infants' can behaviorally respond to certain sound stimuli, audiologists' interpretations

of the infants' hearing can be subjective (DeBonis & Donohue, 2008, p. 170; Welling & Ukstins, 2015, p. 88). In order to provide the most accurate diagnosis of a patient, there are several electrophysiological tests that provide useful insight about the nature of an individual's hearing without needing them to actively participate.

***Otoacoustic Emissions (OAEs).*** The cochlea is the most important organ of hearing. Not only does it give humans the ability to interpret sound, but it also is capable of producing sound itself (Dalebout, 2009, p. 52; Welling & Ukstins, 2015, p. 88). This phenomenon, first noted by David Kemp in 1978, creates “an impulse response waveform” due to acoustic stimuli presented to a typically functioning cochlea (DeBonis & Donohue, 2008, p. 169; Martin & Clark, 2015, p. 165). These otoacoustic emissions arise from the expansion and contraction of the outer hair cells of the cochlea (DeBonis & Donohue, 2008, p. 169; Welling & Ukstins, 2015, p. 89). Otoacoustic emissions are frequency-specific, in that, they result from the basilar membrane responsible for managing that frequency (Stach, 2009, p. 313). A sensitive microphone in the external auditory canal can record the mechanical energy produced by the *spontaneously produced otoacoustic emissions (SPOAEs)*, which are propagated outward from the cochlea (Martin & Clark, 2015, p. 166; Stach, 2009, p. 313; Welling & Ukstins, 2015, p. 88). SPOAEs, which do not require auditory stimulation, occur in nearly 50-70% of those who have hearing within normal limits (Stach, 2009, p. 313). There are ways, however, to *transiently evoke OAEs (TEOAEs)* from the cochlea (Cranford, 2008, p. 101; Martin & Clark, 2015, p. 166; Stach, 2009, p. 315). In order to evoke an OAE, a sound is sent into the ear, and in response, the ear produces a sound and sends it back towards the external auditory canal (Welling & Ukstins, 2015, p. 88).

Considering OAE testing only lasts a few minutes and requires no participation from the individual being tested, they are one of the most commonly used tests used for newborn hearing

screenings in the United States (DeBonis & Donohue, 2008, p. 170; Madell & Flexer, 2008, pp. 124-125). Absent OAEs during these screenings usually suggest there is a sensorineural hearing loss with a cochlear site of lesion (Stach, 2009, p. 320). OAEs are not used exclusively for newborn screenings though (Dalebout, 2009, p. 52). According to Stach (2009), OAEs are also used for cochlear function monitoring and other diagnostic applications (p. 318).

***Auditory-Evoked Potentials.*** Once an acoustic signal has been processed through the cochlea, the sound energy is not what is transmitted to the brain, but rather a series of electrochemical impulses. As these electrochemical signals are propagated onto the vestibulocochlear nerve and up the central auditory pathway, there have been a considerable amounts of tests created to measure the *cortical auditory evoked potentials (CAEPs)* or neurological activity during this transmission (Cranford, 2008, p. 97; DeBonis & Donohue, 2008, p. 202; Martin & Clark, 2015, p. 169). The main discrepancy between these tests is where they measure the neurological activity along the central auditory pathway and the *latency*—the time it takes for the brain to respond to the presented stimulation (Martin & Clark, 2015, p. 169; Sharma, Nash, & Dorman, 2009, p. 273). The first positive peak or P1 component of the CAEP is considered an indicator of the maturity of the auditory cortical areas (Sharma et al., 2009, p. 273). The P1 symbolizes the sum of the synaptic delays throughout the central auditory pathways (Eggermont, Ponton, Don, Waring, & Baldwin, 1997, p. 161).

The two main types of auditory-evoked potentials are *Auditory Brainstem Response (ABR)* and *Auditory Steady State Response (ASSR)* (DeBonis & Donohue, 2008, p. 202; Martin & Clark, 2015, pp. 171, 174; Stach, 2009, pp. 300-301; Welling & Ukstins, 2015, p. 90). There are two main purposes of ABR: to rule out any damage beyond the cochlea—*retrocochlear*—and to estimate an individual's hearing thresholds (DeBonis & Donohue, 2008, p. 205).

Electrodes are placed on the individual's head as "clicks" or "tone pips" are presented in rapid succession via earphones or ear inserts to the individual (Dalebout, 2009, p. 53; DeBonis & Donohue, 2008, p. 206; Welling & Ukstins, 2015, p. 90). The electrodes then capture the neural responses and are recorded as "waveforms" as the auditory signal is being provided (Martin & Clark, 2015, p. 172; Stach, 2009, p. 300; Welling & Ukstins, 2015, p. 91). Unlike ABR, ASSR elicits evoked potentials using a steady-state tone stimulus (DeBonis & Donohue, 2008, p. 221; Welling & Ukstins, 2015, p. 92). As a result, ASSR can provide frequency-specific information to help differentiate among the various degrees and severities of hearing loss (Welling & Ukstins, 2015, p. 92).

**Behavioral Assessment.** Electrophysiological testing such as OAE, ABR, and ASSR are frequently used to provide more specific diagnostic data regarding an individual's hearing, especially with infants. According to Madell & Flexer (2008), although these tests are essential to the practice of audiology they are in fact not true tests of hearing. The only true tests of hearing are behavioral (p. 54). In order for these tests to be truly effective, the infant must be developmentally mature enough to respond to sound stimuli in a repeated manner and depending upon the test, a certain degree of receptive language (Martin & Clark, 2015, p. 196; Welling & Ukstins, 2015, p. 61).

**Behavioral Observation Audiometry (BOA).** Many of the behavioral assessment measures used to test infants' hearing rely on the infant's ability to localize auditory stimuli (Martin & Clark, 2015, p. 196). From birth to 6 months of age, *Behavioral Observation Audiometry (BOA)* is a test used to assess infants' responses to acoustic stimuli through a variety of responses such as: blinking, eye movement, startling, changes in sucking pattern, and several other objective responses (DeBonis & Donohue, 2008, p. 306; Madell & Flexer, 2008, p. 56;

Martin & Clark, 2015, p. 196; Welling & Ukstins, 2015, p. 62). If the child does not turn to locate a sound by the age of 6-8 months, it can be suspected that something is wrong, although the issue is not always a hearing loss (Martin & Clark, 2015, p. 196). Since the auditory stimuli are usually presented via sound-field audiometry—using multiple speakers to present the acoustic signal—BOA does not provide ear-specific information (DeBonis & Donohue, 2008, p. 306; Madell & Flexer, 2008, p. 58; Welling & Ukstins, 2015, p. 62).

***Visual Reinforcement Audiometry (VRA).*** As infants mature developmentally at approximately 6-7 months of age, acclimating them to respond to the auditory stimuli becomes easier (Welling & Ukstins, 2015, p. 62). The strength and consistency of their responses, however, can become more variable due to *auditory habituation* (DeBonis & Donohue, 2008, pp. 306-307). As speech and tonal stimuli are continuously repeated, it is common for the child to become less interested in the task (DeBonis & Donohue, 2008, p. 307). One way to combat auditory habituation is visually reward the child for appropriate responses (DeBonis & Donohue, 2008, p. 307; Martin & Clark, 2015, p. 198; Welling & Ukstins, 2015, p. 62). *Visual Reinforcement Audiometry (VRA)* is typically used with children from 6 to 36 months (Madell & Flexer, 2008, p. 65). The infant is conditioned to localize the auditory stimuli, and as a result for appropriate responses, is rewarded by the movement of a toy (DeBonis & Donohue, 2008, p. 307; Martin & Clark, 2015, p. 198; Welling & Ukstins, 2015, p. 62). After the child is conditioned to the process, the child expectantly turns his/her head to localize the sound source and the moving toy (DeBonis & Donohue, 2008, p. 307; Martin & Clark, 2015, p. 198; Welling & Ukstins, 2015, p. 62). Oftentimes the VRA does not specify which ear is responding to the signal; however, VRA can provide more ear-specific information depending on the child's

willingness to wear earphones or ear inserts (Stach, 2009, p. 374; Welling & Ukstins, 2015, p. 62).

***Conditioned Play Audiometry (CPA)***. As children grow to approximately 2 ½ years old, they usually can be conditioned to play audiometry. *Conditioned Play Audiometry (CPA)* is a method of behavioral testing in which children's appropriate responses to auditory signals results in the child carrying out a pre-established play activity (DeBonis & Donohue, 2008, p. 309; Madell & Flexer, 2008, p. 76; Martin & Clark, 2015, p. 202; Welling & Ukstins, 2015, p. 63). Play activities can be any type such as: placing a ring on a peg, moving beads from one container to another, shooting a ball through a hoop, etc. Similar to VRA, depending on the child's willingness to wear earphones or ear inserts, CPA can ideally provide audiologists with ear-specific information (Madell & Flexer, 2008, pp. 78-79; Welling & Ukstins, 2015, p. 63)

Based off of the audiological information collected from electrophysiological and behavioral testing, audiologists can develop a much better understanding of a potential diagnosis for an individual. Once a diagnosis of the hearing loss is made, audiologists can then transition into the most efficient way to treat those with hearing loss. Consequently, the following section will review different types of hearing sensory technology used to assist those with hearing loss.

### **Hearing Sensory Technology**

Learning the intricacies of audiological evaluation is essential to comprehending the type and nature of an individual's hearing loss. The impact of a hearing loss on an individual's ability to function daily varies from person to person. Since each person is unique in how he/she copes with hearing loss, audiologists need to consider a vast array of factors when determining the most appropriate intervention to enhance an individual's speech understanding and quality of life (Martin & Clark, 2015, p. 365). Those factors include: skills related to communication, social

interaction, independent functional capacity, vocational needs, and academic needs (Welling & Ukstins, 2015, p. 130). In the following section, the benefits of hearing sensory technologies including the following: hearing aids, hearing assistive technologies, and cochlear implants will be reviewed.

### **Hearing Aids**

According to Dalebout (2009), only 5 to 10 percent of adults with a hearing impairment can be treated with either a medical or surgical intervention (p. 109). The remaining 90 to 95 percent can be treated nonmedically with appropriate types of hearing sensory technology and auditory (re)habilitation (p. 109). One particular type of hearing sensory technology common for those with hearing loss is a hearing aid. A *hearing aid* may be defined as an electronic device consisting of a *microphone*, *amplifier*, and *receiver* used to amplify sounds and deliver them to an individual's ear (DeBonis & Donohue, 2008, p. 434; Martin & Clark, 2015, p. 366; Stach, 2009, p. 468). The hearing aid's omnidirectional microphone located on the outside of the hearing aid senses the air-pressure waves of the acoustic signals and convert the acoustic energy into an electrical signal (DeBonis & Donohue, 2008, p. 434; Stach, 2009, p. 435). Next, the electrical signal reaches the amplifier, which increases the intensity or "loudness" of the signal. Considering the outer ear cannot process electrical stimulation, the electrical signal is then converted back to an acoustic signal by the receiver (DeBonis & Donohue, 2008, p. 434; Welling & Ukstins, 2015, p. 133).

There are two different categories of hearing aids—*analog* and *digital*. Analog hearing aids involve modifying a continuous electrical current that is analogous to the sound that comes into the instrument (Martin & Clark, 2015, p. 366; Welling & Ukstins, 2015, p. 133). Analog hearing aids, however, have since been replaced with a more sophisticated technology, which

benefits those with hearing impairment even more. Digital hearing aids convert sounds waves into numbers that can be manipulated by a computer to meet the client's ideal needs for amplification (DeBonis & Donohue, 2008, p. 434; Martin & Clark, 2015, p. 366; Welling & Ukstins, 2015, p. 133). During the *hearing aid selection process*, characteristics of the hearing aid that are both electroacoustic and nonelectroacoustic in nature play large roles in the decision as to which hearing aid will best "fit" the individual (Dalebout, 2009, pp. 110-111; DeBonis & Donohue, 2008, p. 434).

**Types of Hearing Aids.** Hearing aids come in a variety of designs, shapes, colors, sizes, and types. The most common type of device is a *behind-the-ear (BTE)* hearing aid, which is worn over the top of the ear. The microphone, amplifier, and receiver of the hearing aid are encased in a processor that rests atop the pinna (Dalebout, 2009, p. 115; Welling & Ukstins, 2015, p. 133). An ear hook is then attached to the top of the hearing aid by plastic tubing, which connects to an *earmold* placed in the concha of the pinna (Martin & Clark, 2015, p. 372; Welling & Ukstins, 2015, p. 133). An earmold is cast to fit the specific shape of the individual's concha (Welling & Ukstins, 2015, p. 133). Sound is collected by the hearing aid, which amplifies and transfers the acoustic signal through the plastic tubing to the earmold resting in the external auditory canal (Dalebout, 2009, p. 115; Stach, 2009, p. 495). These hearing aids can be used for a wide range of patients who have hearing impairments from slight to profound (Dalebout, 2009, p. 115; Martin & Clark, 2015, p. 372).

One of the main reasons as to why the BTE hearing aid holds 70 percent of the hearing aid market is due to the emergence of *open-fit hearing aids* (Martin & Clark, 2015, p. 372). These hearing aids are oftentimes smaller than conventional BTE hearing aids, which contribute to the increased cosmetic appeal. Due to the decreased size of the hearing aids, the likelihood of



*acoustic feedback*—a whistling sound caused by sounds that “escape” the earmold and are amplified again—decreases significantly (Martin & Clark, 2015, p. 372; Stach, 2009, p. 498).

Another type of hearing aid is an *in-the-ear (ITE)* hearing aid, which contains all of the components of a hearing aid housed inside of an earmold placed in the concha and external auditory canal (Dalebout, 2009, p. 114; Stach, 2009, p. 496; Welling & Ukstins, 2015, p. 135). Due to the decreased size of the hearing aid, it can only be used for hearing losses that range from slight to moderately severe (Martin & Clark, 2015, p. 375). The third type device, an *in-the-canal (ITC)* hearing aid is entirely fit within the external auditory canal, with only a small protrusion into the concha (Stach, 2009, p. 497; Welling & Ukstins, 2015, p. 135). These devices are somewhat limited in power due to their size and are useful for individuals whose hearing impairment is in the slight to moderately severe range (Martin & Clark, 2015, p. 375). The final device, *completely-in-the-canal (CIC)* hearing aids, are even smaller in size and are designed to be inserted even deeper into the external auditory canal to be less noticeable (Stach, 2009, pp. 497-498; Welling & Ukstins, 2015, p. 135). Due to their size, CIC hearing aids work best with mild to moderate hearing losses (Dalebout, 2009, p. 114). While hearing aids are an essential component to auditory (re)habilitation, they are not the only hearing assistive technology that may benefit individuals with hearing loss.

### **Hearing Assistive Technology (HAT)**

*Hearing Assistive Technology (HAT)* includes an assortment of devices that that can help an individual with or without a hearing impairment communicate more effectively in listening situations that may be difficult (Stach, 2009, p. 501; Welling & Ukstins, 2015, p. 145). For individuals with a hearing impairment that more severely affects their ability to hear during auditory events, alerting devices are also available to assist these individuals with hearing loss.

**Assistive Listening Devices.** *Assistive Listening Devices (ALDs)* are devices designed to modify the acoustic environment when hearing aids alone are not sufficient in specific listening situations (DeBonis & Donohue, 2008, p. 464; Stach, 2009, p. 501; Welling & Ukstins, 2015, p. 145). Many of these technologies are coupled with personal hearing aids in order to provide increased amplification in public settings such as: classrooms, theaters, hospitals, auditoriums, libraries, offices, and homes (Martin & Clark, 2015, p. 390). One common ALD used in conjunction with hearing aids is a *frequency modulated (FM) system*. In an FM system, the talker often wears a small microphone, which then transfers the acoustic signal through radio waves directly to the hearing aid of the person who is hearing impaired (Dalebout, 2009; 132; DeBonis & Donohue, 2008, p. 464; Welling & Ukstins, 2015, p. 145). Speech may also be delivered directly to hearing aids through *infrared (IR) systems*, which utilize light frequencies to transmit speech signals (Martin & Clark, 2015, p. 390). Another commonly used ALD coupled with hearing aids is an *induction loop system*, which is particularly useful for a whole group of individuals who are hearing impaired (Welling & Ukstins, 2015, p. 149). The induction loop is worn around the neck of the person who is talking and creates an electromagnetic field around the room, which is picked up by the *telecoil* of individuals' hearing aids (Dalebout, 2009, p. 133; Welling & Ukstins, 2015, p. 149). The telecoil, which is built into the hearing aid, picks up on the electromagnetic signals from either a telephone or an induction loop system, and directly transfers the signal to the hearing aid (Martin & Clark, 2015, p. 391).

**Alerting Devices.** Although advanced ALDs have substantially improved the listening environments of those with hearing loss, there are still cases where hearing aids and these devices are not enough (Welling & Ukstins, 2015, p. 149). One of these devices is a *telephone amplifier*, which allows the listener to manually control the intensity of a speaker's voice (Martin

& Clark, 2015, p. 392; Stach, 2009, p. 508; Welling & Ukstins, 2015, p. 150). These telephones also typically have a built in light sensor, which blinks when there is an incoming call (Welling & Ukstins, 2015, p. 150). Another technology that can make communicating on the telephone easier is *text telephones (TTs)*. TTs are telephones that make use of typed messages instead of speaking and listening (Martin & Clark, 2015, p. 392; Stach, 2009, p. 508; Welling & Ukstins, 2015, p. 150). Some alerting and alarm devices such as: flashing lights when the doorbell rings or when a baby cries and a vibrating alarm clock or wrist watch, all assist in making a hearing impaired individual more aware of his/her auditory environment (Welling & Ukstins, 2015, p. 154).

Though many of these hearing sensory technologies thus far are useful for individuals with hearing loss, there are still many who do not benefit from the technologies above due to the severity of their hearing loss. For those who have profound sensorineural hearing loss, cochlear implants may be an option, which is the final hearing sensory technology that will be described.

### **Cochlear Implants**

The final hearing sensory technology is cochlear implants. A cochlear implant is a surgically implanted device that provides direct electrical stimulation to the 8<sup>th</sup> cranial nerve (vestibulocochlear) by means of an electrode array, which transmits electrical signals to the auditory cortex in order to provide the sensation of hearing (Johnson, 2012, p. 266; Vincenti et al., 2014, p. 72). Generally, a cochlear implant is an option for patients at and above age 12 months, who have severe to profound sensorineural hearing loss (SNHL) in both ears, and are not sufficiently helped by hearing aids (American Speech-Language-Hearing Association [ASHA], n.d., para. 18; Johnson, 2012, p. 265).

For people who have “typical” hearing, the hair cells within the cochlea receive vibrations from sound waves and convert the acoustic energy into a neural signal. Those individuals who have sensorineural hearing loss (SNHL) typically have significant damage to or lack of hair cells within the cochlea, resulting in an inability to send these signals to the auditory cortex of the brain (Vincenti et al., 2014, p. 72). Cochlear implants essentially replace the cochlea by electrically stimulating the vestibulocochlear nerve via electrodes. These electrodes bypass the function of the hair cells and directly stimulate the remaining nerve fibers inside of the cochlea (ASHA, n. d., para. 2).

Although cochlear implants have arguably had a profound effect on the way hearing loss is treated, there are still a few misconceptions about their function. Cochlear implants do not “restore” or “cure” hearing loss, but rather allow for the perception of sound (ASHA, n. d., para. 3; Johnson, 2012, p. 266). Cochlear implants, however, have come a long way to become the technology they are today.

**Background and History.** Centuries ago, the notion to use electrical stimulation to assist those with hearing loss was first tested. In 1800, Alessandro Volta experimented with electrical stimulation during his early studies investigating the battery. Volta was trying to better understand the relationship of opposite charges in electricity by using metal rods, which he inserted in his own ears and then “felt” an auditory sensation (ASHA, 2003, para. 3). Over a century later, two physicians, Djourno and Eyries in France, stimulated the vestibulocochlear nerve via an electrical current during a neurological surgical procedure or operation (ASHA, 2003, para. 3). In 1961, House and Doyle placed an electrode in the round window of two different patients’ ears who noted that the intensity of the sounds changed with the level of stimulation, and the frequency changed with the rate of stimulation (ASHA, 2003, para. 3). Over

a decade later, the first commercially sold single-channel cochlear implant was introduced in 1972, and was later followed in 1978 by the first multi-channel cochlear implant created by Graeme Clark and the Cochlear Ltd. in Australia (ASHA, 2003, para. 4; Clark, 2013, p. 1; Cochlear Americas, n.d., para. 6).

**How Do Cochlear Implants Work.** Since the historic and initial models of the cochlear implant, the components of the cochlear implant have evolved. In the models used today, the external parts of a cochlear implant now include a directional microphone used to pick up environmental sounds; a speech-sound processor typically at the ear; a cord or cable in between the two; and a transmitting coil. The internal components of a cochlear implant consist of the receiver-stimulator, internal receiver, electrode array, and a ground electrode (Johnson, 2012, p. 266).

All of the above-noted combined parts work in synchrony to create the ability to stimulate the vestibulocochlear nerve. To start, the directional microphone, which is often located behind the ear, receives auditory signals from all around the patient and converts this acoustic energy into electrical energy (Johnson, 2012, p. 266). The speech-sound processor, which is coupled with the microphone, then takes the electrical energy and converts it into a digital code that reflects the sound's intensity, frequency, and tempo (Johnson, 2012, p. 266; Vincenti et al., 2014, p. 72). The code is then sent to the transmitting coil via FM signals or an electromagnetic conductor. The transmitting coil, which is held in place by a magnet, passes the coded signal through the skin and to the internal receiver-stimulator, which receives the coded electrical message (Johnson, 2012, p. 266). Once the electrical code is established in the internal receiver-stimulator, it is sent to the electrode array that stimulates the vestibulocochlear nerve fibers. These electrical signals correspond to the intensity, frequency, and tempo of the electrical

coded signal provided (Johnson, 2012, p. 265; Vincenti et al., 2014, p. 72). Along with cochlear implant technology growing significantly over the past decades, the candidacy criteria have also expanded to allow for a larger potential field of recipients.

**Pediatric Candidacy Criteria.** Not all patients with hearing loss qualify as cochlear implant candidates. Initially, only post-lingual deafened adults were considered candidates for cochlear implantation (Vincenti et al., 2014, p. 72). After obtaining positive results with the adult population, the candidacy criteria were eventually expanded to allow congenitally severe to profound deafened children to receive cochlear implants (Johnson, 2012, p. 269; Vincenti et al., 2014, p. 72). Within the pediatric population, determining which patients qualify for a cochlear implant(s) is critical for the child's future (Heman-Ackah, Roland, Haynes, & Waltzman, 2012, p. 41).

The Food and Drug Administration (FDA) establishes the candidacy criteria for all cochlear implants. Since the cochlear implant's first approval in 1984, the FDA has since expanded its approval to 3 different and separate cochlear implant manufacturers: Cochlear Americas, Advanced Bionics, and MED-EL (U.S. Food and Drug Administration [FDA], 2014a). Currently the FDA has a minimum age requirement of 12 months of age in order to be eligible to receive a cochlear implant; however, there is no maximum age that excludes older adults from receiving a cochlear implant (Armstrong et al., 2013, p. 1869). Some of the other necessary criteria that must be met are the completion of a hearing aid trial, SNHL demonstrated through pure-tone audiometry, and poor speech intelligibility (Heman-Ackah et al., 2012, pp. 46-47). Although the FDA regulates the approval and the overall candidacy criteria to receive a cochlear implant, the candidacy criteria for pediatric recipients for unilateral and bilateral cochlear implants are not however, universal across the cochlear implant companies in the

United States. The three main cochlear implant manufacturers in the U.S. are Cochlear Americas, Advanced Bionics, and MED-EL, all of which function somewhat independently regarding the selection criteria they employ (Johnson, 2012, p. 271). Table 2 offers specific findings of the auditory and electrophysiological evaluations required to be eligible for cochlear implants and some of the distinctions among the three manufacturers.

Table 2

*Pediatric Candidacy Criteria for Cochlear Implant Recipients*

<i>Cochlear Americas</i>	<i>Advanced Bionics</i>	<i>MED-EL</i>
<p><i>Age: 12 months to 24 months</i></p> <ul style="list-style-type: none"> <li>• Bilateral profound SNHL</li> <li>• Limited benefit from appropriate binaural hearing aids</li> <li>• No medical contraindications</li> <li>• High motivation and appropriate expectations from the child and family</li> </ul>	<p><i>Age: 12 months to 17 yrs., 11 months</i></p> <ul style="list-style-type: none"> <li>• Bilateral profound SNHL</li> <li>• Hearing Aid Trial               <ul style="list-style-type: none"> <li>○ <i>Patient Age: 12 months-23 months</i>: 3 month trial period</li> <li>○ <i>Patient Age: 24 months-17 yrs., 11 months</i>: 6 month trial</li> </ul> </li> <li>• No medical contraindications</li> <li>• High motivation and appropriate expectations from the child and family</li> </ul>	<p><i>Age: 12 months to 17 yrs., 11 months</i></p> <ul style="list-style-type: none"> <li>• Bilateral profound SNHL</li> <li>• Limited benefit from appropriate binaural hearing aids</li> <li>• No medical contraindications</li> <li>• High motivation and appropriate expectations from the child and family</li> <li>• Implantation at a young age to promote language development</li> </ul>
<p><i>Age: 25 months-17 yrs., 11 months</i></p> <ul style="list-style-type: none"> <li>• Bilateral severe-to-profound SNHL</li> </ul>	<ul style="list-style-type: none"> <li>• No medical contraindications</li> <li>• High motivation and appropriate expectations from the child and family</li> </ul>	

(Adapted from Heman-Ackah et al., 2012, p. 48; Johnson, 2012, p. 271; MED-EL, n.d. a, para. 2-3).

Beyond the electrophysiological tests conducted, the candidacy evaluation for a pediatric patient should typically be comprised of an auditory evaluation, medical examination, imaging evaluation, speech and language (communication) evaluation, psychological evaluation, and parent/family counseling (Heman-Ackah et al., 2012, p. 41; Johnson, 2012, p. 269; Vincenti et al., 2014, p. 72). In general, cochlear implant team members must agree, following a review of all of the evaluations, before a patient is approved as a cochlear implant candidate. Prior to

surgery, all patients must undergo a full-scale case history and medical evaluation to ensure there is no increased risk of surgery (Heman-Ackah et al., 2012, p. 42). Oftentimes, profound SNHL can be acquired by other diseases and disorders such as: cytomegalovirus, bacterial meningitis, herpes virus, Usher's syndrome, and exposure to ototoxic drugs, all of which may result in variations required in the surgical approach and influence the risk involved in the completion of cochlear implantation (Heman-Ackah et al., 2012, pp. 42-43; Johnson, 2012, p. 272). Patients must also undergo imaging procedures, typically including a computed tomography (CT) scan and/or a magnetic resonance imaging (MRI) scan to evaluate the presence of any cochlear malformation and verify the patency (opening) of the cochlea (Heman-Ackah et al., 2012, p. 45).

Even if not all of the candidacy criteria are met for cochlear implantation, a pediatric patient may still receive a cochlear implant(s). Oftentimes in medicine, technological developments and devices are produced at a faster rate than Institutional Review Boards (e.g., FDA) can evaluate and approve them for use (American Association of Orthopaedic Surgeons [AAOS], 2009, p. 1; U.S. FDA, 2014b, para. 1). It is not uncommon for medical products to be used regularly in patient care before there is full approval or clearance of the labeled product (AAOS, 2009, p. 1). The "off-label" use of drugs, biologics, and medical devices means that these products have yet to be formally approved or cleared by the FDA (AAOS, 2009, p. 1). As a result, physicians are allowed to use these various legally available drugs, biologics, and medical devices within the context of good medical practices and in the best interests of the patient's care (FDA, 2014b, para. 1). Pediatric surgeons, as well as oncologists, are often cited as those who use off-label drugs or medical devices the most (AAOS, 2009, p. 3). One of the main reasons why pediatric surgeons are allowed to utilize off-label medical devices is because the children are historically the last ones to be included in medical trials and there is increased liability,



among other reasons (AAOS, 2009, p. 3). Subsequently, cochlear implant team members, in particular otologists/neurotologists, have the ability to approve a patient to receive a cochlear implant(s), if they deem the child is a suitable recipient, regardless of some missing criteria.

**Expanding Candidacy Criteria.** Although the FDA has only approved cochlear implants for pediatric patients ages 12 months and older, there has been an effort made by some audiologists, speech-language pathologists, auditory-verbal therapists, parents, and physicians, among others, to have patients implanted prior to 12 months of age. As a result of programs like Universal Newborn Hearing Screening (UNHS), children who are born with or acquire SNHL shortly after birth are being “flagged” as hearing impaired within the first days or months of life (Heman-Ackah et al., 2012, p. 57). If these children are found to have hearing loss, progressive and forward-thinking clinicians arguably should begin a hearing aid trial along with auditory-based therapy as soon as possible.

Auditory-based therapy must be coupled with the hearing aid trial period as speech-language pathologists, audiologists, and auditory-based therapists try to access the children’s central auditory system and language centers of the brain during their “sensitive period” (Vincenti et al., 2014, p. 72). There exists a brief or limited window of time during the first three years of a child’s life where the brain’s neuroplasticity is heightened and its ability to develop neural pathways, due to auditory stimulation, can result in children developing spoken language skills (Sharma, Dorman, & Kral, 2005, p. 141). This “incidental” learning is the way most children learn how to use listening and spoken language regardless of whether they have hearing loss or not (Genesee, 2008, p. 21).

If amplification via hearing aids does not improve or significantly demonstrate the child’s ability to hear after an approximately three-month hearing aid trial, professionals on the cochlear

implant team will oftentimes introduce the idea of cochlear implants as a potential option to the parents (Heman-Ackah et al., 2012, p. 57). The use of cochlear implants stimulates the underdeveloped auditory cortex and hopefully will then build neural pathways to language centers in the brain; thus, allowing the child with hearing loss the opportunity to listen and talk (Sharma et al., 2005, p. 41).

Although cochlear implants foster more opportunities for children to develop spoken language, the child needs a dedicated team of audiologists, speech-language pathologists, therapists, physicians, and most importantly, supporting parents and family members in order for the child to develop age-appropriate listening and spoken language skills. In order to foster the child's ability to acquire listening and spoken language, the child must be provided appropriate therapy from the clinicians, but more importantly, from the child's parents who act as the child's clinicians for every day life.

### **Auditory Habilitation**

Auditory habilitation includes a range of treatment services provided to families along with their children who have prelingual hearing loss. The purpose of these services is to develop auditory, speech, and language skills through a child's use of his or her hearing (Johnson, 2012, pp. 348-349). Although audiologists may lead the way on issues related to hearing healthcare, a team approach is usually adopted, making use of a variety of healthcare professionals and the child's parents (Johnson, 2012, p. 87). The team's main goal is to reduce the negative effects of hearing loss for the patient and promote spoken language competence (Johnson, 2012, p. 7). Today, the majority of pediatric cochlear implant recipients' parents elect for a listening and spoken language approach as their child's method of communication considering 92% of children with a hearing impairment are born to two typical hearing parents (Mitchell &

Karchmer, 2004, p. 17). Regardless, it should be noted that other communication “opportunities” also exist.

### **Modes of Communication/Communication Opportunities**

There are a multitude of approaches available for teaching children who are deaf or hard of hearing to communicate (Madell & Flexer, 2008, p. 205). Some of these approaches are auditory in nature, whereas others are primarily visual.

One major visual communication opportunity is teaching of *American Sign Language (ASL)*. ASL is a manual and visual language, which has its own grammar and linguistics structures, used primarily in the Deaf communities across the United States (Beginnings, n.d., para. 1; Madell & Flexer, 2008, p. 206). For those who use ASL, English is considered a Second Language (ESL) and even for some members of the Deaf community, spoken English is not taught at all (Beginnings, n.d., para. 1; MED-EL, n.d. b, para. 3). ASL does emphasize creating a foundational understanding of language in general, which provides opportunities for those who want to learn ESL (Beginnings, n.d., para. 2). The implications of learning ESL are a little contentious though. In a study conducted by Kumar and her colleagues (2009), children who are concurrently exposed to predominantly sign language and some oral language do not acquire the language at the usual rate of monolingual hearing children (p. 142). These children generally had higher vocabulary and grammar scores in sign language than in spoken language regardless of which they were predominantly exposed (p. 142).

The primary goal of those who use ASL is to develop age-appropriate communication skills and written English (Beginnings, n.d., para. 1; MED-EL, n.d. b, para. 2). ASL provides an opportunity to those who are deaf or hard of hearing, to form an identity in the Deaf community without the need for amplification through hearing aids or electrical stimulation by cochlear

implants (Beginnings, n.d., para. 4; MED-EL, n.d. b, para. 5). For those who do have hearing technology, ASL is not the likely mode of communication selected; however, ASL is a viable option for those who elect to not receive hearing technology and have strong ties to the Deaf community.

Another communication opportunity that connects to the identity of Deaf culture while also integrating and establishing an identity within the “hearing world” is known as *Bilingual-Bicultural (Bi-Bi)*. Bi-Bi emphasizes a bilingual approach to language, which includes the development and use of ASL as the native language and spoken English as the secondary language (Beginnings, n.d., para. 1; Gallimore, 1996, p. 91; Madell & Flexer, 2008, p. 207). This practice of both languages allows for the child to identify with the Deaf community and the “hearing world” (Beginnings, n.d., para. 5; Gallimore, 1996, p. 92; Madell & Flexer, 2008, p. 207). There do exist some limitations in the use of Bi-Bi, mainly revolving around the fact that the teaching programs that instruct a Bi-Bi education style often do not have fluent and proficient ASL users (Gallimore, 1996, p. 93). As a result, the students do not develop ASL proficiency or English with the same fluency. The teachers also need to be aware of the cultural sensitivity of those who use Bi-Bi because of their affiliation with the Deaf community (Gallimore, 1996, p. 93).

Beyond communication options that are visual or manual in nature like ASL and Bi-Bi, there are also modes of communication that combine both manual and spoken communication systems. One of the combined communication opportunities for children who are deaf or hard of hearing is called *Total Communication (TC)*. The philosophy of total communication is to use every means necessary to communicate with the child who is deaf (Madell & Flexer, 2008, p. 207; MED-EL, n.d. b, para. 1). This mode of communication often combines a sign-language

system (e.g., ASL or a Manually Coded English [MCE] sign system), fingerspelling (manual alphabet), speechreading, body language, natural gestures, spoken language, and amplification exposure to the child (Beginnings, n.d., para. 2; Bodner-Johnson, 1996, p. 210; MED-EL, n.d. b, para. 1). The primary objective of this communication method is to give the child the most opportunities to communicate with others around him/her, while also using all of the available senses and resources to assist him/her (Bodner-Johnson, 1996, p. 211; Madell & Flexer, 2008, p. 207; MED-EL, n.d. b, para. 2). Although the child is given all of the tools necessary to learn to speak English, it is encouraged that the family members still learn the manual form of communication (e.g., ASL) in order to support the child in his/her primary form of communication (Bodner-Johnson, 1996, p. 214; MED-EL, n.d. b, para. 6).

Another combined communication approach is called *Cued Speech*. Cued Speech is a visual communication system that combines spoken English with eight hand shapes to represent groups of consonants, and four different positions near the mouth to represent vowel sounds (MED-EL, n.d. b, para. 1; Madell & Flexer, 2008, p. 207; Williams-Scott, 1996, p. 118). These hand shapes and placements coupled with spoken language help children not only hear, but also see each individual phoneme the speaker is making (Beginnings, n.d., para. 2; Madell & Flexer, 2008, p. 207; Williams-Scott, 1996, p. 119). These clues also help to clarify *speechreading*, which is normally an unclear method of comprehending what someone else is saying (Williams-Scott, 1996, p. 119). Speechreading is a technique of understanding speech by interpreting the visual movements of the lips, face, and tongue of the speaker (Gallimore, 1996, p. 92). These speech cues help build linguistic and syntactical skills necessary for these children to be integrated into the hearing community (MED-EL, n.d. b, para. 2). The use of amplification is strongly encouraged for this communication method in order to give the maximum opportunity

to use his/her remaining hearing (MED-EL, n.d. b, para. 5). Although clinicians teach the parents how to cue to their child, the parents should be the primary teachers of Cued Speech and are expected to cue at all times to help the child practice distinguishing between phonemes (MED-EL, n.d. b, para. 6). Similar to Cued Speech, verbal communication methods rely on spoken language, but depend on the individual's ability to listen and speak while not promoting the use of other visual cues.

One major form of “oral” or spoken language communication is the auditory/oral approach. Auditory/oral communication emphasizes that the child uses his/her residual or “electrical” hearing via hearing technologies such as hearing aids and cochlear implants, while also using speechreading cues to foster better understanding of the person who is talking (Madell & Flexer, 2008, p. 207; MED-EL, n.d. b, para. 1). Typically the major point of emphasis of this approach is that while engaging in conversation, the child with hearing loss will only use spoken language (Gatty, 1996, p. 163). Although the use of natural hand gestures may help, there is no encouragement of any sort of formal manual language (Madell & Flexer, 2008, p. 207; MED-EL, n.d. b, para. 1). Statistics show that over 90% of children who are born with a severe to profound hearing impairment, have two parents who are both hearing (Gatty, 1996, p. 168). Therefore, this is a logical communication approach for a child, for example, who receives a cochlear implant because the vast majority of the children who receive them are from families whose parents are not deaf or hard of hearing. Considering one of the most important aspects of developing communication is constant exposure to fluent speech the child's parents, for many, the auditory-oral approach makes sense for those who are not fluent in a manual communication system.

The last major mode of “oral” or spoken language communication to discuss is known as the auditory-verbal approach. Auditory-verbal communication has the strongest emphasis on

auditory-based teaching for communication (Johnson, 2012, p. 288; Madell & Flexer, 2008, p. 207). This method of communication encourages children with hearing loss to use only their residual hearing, amplification or electrically-aided hearing to understand what is being said (Johnson, 2012, p. 288). The clinician often covers his/her mouth in order to emphasize the point that the children should not rely on visual cues such as speechreading in order to understand what is being said. As a result, the clinicians are seeking to increase the strength of the child's hearing and listening skills and abilities (Estabrooks, 1996, p. 54; Johnson, 2012, p. 288; Madell & Flexer, 2008, p. 207). The main goal of the auditory-verbal approach is to develop listening and spoken language skills, through the use of "aided" hearing alone, in order to integrate the child into the listening and talking community (MED-EL, n.d. b, para. 2). The auditory-verbal approach encourages children to gain conversational competence through listening and spoken language, have access to a mainstream educational setting, and ultimately have an unlimited amount of educational and social opportunities for the rest of their lives (Estabrooks, 2012, p. 2; Madell & Flexer, 2008, p. 207). In order to ensure the child has positive outcomes from this mode of communication, clinicians and parents need to work together to create a stimulating auditory and spoken language environment for the child (Estabrooks, 2012, p. 4).

### **Auditory-Verbal Therapy**

Auditory-verbal therapy sessions are considered diagnostic in which a child and his/her parents progress in learning how to interact in an environment focused on listening and talking (Estabrooks, 1996, p. 54). The overall goals for children in the therapy are two-fold. The first is the integration of hearing into the daily life and personal development of the child with hearing loss regardless of the severity of the hearing loss or the technology the child uses. Two, the growth of the child in therapy is intended to prepare the child for full participation and

independence in a mainstream educational setting, rather than a special education setting (Estabrooks, 1996, p. 54; Pollack, Goldberg, & Caleffe-Schenck, 1997, p. 39). Ultimately, the listening and spoken language that the child learns needs to be incorporated into every aspect of the child's personal, social, and academic development (Estabrooks, 2012, p. 2).

**Principles of Auditory-Verbal Therapy.** Please see Appendix A for more details of the 10 foundational principles of auditory-verbal therapy (Alexander Graham Bell Association for the Deaf and Hard of Hearing [AG Bell], 2007; Pollack, 1970).

**Listening and Spoken Language Specialist (LSLS).** An auditory verbal therapist is a qualified educator, or clinician with a background in speech-language pathology (an SLP), audiology, or deaf education, who has chosen to teach those who are deaf or hard of hearing how to listen and talk following the 10 principles of auditory-verbal therapy (Estabrooks, 1996, p. 56; Houston, 2012, p. 3). These hearing and language professionals have at least a bachelor's or master's degree in their respective field and have the legal ability to provide services to children with hearing loss (Estabrooks, 2012, p. 2; Houston, 2012, p. 3). In order to qualify to be a Listening and Spoken Language Specialist (LSLS-) certified, clinicians must provide 3 to 5 years of mentored therapy with another LSLS-certified clinician and pass an examination to earn the certification (Estabrooks, 2012, p. 2; Houston, 2012, p. 3). There are two different certification designations a hearing professional can become, one being a Listening and Spoken Language Specialist in Auditory-Verbal Therapy (LSLS Cert. AVT) and the other being a Listening and Spoken Language Specialist in Auditory-Verbal Education (LSLS Cert. AVEd). Although these clinicians are qualified therapists to teach children how to use listening and spoken language, the parents of the child are always the child's most important therapists.



**Parental Involvement.** Auditory-verbal clinicians would all agree, parents play the most important role in the success of their child in his/her ability to use listening and spoken language because they are always with the child; whereas the auditory-verbal therapist is only with the child for usually one hour/week (Estabrooks, 1996, p. 57; Estabrooks, 2012, p. 4; Johnson, 2012, p. 288). Oftentimes, auditory-verbal therapy is known as a *family-centered approach* because of its significant reliance on the parents to focus on the development of listening and spoken language for their child (Estabrooks, 2012, p. 4; Madell & Flexer, 2008, p. 207). By working with auditory-verbal therapists and other professionals, parents learn how to create an environment enriched with listening and learning that allows the child to practice his/her abilities related to audition, speech, language, cognition, and communication and ultimately reach the child's targeted goals (Estabrooks, 1996, p. 56). During the first few sessions with the auditory-verbal therapist, the parents, and the child, it is important to choose a mode of communication for the child, in order to develop realistic goals for the child's future (Pollack et al., 1997, p. 279). As mentioned before, children learn language best through incidental learning and by being engaged in an informal and relaxed environment, all of which mimic the setting of auditory-verbal therapy (Estabrooks, 2012, p. 4; Genesee, 2008, p. 21). Table 3 provides some specific information regarding responsibilities of parents during auditory-verbal therapy sessions and in the auditory-verbal program in general.

Table 3

*Responsibilities of Parents in an Auditory-Verbal Program*

<u>Responsibilities: In the session</u>	<u>Responsibilities: In general</u>
<ul style="list-style-type: none"> <li>• Model techniques for stimulating speech, language, and communication into daily routines</li> <li>• Communicate as partners in therapeutic and educational exercises</li> <li>• Discuss and practice appropriate behavior management techniques</li> <li>• Record and discuss progress</li> <li>• Inform the professional of the child's interests and abilities</li> <li>• Prepare the child socially</li> <li>• Ask questions for clarification</li> </ul>	<ul style="list-style-type: none"> <li>• Plan strategies to integrate listening, speech, language, and communication into daily routines</li> <li>• Keep hearing aids or cochlear implants in good and clean condition</li> <li>• Learn everything possible about hearing loss, amplification, etc.</li> <li>• Interpret short- and long-term goals</li> <li>• Follow through on appointments and assignments</li> <li>• Teach self-discipline</li> <li>• Apply coping strategies when necessary</li> </ul>

(Adapted from Estabrooks, 2012, p. 4; Pollack et al., 1997, p. 281).

**Auditory-Verbal Therapy Techniques.** Listening and Spoken Language Specialists teach parents a variety of different techniques to foster the child's growth in listening and spoken language communication. At the very core of auditory-verbal therapy, there are at least four fundamental practices used by auditory-verbal therapists to help teach the young child listening and spoken language skills. The first major technique is to use "listen" prompts in therapy and throughout the child's daily life. This practice is meant to draw the child's attention to the speaker and localize from which direction the sound is coming. The auditory-verbal therapist will often point to his/her ear to signify to the child that it is time to pay attention and focus on what is being said (Goldberg, 2013, p. 1).

An additional common therapy practice is to model and have the child produce the Ling 6 Sounds each day. The Ling-6 Sounds are speech sounds (/m/, /u/, /i/, /a/, /j/, /s/) that represent a range of different frequencies or pitches (Ling, 2012, p. 59). These sounds were designed to test the listening range of a child with hearing loss and to ensure that the child has access to all of the

speech sounds necessary to learn spoken language (HOPE: Cochlear (Re)Habilitation Resources, 2014, p. 1; Ling, 2012, p. 59). The clinician or parent is initially supposed to present each sound individually to the child a few inches away from their microphone with a conversational speaking voice and in a quiet, calm environment (HOPE: Cochlear (Re)Habilitation Resources, 2014, p. 2). As the child becomes better at distinguishing the sounds by using only his/her hearing and no visual clues, the clinician or parent may increase their distance of presentation to 3 feet, 6 feet, and finally 9 feet (HOPE: Cochlear (Re)Habilitation Resources, 2014, p. 2; Ling 2012, p. 59).

Another commonly used therapy technique used in early auditory-verbal practice are the “Learning to Listen” associated sounds. These sounds correspond to pictures or objects associated with variations in duration, intensity, and frequency, and expose the child to a variety of different sounds (Cochlear, 2005, p. 13). Some examples of common sounds are “aaahhh” for an airplane, “choo choo” for a train, “beep beep beep” for a car, “meow” for a cat, and “baaa” for a sheep (Cochlear, 2005, p. 72). Clinicians and parents will often make a “Learning to Listen” book for the child, which features large colorful pictures of objects that represent the sound it makes (Goldberg, 2013, p. 1). Another option is to place the objects around the house in places that are easy to see for the child, which allows him/her to constantly be immersed in an environment filled with different “associated” sounds (Cochlear, 2005, p. 95). Also, developing an “Experience Book” for the child is an effective way for the child to verbally discuss events in his/her life (Goldberg, 2013, p. 2; Sindrey, 2012, p. 142). An “Experience Book” will effectively engage a child by targeting words, phrases, and sentences that are meaningful to him/her related to events, awards, or daily activities (Sindrey, 2012, pp. 142-143). This type of book can also be useful for developing a child’s understanding of a sequence of actions in an event, or *schema*

(Sindrey, 2012, p. 143). These books can eventually be used as stimulus items for parents to use with their child allowing him/her to describe what goes into the making of the book, but also, turn-taking abilities used in conversation (Sindrey, 2012, p. 145). Ultimately these stimuli are used to promote awareness in the child of the environmental sounds and activities around him/her in a fun and interactive environment.

Another critical therapy technique used in auditory-verbal sessions include responding to all of an infant's or child's vocalizations and verbalizations (Goldberg, 2013, p. 1). This ensures that the child knows that he/she is being rewarded or reinforced for producing any vocal/verbal production. Although the above are some of the major therapy techniques used in auditory-verbal practice, Table 4 offers an additional listing of other common procedures and techniques used in many auditory-verbal sessions.

Table 4

*Techniques in Auditory-Verbal Therapy*

*Clinical and parental cues used in the auditory-verbal approach*

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Coaching the parents as the primary models for listening and talking</li> <li>• Narrating life as it happens when the child does not have the words</li> <li>• Asking the child, "What did you hear?" instead of repeating the stimuli</li> <li>• Rewording, providing alternatives, and repeating previously heard information</li> <li>• Returning back to spoken language cues immediately after a different cue</li> <li>• Directing the child to "Listen!"</li> </ul> | <ul style="list-style-type: none"> <li>• Responding with spoken language to facial gestures</li> <li>• Providing <i>acoustic highlighting</i>: whispering, singing, etc.</li> <li>• Moving closer to the child's microphone when speaking</li> <li>• Waiting for the child's response in order to continue the conversation</li> <li>• Using different <i>visual distraction techniques</i> and <i>auditory hooks</i></li> <li>• Using the <i>hand cue</i>: covering your mouth to ensure only auditory cues</li> </ul> |
|---|---|

(Adapted from Estabrooks, 1996, pp. 59-60; Estabrooks, 2012, pp. 4-5)

**Auditory-Verbal Outcomes.** Recently, several studies have been conducted to see if cochlear implants coupled with auditory-verbal therapy are the two best-suited options for

children with a profound hearing impairment. One study examined family members' perceptions of their quality of life following early identification of deafness in children. Data analyses showed that family members of children using cochlear implants and listening and spoken language were more satisfied with their child's progress in clarity and speech perception than were family members of children using hearing aids and sign language (Jackson, Wegner, & Turnbull, 2010, p. 203).

In another study conducted by Black and her colleagues (2011), conducted a systematic review of the prognostic factors that influence outcomes of children with hearing loss who have received cochlear implants (p. 67). The results suggested that children who use oral or verbal communication demonstrate higher levels of language and auditory performance than children who use Total Communication (p. 73). Similarly, in an article published by Archbold and her colleagues (2006) on parents' perspectives of the implantation process three years after their child received a cochlear implant, parents agreed that listening and spoken language should be emphasized, though signing can be useful during transitional periods (p. 204).

Dornan and her colleagues (2010) organized a longitudinal study assessing if auditory-verbal therapy is effective for children with hearing loss. The study evaluated the speech and language outcomes for children with hearing loss enrolled in an auditory-verbal program compared with a control group of typical hearing peers (p. 365). The results showed no significant differences between the groups for speech, language, and self-esteem (pp. 376-377). Reading and mathematics scores however were comparable between the groups, concluding that auditory-verbal therapy is an effective communication option for this population of children with hearing loss (p. 378).

In another study, children with hearing loss who had only received 20 weeks of auditory-verbal therapy improved significantly in speech perception, speech production, and receptive language skills (Fairgray, Purdy, & Smart, 2010, p. 430). Finally, when three well-matched groups of children who use cochlear implants were compared on how their communication methods (e.g., auditory-verbal, auditory-oral, and bilingual-bicultural) impacted their speech perception and language skills, results supported a consistent emphasis on using listening and spoken language to yield the best outcomes (Dettman, Wall, Constantinescu, & Dowell, 2013, pp. 456-457).

**AVT Conclusion.** Although the auditory-based approach was the selected method that had been targeted in the current study, in no way was this to suggest that the auditory-based therapy approach is the only or necessarily the best mode of communication for all children with hearing loss. For this particular study, this mode was selected to highlight its importance and relevance to the sample population who had received cochlear implants. Also, the auditory-based approach is in no way an attempt to deny the psychological and emotional impacts deafness has on parents of children who have hearing loss (Pollack et al., 1997, p. 39). The purpose of the approach was not to make the child with hearing loss feel that he/she needs to be the same as those with normal hearing because frankly, the child with hearing loss is not “special” (Pollack et al., 1997, p. 39). The child’s hearing loss, however, may not be a defining factor of who he/she is as a person. Auditory-verbal therapy or practice provides parents and children with hearing loss a choice of becoming integrated into a world that was not possible before universal newborn hearing programs and developing technology; resulting in an opportunity to be a part of a hearing world (Pollack et al., 1997, p. 39).

## Dual-Language Acquisition

For children with a cochlear implant, the realistic implications of acquiring one language that emphasizes listening and spoken language is remarkably difficult. For those children, however, who grow up in culturally and linguistically diverse backgrounds, it is more common to have to learn not only their native language, but English as well. The following section reviews theories of bilingualism, neurological effects of language acquisition, and outcomes for bilingual cochlear implant patients.

### Theories of Bilingualism/Dual-Language Theory

One of the most difficult challenges for children who are raised listening to two languages, is creating a neural-linguistic system that enables them to recall both languages instantaneously (Gardner-Chloros, 2009, p. 124; Montrul, 2013, p. 166). In order for children to develop the required neural network, the quality and quantity of spoken language stimuli that the child hears is essential to his/her growth in both languages (Montrul, 2013, p. 165; Silva-Corvalán, 2014, p. 17). Bilingual children can correctly recognize the sounds of both languages (Montrul, 2013, p. 165). Which poses an important question—do infants perceive both languages as one or are they able to distinguish them as two separate languages from a young age?

For years, two major hypotheses have dominated the field of bilingual memory. The first hypothesis known as the *shared or interdependence memory hypothesis* proposes a bilingual structure in which the individual's two languages are stored in the one memory store of the brain (Altrarrriba & Heredia, 2008, p. 41). This model speculates that words from both languages are stored as language free-concepts, suggesting that both words and labels have a singular meaning (Altrarrriba & Heredia, 2008, p. 41; Montrul, 2013, p. 169). In order to identify words within the proper language, there exists some form of “tagging” mechanism, which helps distinguish the

appropriate word at the time of retrieval (Altrarrriba & Heredia, 2008, p. 41). The *separate or independence memory hypothesis* contrasts the shared hypothesis. The separate hypothesis postulates that the bilingual person's two languages are organized in two separate, independent memories stored with information for one language not readily available to the other (Altrarrriba & Heredia, 2008, p. 45; Gardner-Chloros, 2009, p. 142; Montrul, 2008, p. 169). The only interaction between the two languages therefore is through translation processes.

### **Neurolinguistics**

Although there exists several prominent theories of how individuals store their knowledge of two or more languages, the fact remains that there is no singular theory that fully encompasses all of the nuances of language within the neocortex of the human brain (Gleason & Ratner, 2012, p. 191). For centuries, neuroscientists have raised questions regarding how humans have developed such complex and formalized systems of languages while other species cannot communicate nearly as efficiently. Many neuroscientists have attributed *cognition* as the major discrepancy between humans and other species—humans' ability to process and accrue new knowledge through conscious thought, experience, and sensation (Kolb & Whishaw, 2012, p. 526). Although the formalized use of language is not the only major characteristic of human cognition, it is arguably the most elaborate example of what distinguishes humans compared to other species (Gleason & Ratner, 2012, pp. 1-2). This concept provokes a wide range of questions about humans' ability to use language, where this ability comes from, and what neural processes are involved for learning humans' methodical approach to communication.

**Definition/Background.** Neurolinguistics is a branch of neuroscience dedicated to studying the dynamic interactions between the human brain and language (Mahmoodzadeh, 2012, p. 13). The main goal of neurolinguistics is to develop a clearer understanding of how the



comprehension, production, and acquisition of language function while incorporating different biological and psychological principles (Mahmoodzadeh, 2012, p. 13; Menn, 2012, p. 1).

Although many researchers and linguistic scholars would agree that humans' knowledge of cognition is primitive, neurolinguists and psycholinguists alike have contributed a great deal of research concerning the representation of language in the brain. Their inputs have been especially influential with language acquisition of the first and second language, or L1 and L2 systems respectively (Mahmoodzadeh, 2012, p. 13). Neurolinguists explore the linguistic development of typically developing subjects, identify issues relating to patients' language impairments, and investigate language use by people who demonstrate specific language impairment (Nergis, 2011, p. 143).

**Neuroanatomy.** Our brains are organized through a series of neural networks connected by collections of neurons, or *nerves* (Kolb & Whishaw, 2012, pp. 46-47, 82; Menn, 2012, p. 1). Each neuron contains three basic components: a *soma*, an *axon*, and some *dendrites*, which all contribute to the processing of information (Kolb & Whishaw, 2012, p. 76). The soma acts as the cell body of the neuron and is also the site of the nucleus of the cell (Kolb & Whishaw, 2012, p. 76). An axon is a single fiber attached to the soma of a neuron that carries electrical impulses or "messages" away from the cell body to other neurons (p. 76). These axons are usually encased in a fatty white substance that insulates the axons called the *myelin sheath* (p. 76). But axons are not completely encased in myelin. Unmyelinated gaps, the *nodes of Ranvier*, on the axon are rich with voltage-sensitive channels that recharge the action potential with enough electrical stimulation to open the voltage-sensitive gates at other nodes (Breedlove et al., 2010, p. 44). As a result, the action potentials are able to continue progressing toward the end of the axon (p. 44). Once the electrical stimulation reaches the end of the axon, or the *terminal button*, the electrical

stimulation is transferred from the axon to the dendrites of another neuron (Kolb & Whishaw, 2012, p. 76). The dendrites act as points of contact for the neurons, using their branching extensions to collect electrical stimulation from other neurons' axons (Breedlove et al., 2010, p. 45). As the electrical signal moves from the terminal button of one neuron to the dendritic spines of another, the action potential crosses a gap between the two neurons, better known as a *synapse* (p. 45).

During the process of transferring the signal from one neuron to another, neurotransmitters are released causing either an excitatory or inhibitory action potential in the next neuron (Kolb & Whishaw, 2012, p. 77). If inhibitory neurotransmitters are released, the electrical signal will cease and will not be passed to the next neuron; however, if excitatory neurotransmitters are released, the new neuron will continue transmitting the electrical signal (p. 76). In the case of excitatory factors being released, the dendrites receive the signal and move it towards the soma of the new neuron, which starts the process of propagating the electrical signal the length of the axon again (Breedlove et al., 2010, p. 45).

Neurons, however, are not the only group of cells present in the nervous system. They are aided significantly by another group of cells, neuroglia, or *glial cells*, known as the support cells of the nervous system. Although glia do not transmit electrical impulses themselves, these cells help bind neurons together and provide insulation, nutrients, and support that aids in repairing neurons and eliminating waste products (Kolb & Whishaw, 2012, p. 82). There are five major types of glia that are characterized by their unique structures and functions within the brain. The first major type of glia is an ependymal cell, which produces and secretes *cerebrospinal fluid (CSF)* in the brain (p. 82). CSF provides nutrients, is a medium to eliminate waste products, and helps absorb shock in the case of any movement of the brain (p. 82). A second type of glia is

astrocytes, which are star-shaped glial cells that provide structural support to neurons in the *central nervous system (CNS)* and transports substances between neurons and blood vessels (pp. 83-84). The third form of glia is microglia, which aid in cell repair and identify and eliminate foreign tissue or pathogens (pp. 44-45). The fourth and fifth types of glia both serve a very similar function in that they both myelinate axons. The discrepancy between the two, however, is that oligodendroglia myelinate axons in the CNS and Schwann cells myelinate axons in the *peripheral nervous system (PNS)* (p. 85).

Sensory (afferent) and motor (efferent) neurons act as connectors between the brain and the rest of the body (Kolb & Whishaw, 2012, p. 79; Menn, 2012, p. 1). In order to produce movement as we explore our environments, the brain must receive external information about the world around us from the PNS (Kolb & Whishaw, 2012, p. 79). Once an external stimulus evokes a neural response in the PNS, sensory neurons propagate the signal to the CNS—the brain and spinal cord (Breedlove et al., 2010, p. 59). The brain then interprets the signal, decides the appropriate motor response, and sends the electrical stimulation back to the PNS triggering a behavioral response in a matter of milliseconds (Breedlove et al., 2010, p. 59). Without any *stimulation*, however, the brain cannot adjust our bodies appropriately to generate the correct response. The central and peripheral nervous systems' acceptance of sensory information and translation of electrical impulses shape our views of reality, or individual *perceptions*. (Kolb & Whishaw, 2012, p. 35). Each and every experience we have helps develop the neural pathways necessary to respond to any simple or complex task.

All of our perceptions and responses can be grossly associated with a certain region of the brain, better known as *lobes* (Breedlove et al., 2010, p. 12). The human *cerebral cortex*—the outermost layer of tissue, consists of the left and right hemispheres separated by a long groove

called the *medial longitudinal fissure* (Kolb & Wishaw, 2012, p. 40). Each hemisphere is then subdivided into four lobes, whose names correspond with the bones of the skull that protect them. The three posterior lobes have sensory functions: the *occipital lobe* is affiliated with visual processing; the *parietal lobe* is related to movement or tactile sensations; and the *temporal lobe* is associated with language, auditory, and gustatory (taste) information (Breedlove et al., 2010, p. 14). Contrastingly, the *frontal lobe* is motor in nature and is often grossly perceived as the brain's "executive" lobe because it integrates sensory information and motor functions before it makes a "decision" on how to respond (Breedlove et al., 2010, p. 14).

The structure of the *neocortex*—the evolutionarily newest part of the cerebral cortex, is the main reason why humans can perceive and respond to the world around us. This tissue is divided between six different layers of *gray matter*—neurons with unmyelinated axons, resting upon a singular layer of *white matter*—neurons with myelinated axons (Kolb & Wishaw, 2012, pp. 56-57). Each different layer of gray matter in the neocortex corresponds with different functions. For example, the outermost (supragranular) layers I, II, and III are broadly responsible for integrative functions, layer IV (internal granular) is related to sensory (afferent) input, and the innermost (infragranular) layers V and VI are used as output centers to other parts of the brain (Kolb & Wishaw, 2012, pp. 56-57).

Due to the organizational structure of the neocortex, there are two key cortical approaches in which humans perceive information: *top-down processing* or *bottom-up processing*. The top-down approach is a cognitive process that is initiated with our thoughts at higher cortical levels of the brain, which then transition to lower-level functions, such as the senses (Kolb & Wishaw, 2012, pp. 56-57). Whereas the bottom-up approach works in the opposite direction, perception starts at a lower cortical area as a result of the sensory input or

stimulus and then is transferred to higher cortical regions of the brain (pp. 56-57). Our behaviors in response to the world around us are determined by the neocortex, but when the neocortex is deprived of sensory stimulation due to deafness, the neocortex cannot interpret the sounds of the world, which has enormous neurological implications on the brains of children who are deaf or hard of hearing.

**Critical Period.** Although many early theories about the brain were rooted in the idea that each region had a specific, preset purpose, it has since been decided that the brain is an adaptable and malleable organ (Kolb & Whishaw, 2012, p. 35). The term most often affiliated with this concept is *plasticity*, the idea that neural tissue has the capacity to adapt by changing how its functions are organized based on the sensory stimulation it is presented (p. 35). For humans to learn and process any new information, neural circuits need to reorganize themselves to store new knowledge or experiences. Development of neural circuits emanates from neuronal branching patterns and the creation of axonal and dendritic synapses, which act as information-transfer sites between neurons (Kolb & Whishaw, 2012, p. 78; Kral, 2013, p. 120). Imaging techniques reveal multiple areas of the brain that are affiliated with certain language functions, while other functions are more area-specific (Ulanet, Carson, Mellon, Niparko, & Ouellette, 2014, p. 231). In learning a new language, the cortical regions affiliated with language actually enlarge to compensate for the latest data that need to be stored (Kolb & Whishaw, 2012, p. 35).

Throughout the brain's early stages of development, there exist periods of higher susceptibility to alterations by external stimulation to create strong neural pathways and a functional neural network (Sharma & Campbell, 2011, p. 151). The neuroplasticity of the brain, due to the increase of synaptogenesis—the creation of neuronal connections—is much higher in the first few years of life compared to later in development (Huttenlocher & Dabholkar, 1997; p.

174; Sharma & Campbell, 2011, p. 151). During those first few years of life, the brain depends on enrichment from its external environment to form meaningful neural connections. These sensitive periods, which are also known as *critical periods*, reflect the necessity for stimulation of certain areas of the brain critical for its neurobiological development.

In relation to the auditory system, the critical period of the central auditory pathways is a phase when the regions of the brain related to audition are maximally plastic and primed for stimulation and development (Sharma et al., 2009, pp. 272-273). According to Penhune (2011), there are several examples of increased auditory performance early in life due to the neuroplastic abilities of the brain such as “ear-training” in music and learning languages (p. 1127). In accordance with certain theories of universal language and grammar, infants are able to babble and discriminate between the phonetic features of all languages; however, as they become older, infants specialize in their “mother” language and lose the ability to differentiate between the phonetic aspects of other languages at around 8-10 months (Kral, 2013, p. 118). As time continues, the infants’ brains are able to compartmentalize acoustic sounds of similar classes and learn to disregard sounds that are not frequently heard (p. 118).

When sensory input such as hearing is absent, the consequences of the brain development can be devastating (Sharma & Campbell, 2011, p. 151). Children who suffer from the effects of auditory deprivation all have unique experiences due to a variety of factors including: severity of hearing loss, age, level of auditory development at the onset of his/her hearing loss, the communication option the child uses, and how his/her exposure to listening and spoken language differs as a result (p. 151). For many pediatric patients who meet the necessary candidacy criteria to receive cochlear implants, the hearing sensory technology may help provide stimulation to the auditory processing centers of the brain to combat and even overcome the potential ramifications

of auditory deprivation. Cochlear implants, as has already been discussed, differ from acoustic stimulation from hearing aids because cochlear implants provide electrical stimulation directly to the cochlea as opposed to amplifying the ambient sounds in one's environment (Vincenti et al., 2014, p. 72). The electrical stimulation from the cochlear implant helps to distinguish between speech sounds and interpret the range of input in a more significant and improved manner (Sharma & Campbell, 2011, p. 151).

With the adoption of Universal Newborn Hearing Screening (UNHS) policies and Early Hearing Detection and Intervention (EHDI) programs throughout the United States, early access to sensory stimulation via hearing technologies including hearing aids and cochlear implants, is more accessible than ever before. The major purpose of these early identification and intervention programs is to intervene at the youngest possible age to exploit the brain's neuroplasticity of the child. Cochlear implants are capable of inciting synaptic morphology in the central auditory pathways, even after years of auditory deprivation during childhood (Gordon et al., 2011, p. 204; Ulanet et al., 2014, p. 230). The presentations of sensory and motor stimuli promote interactive exchanges between the brain's "language centers" and facilitate the development of communication skills while counteracting the adverse effects of auditory deprivation (Kral, 2007, p. 486). Pediatric cochlear implants are designed to electrically stimulate the "fresh" auditory pathways in children who are deaf, which begs a certain question. How late is *too* late before permanent deficits occur and neuroplasticity can no longer compensate for what could have been a typically functioning central auditory pathway?

***Cortical Auditory Evoked Potentials (CAEPs).*** One objective way to measure the developmental status and limitations of the brain's plasticity of the human central auditory system is the use of cortical auditory evoked potentials (CAEPs) (Sharma & Campbell, 2011, p.

152; Sharma et al., 2009, p. 273). The *latency*—the time it takes for the brain to respond to the presented stimulation, of the first positive peak or P1 component of the CAEP is considered an indicator of the maturity of the auditory cortical areas (Sharma et al., 2009, p. 273). The P1 symbolizes the sum of the synaptic delays throughout the central auditory pathways (Eggermont et al., 1997, p. 62). The neurological response from children normally occurs around 100-300 ms after the presentation of the signal, but consequently decreases incrementally with age (Sharma & Campbell, 2011, p. 152; Sharma et al., 2009, p. 273). This decrease in latency is a result of the maturation of the central auditory pathways via increased synaptogenesis, myelination, and *synaptic pruning*—the elimination of certain synaptic connections, which contribute to a quicker transmission of sound (Eggermont & Ponton, 2003, p. 250).

The P1 response has been measured across several studies for children who are congenitally deaf and received cochlear implants to observe the range of the brain's neuroplasticity in response to auditory stimulation at different ages. The general conclusion of the studies conducted is that children who received stimulation via a cochlear implant early in childhood (<3.5 years) had normal P1 latencies within 6 months of cochlear implant use. While children who received electrical stimulation from the cochlear implants late in their developments (>7 years) showed atypical cortical response latencies even after multiple years of consistent cochlear implant use. For the children who received implants in between 3.5 to 7 years of age, their P1 latencies were highly variable (Sharma & Campbell, 2011, p. 152). Although the data from the children in between the ages of 3.5 to 7 years was inconsistent, it appeared that the critical period for language, potentially ends at approximately age 7 years, even with stimulation from a cochlear implant (Sharma & Campbell, 2011, p. 152; Sharma et al., 2009, p. 273). Although children who are implanted late still often benefit from cochlear implants by being



aware of sounds, they often are not able to distinguish between complex acoustic configurations (Kral, 2013, p. 121).

**Cortical De-coupling.** Several studies have been conducted in congenitally deaf cats to help determine exactly when the sensitive period ends. After the sensitive period of central auditory development in cats (4-5 months) had ended, the cats began receiving electrical stimulation in order to detect areas of activation in their auditory cortices. The researchers used high-density EEG measures to record the CAEP latencies of the cats. The results showed that there was a significant delay in the activation of supragranular layers of the cortex (layers I and II), and a near absence of activity at longer latencies and in infragranular layers (layers V and VI) (Kral, Tillein, Heid, Hartmann, & Klinke, 2000, p. 723). These results suggest that electrical stimulation outside of the critical period significantly alters information processing from the internal granular layer (layer IV) to supragranular layers (Sharma et al., 2009, p. 274). Typically, the supragranular layers of the auditory cortex (layers I-III) project back to the infragranular layers (V and VI) of the primary auditory cortex. Afterwards, the information from the infragranular layers (V and VI) is redistributed to the proper subcortical auditory areas (Kolb & Whishaw, 2012, pp. 56-57).

The absence of activity in infragranular layers has significant implications regarding the functional decoupling between the innermost layers of the primary cortex and the higher order layers of the auditory cortex. This issue affects the infragranular layers' abilities to transmit information to subcortical auditory structures, which is essential for the proper information processing (Sharma et al., 2009, p. 274). As a result of auditory deprivation, these cats' infragranular activity is severely compromised, weakening important feedback loops like those associated with the transmission of information from secondary auditory areas to primary

auditory areas. Due to the decoupling of the secondary auditory areas from the primary auditory areas the neocortex struggles to develop “top-down” processing (Kral & Eggermont, 2007, p. 162). As a result of decoupling, researchers hypothesize that the secondary auditory cortex subsequently becomes available to other sensory modalities in a process of *cross-modal reorganization*. These mechanisms, as cited by Kral (2007), are the reasons auditory processing becomes difficult after the sensitive period; specifically, the changes associated with the areas where auditory and linguistic cortical processing occur are used by other systems, making the process of analyzing new incoming auditory stimuli more difficult and challenging for any new incoming auditory stimuli to be analyzed efficiently (pp. 488-490).

**Cross-modal Remodeling.** Auditory deprivation due to congenital deafness can result in changes to the auditory neural architecture of the brainstem and cortex (Kral, 2013, p. 123; Ulanet et al., 2014, p. 230). Functional changes in unstimulated areas of the auditory pathways can leave thalamo-cortical areas vulnerable to being “repurposed” by other competing sensory input systems—or also known as *cross-modal reorganization* or *remodeling* (Gordon et al., 2011, p. 204; Sharma & Campbell, 2011, p. 152). There are two possible theories that have been suggested as to why these phenomena could occur—growth of new connections from auditory regions into other brain regions to adapt its functions, or repurposing these structures for different uses by recruiting interactions between auditory and non-auditory areas (Neville & Lawson, 1987, p. 264). Although the decoupling hypothesis and cross-modal reorganization have been confirmed as factual processes when discussing stimulation to deaf cats after the critical period, there remained some skepticism about the applicability or generalizability of this model to humans.

In 2008, Gilley, Sharma, and Dorman investigated if the results from the deafened cats study would be the same for humans (p. 56). The researchers used high-density EEG measures to analyze the CAEP latencies of normal hearing children and age-matched children who received cochlear implants before (<3.5 years of age) and after (>7 years of age) the sensitive period age cut-offs. The researchers used speech sounds in order to determine areas of activation in the primary and secondary auditory cortices (p. 57). Children who had normal hearing demonstrated bilateral activation of the auditory cortical areas—the superior temporal sulcus and the inferior temporal gyrus. Children who received cochlear implants at an early age (<3.5 years of age at fit) showed activation of the auditory cortical areas similar to that of normal hearing subjects, though there was a minor source of extra activity localized in the anterior parietotemporal cortex p. 61). Late-implanted children (>7 years of age at fit) comparatively showed activation outside the auditory cortical areas in the visual, insula, and parietotemporal areas (pp. 61-62). These results are congruent with that of the deaf cat experiment showing absent or weak connections between primary and association areas, and subsequently, weak feedback activity to the thalamic areas (Gilley et al., 2008, pp. 62-63; Sharma et al., 2009, p. 274).

Throughout newborn development, neural networks are established quickly at both the levels of intrinsic microcircuitry (within one area) and extrinsic circuitry (between areas) (Kral, 2007, p. 485). Due to auditory deprivation, issues related to the intrinsic microcircuitry and cross-modal plasticity suggest that higher-order auditory areas reorganize cross-modally, acquiring visual (and possibly other) functions (p. 486). Though cross-modal re-organization may benefit children who are deaf or hard of hearing by bolstering other sensory modalities in the absence of stimulation to auditory cortical areas, this process may also hinder the processing of auditory stimuli by occupying higher-order auditory areas with other sensory information such

as visual processing. (490).

For infants who receive benefits from cochlear implants within the critical period of language development, growing up to become bilingual appears to be very feasible. As children learn “incidentally” from the acoustic environment around them and with the help of auditory-based therapy, children can presumably become natively proficient in both languages. Though these children have every opportunity to become proficient bilingual speakers, this fact does not eliminate the potential social and cultural effects associated with being hearing impaired, bilingual, and living in the United States.

### **Social/Cultural Effects of Bilingualism**

In modern society, individuals encounter a variety of identities with which they can associate. The complexities of our social structure provide people every opportunity to identify with different social groups based on categories such as race, ethnicity, sexual orientation and preference, language, religion, among many others. For many people who belong to a minority population, especially those who have recently immigrated to the United States, society often dictates and classifies their identities.

### **Hispanic Acculturation**

Throughout most of the 20<sup>th</sup> and 21<sup>st</sup> centuries, social scientists have theorized about the assimilation processes immigrants have faced in order to be incorporated into the social fabric of the United States. Research on these processes—due to the Immigration Act of 1965 and other legislation—have noted the influxes of first-generation European, Asian, and African ethnicities during particular migratory waves into the United States (Portes & Zhou, 1993, p. 75).

According to racial and ethnic trends in migratory statistics, the largest and fastest-growing migratory population has come from neighboring regions of Central and South America in the

late 20<sup>th</sup> century into the early 21<sup>st</sup> century (U.S. Census Bureau, 2010, p. 2).

Hispanic immigrants involved in cultural transitions as a result of migration must learn the nuances of the societal norms, pressures, and standards affiliated with the United States (Padilla & Perez, 2003, p. 42). Portes and Zhou (1993) noted that going through adolescence in an immigrant family is very difficult due to the “conflicting social and cultural demands while they face the challenge of entry into an unfamiliar and frequently hostile world (p. 75). Due to the multifaceted nature of culture, there are several factors (e.g., social, economic, behavioral, cognitive, psychological, religious, and linguistic) each individual Hispanic confronts when (sub)consciously deciding how to become acculturated to the United States (Roitman, 2009, p. 2). *Psychological acculturation* is the internal transformations that immigrants experience when they come into contact with individuals from the host culture (Padilla & Perez, 2003, p. 35). Acculturation is a mutual and co-dependent process, which relies heavily upon the power relationship between the dominant and nondominant groups. For example, the dominant group’s prejudices and discriminatory practices are a driving factor in how open or tolerant they are in allowing nondominant groups to maintain their own culture, while also participating in the dominant culture (Padilla & Perez, 2003, p. 39).

Each individual must establish his/her own ethnic identity in order to determine to what extent he/she is willing to acculturate. As cited in Phinney (1991), ethnic identity is a construct used to clarify one’s self-identification (e.g., attitudes about being a group member, extent of ethnic knowledge, and ethnic behaviors and practices) within a particular group (p. 194). There are three stages involved in developing one’s ethnic identity. In the initial stage, the individual’s ethnicity and value systems are not analyzed due to the individual being in his/her child and adolescent years. The second stage is a period in which individuals become more interested in

their ethnic group's history, traditions, customs, or practices. By the final stage, people from ethnic minorities ideally should have a self-assured perception of themselves individually and collectively as a group (Ghavami et al., 2011, p. 80; Phinney, 1996, p. 921).

Once an individual has established a firm understanding of his/her own ethnic identity, the process then transitions to the individual's ethnic group preferences. These perceptions of other groups usually arise from some form of cultural competence. *Cultural competence* refers to the "learned ability to function in a culture in a manner that is congruent with the values, beliefs, customs, mannerisms, and language of the majority of the members of the culture" (Padilla & Perez, 2003, p. 42). Though having a level of cultural competence is necessary to be considered an "insider" of the home culture, each individual's perception of prejudice and ethnocentrism often affects the level to which an individual may be willing to acculturate. *Prejudice* is a preformed and unsubstantiated judgment denoting an irrationally unfavorable or hostile attitude toward the members of another racial or ethnic group (Negy et al., 2003, p. 335). Whereas *ethnocentrism* refers to applying standards decided by one's own group to another group and judging them as inferior or less valuable if all of the standards are not met (Negy et al., 2003, p. 335).

**Code-Switching.** One social phenomenon associated with acculturation that directly affects the language an individual is likely to use is code-switching. *Code-switching* occurs when a bilingual individual is speaking in one language and then switches to his/her other language (Altarriba & Herida, 2008, p. 86; Garder-Chloros, 2009, p. 20). There are a variety of social, cultural, and linguistic reasons as to why someone may code-switch in conversation (Altarriba & Herida, 2008, p. 86). For example, if a person code-switches in conversation to compensate for limited language proficiency in one language, there are numerous factors affecting why an

individual may want to switch to his/her “stronger” language. For many Hispanics who use the Spanish language as part of their cultural identity, code-switching could mean they simply would prefer to speak their native language instead (Altarriba & Herida, 2008, p. 87; Garder-Chloros, 2009, p. 142).

### **Theories of Acculturation**

These social cognitive processes of acculturation sparked the production of two major theories of how ethnic identities shape an individual’s perceptions of intergroup and intragroup relations. In a landmark study in 1986, Tajfel and Turner formed the idea of *Social Identity Theory (SIT)*, which stresses that individual behavior reflects individuals’ larger societal units (1986, pp. 15-16). As a result, group members view their group as unique from other groups and attempt to preserve their distinctiveness in order to maintain a positive social identity (Negy et al., 2003, p. 336; Padilla & Perez, 2003, p. 42). For instance, Hispanics who exhibited some level of accented English and who accepted this theory, would be less likely to acculturate, believing that the negative stigmatization affiliated with their speech sound productions would persist regardless of their best efforts (Padilla & Perez, 2003, p. 43). Conversely, the *multicultural approach* posits that individuals with a positive sense of their own ethnic identity and culture will portray positive attitudes toward other groups and higher self-esteem (Berry, 2011, p. 6). From this theory, high ethnic identity is deemed as ideal in order to best reflect greater acceptance of other social groups (Phinney, 1996, p. 926).

Language is a vital aspect of ethnic identity that contributes to an individual’s socialization and emotional, behavioral, and social self-regulation (Dale, 1996, p. 5). Considering an individual’s native language is a major contributing factor to a person’s ethnic identity, Hispanics in the United States are often faced with a difficult decision as to how and to

what capacity they speak Spanish compared to English (Portes & Zhou, 1993, p. 88). According to Ghavami and her colleagues, minority individuals who identify more strongly with their minority group reported greater psychological well-being (Ghavami et al., 2011, p. 79). There is some debate in the literature, however, that addresses how attributes such as accented English may lead to social *stigmatization*, which poses a threat to an individual's safety and feelings of personal value (Padilla & Perez, 2003, p. 49).

For instance, English is the most common language spoken in the majority of public education institutions in the United States. As a result, those who speak another language or demonstrate an accented production of English may be treated as “babies” due to their intonation difference (Cavazos-Rehg & DeLucia-Waack, 2009, p. 47). Stigmas related to accents are not easily concealed and make the process of coping with stereotypes and prejudice from their peers more difficult for Hispanic children. Therefore, many individuals often self-monitor their behavior, attire, and the manner in which they speak in hopes of being socially accepted by their peers of the dominant group (Padilla & Perez, 2003, p. 45).

### **Bilingual Education Systems**

Due to the growing ethnic and racial diversity in the United States, public school systems have had to adapt to the ever-changing social demographic that they serve. The majority of Hispanic children who are English Language Learners (ELLs) begin to learn English upon entering preschool (Gutiérrez-Clellen, Simon-Cerejido, & Sweet, 2012, p. 64). One instructional transformation that has been implemented to assist with this issue was the establishment of bilingual education (Cavazos-Rehg & DeLucia-Waack, 2009, p. 47). Bilingual education programs support a pedagogical approach to teaching in two languages, most usually English, along with the primary language of the student. The objective is to develop mastery in both the



primary language and English, while expanding the student's knowledge of his/her ethnic heritage (Cavazos-Rehg & DeLucia-Waack, 2009, p. 47; Negy et al., 2003, p. 334). Oftentimes, instruction about the child's home culture intends to foster a positive attitude toward his/her ethnic background, and hopefully, his/her self-concept as a whole. In contrast English as a Second Language (ESL) programs deliberately aim at assisting Limited English Proficient (LEP) students to better understand academic, social, and cultural skills associated with the English language (Cavazos-Rehg & DeLucia-Waack, 2009, p. 47).

These educational resources have been vitally important for Hispanic children, who are far more likely to be bilingual English-Spanish speakers compared to their first-generation immigrant parents (Portes & Zhou, 1993, p. 78). According to the National Center for Education Statistics (NCES) in 2005, 18.7% of the U.S. population older than the age of 5 years old speaks a language other than English at home (p. 174). In 2003, 40% of all public school students were considered to be part of a minority group compared to 22% in 1972 (Perie, Grigg, & Donahue, 2005, p. 12). This increase is largely due to the growth in the proportion of Hispanic students, which is estimated to consist of over 19% of all students enrolled in grades K–12 (Perie et al., 2005, p. 22).

Since adolescence is a critical period for identity development, students enrolled in bilingual educational programs should arguably learn and develop more pride in their ethnic identity than those enrolled in traditional education systems (Cavazos-Rehg & DeLucia-Waack, 2009, p. 48; Ghavami et al., 2011, p. 81) Several studies have examined the relationship between self-esteem and bilingual education, but the results are contradictory. According to Cavazos-Rehg and DeLucia-Waack (2009), Hispanic adolescents in a traditional education programs were more likely to acculturate to the United States culture than the adolescents who were in bilingual

education programs (p. 51). There was no statistical difference, however, between Hispanic adolescents in traditional education programs and Hispanic adolescents in bilingual education programs on levels of self-esteem (Cavazos-Rehg & DeLucia-Waack, 2009, p. 51).

A different study by Gutiérrez-Clellen and his colleagues (2012) stated that a bilingual approach to language instruction in preschool demonstrates more positive effects compared to English only approaches (p. 64). In contrast, Huang (1992) examined how Spanish proficiency is associated with self-esteem among Mexican-American adolescents. According to his results, Spanish proficiency does not indiscriminately enhance Mexican-American students' self-esteem. Though a school setting with a high proportion of racial-ethnic minority students facilitates the function of Spanish proficiency in promoting self-esteem of Mexican-American children (p. 20).

Although there are conflicting results as to whether or not bilingual education programs positively or negatively impact Hispanics' self-esteem in the United States, it appears to help strengthen their self-concept (Collins, 2014, p. 390). In a post-modern world, the paradox of living in a world without borders while simultaneously not accepting certain ethnic, racial, linguistic, and other identities is contradictory (Roitman, 2009, p. 2). Society compartmentalizes people in groups based on similarities as opposed to leaving the choice open to the individual.

### **Multicultural Issues**

As the United States population continues to grow in both size and diversity, communication professionals must recognize this growing trend and adapt to the ever-changing client population they serve (Moore, Prath, & Arrieta, 2006, p. 322). There are however, a large array of factors clinicians must consider in order to provide appropriate and effective therapy (Katz & de Melo, 2012, p. 44). Approximately 308.7 million people live in the United States, with 50.5 million being Hispanic/Latino. They are the largest minority group in the country

representing 16.3% of the total population (U.S. Census Bureau, 2010, p. 2). The Hispanic population is projected to triple in size by the year 2050 and Whites/Caucasians will no longer be considered the numerical majority—down to 47% (Gans, 2013, p. 34). Coincidentally, there exists a higher prevalence of hearing loss in the pediatric Hispanic-American population compared to all other minority groups, with 10.3% coming from monolingual Spanish-speaking homes (Mehra, Eavey, & Keamy, 2009, p. 464; Ramkissoon & Khan, 2003, para. 2).

With this trend growing at such a rapid pace, a central issue that remains is that the backgrounds of auditory-based therapists do not resemble the same cultural and linguistic diversity demonstrated by the families they assist (Rhoades, Price, & Perigoe, 2004, p. 290). Auditory-verbal therapists, however cannot be “blamed” for this issue. There have only recently been some newly developed Doctor of Audiology (Au.D.) and graduate training programs where students are provided with information regarding cultural and linguistic differences and standards of linguistic development for languages other than English (Douglas, 2011a, p. 5; Moore et al., 2006, p. 322). Despite clinicians’ apparent lack of knowledge, hearing healthcare clinicians are now expected to develop both cross-cultural and linguistic competence in order to facilitate therapy as efficiently as possible (Douglas, 2011a, p. 5; Johnson, 2012, p. 61; Rhoades et al., 2004, p. 290). Clinicians should use their knowledge about children who are hearing impaired and apply it to information regarding the typical development of children who are bilingual (Douglas, 2011a, p. 5). Although data about demographic information of auditory-based therapists are not currently available, it is important to note that a significant language barrier does exist between most therapists and the bilingual child (Rhoades et al., 2004, p. 290). The language barriers that often occur between therapists and the child and his/her family are becoming a growing issue, especially with Hispanic families who only speak Spanish. As a

result, many therapists are finding it increasingly more challenging to appropriately help this growing population (Johnson, 2012, p. 68).

### **Language Barriers**

Language barriers between the auditory-based therapist and the family of a child with hearing loss may cause a variety of different issues. Some of these hindrances in communication can cause the child and his/her family to have problems with the referral process, scheduling appointments, discussing the child's issues, the appropriate assessment of the child, and even the recommendations associated with treatment (Douglas, 2011a, p. 7; Johnson, 2012, p. 55).

Since the introduction of Universal Newborn Hearing Screening (UNHS), overseen by the Joint Committee on Infant Hearing (JCIH) and early hearing detection and intervention (EHDI) programs, it has been recommended that all children be screened for hearing loss within 1 month of age; receive a diagnosis of hearing loss by 3 months of age; and clinical intervention should begin by 6 months of age (JCIH, 2007, p. 898; Johnson, 2012, p. 56). Though these very valuable programs were established in order to diagnose and assist those with hearing loss as early as possible, oftentimes language barriers have caused some parents of different cultural and linguistic backgrounds to not understand the purpose of having the child's hearing screened, the consequences of untreated hearing loss, and even the importance of scheduling and attending follow-up appointments (Johnson, 2012, p. 56; Katz & de Melo, 2012, p. 45).

Language barriers may also cause a communication "disconnect" between the therapist and the parents when the parents need to discuss assorted issues they observe with their child. One tool therapists use to gain some background information on clients is a case history form (Douglas, 2011a, p. 8). A *case history form* is a common assessment document used for collecting relevant patient information in an organized manner (p. 8). Unfortunately, case history

forms are not always presented in the native language of the family and can be challenging for parents to write down relevant medical information when they cannot understand the form (Douglas, 2011a, p. 8; Johnson, 2012, p. 58). A better alternative might be a home language survey. A *home language survey* is “a questionnaire completed prior to an assessment to information on the language or languages used in the home” (Douglas, 2011a, p. 8). A home language survey should also be considered in order to get a better understanding of the language and cultural norms affiliated with the child’s background (Douglas, 2011a, pp. 8-9). Also, parents who do not speak English proficiently can experience trouble speaking about the child’s difficulties and may find the required follow-up services needed for treatment and proper therapy activities at home challenging (Katz & de Melo, 2012, p. 45). Overall, the family and parents in particular may struggle comprehending the therapy goals, techniques, and strategies that may have been introduced or incorporated into the intervention session (Katz & de Melo, 2012, p. 44).

If the clinician is a competent and native speaker of the language the family uses, however, the therapist should ideally conduct therapy in the family’s home language (Katz & de Melo, 2012, p. 45). As needed, most auditory-based therapy sessions with culturally or linguistically diverse children may require an interpreter during the sessions to explain the purpose of what the clinician is doing (Katz & de Melo, 2012, p. 46). An *interpreter* is “a person who serves as a conduit for communication between individuals who use two different languages” (Johnson, 2012, p. 58).

Since auditory-based therapy sessions are diagnostic in nature, the auditory-based therapist usually includes both informal and standardized assessments during therapy sessions. The interpreter plays a large role in the informal assessments because of his/her ability to

interpret the child's utterances (Katz & de Melo, 2012, p. 46). If interpreters are not available though, selective family members may be able to act as the interpreter between the child and the therapist (Johnson, 2012, p. 58). Family members may report to the auditory-based therapist what the appropriate response should be, versus what the child actually "had" produced. If the auditory-based therapist cannot accurately interpret the child's utterances, the child's incorrect productions may go unnoticed by the clinician (Katz & de Melo, 2012, p. 46).

When the auditory-based therapist needs to conduct formal assessments, he/she must understand that the use of tests that were designed for English-speaking children cannot automatically be used for children speaking other languages (Katz & de Melo, 2012, p. 46). These formal assessments can be problematic because there are very few norm-referenced tests created for languages other than English and Spanish (Douglas, 2011a, p. 5; Rhoades et al., 2004, p. 293). Clinicians should administer standardized tests in the native language, or, use a test that may have already been translated (Douglas, 2011a, pp. 10-11). The results from the adapted tests can only be used in a *criterion-referenced* manner, or compared to the child's own previous performances (Katz & de Melo, 2012, p. 46). When the auditory-based therapist receives results from the assessments he/she must not consider dialectal, cultural, or language differences as communication impairments, but as spoken language "differences" (Douglas, 2011a, p. 11). Based off of the results from the child's case history, assessment measures, and stimulability probes, auditory-based therapists must develop a unique program for the child: recommending what the child needs, how often/long the child will need therapy, and make any adaptations the child will need in the future as necessary (Douglas, 2011a, p. 11).

Sometimes the results of hearing assessments do not bring good news to the family about the severity of the child's hearing loss. If there is an interpreter or someone who speaks the

native language of the family, it is important that he/she tells the family about any prognosis or issue related to the child in the family's native language (Johnson, 2012, p. 59). Clinicians and interpreters should evaluate the way the parents' receive the news to determine whether or not they understand the situation (p. 59). Clinicians must also understand that parents of children from culturally and linguistically diverse backgrounds might not follow the recommendations from the therapists at all; however, this possibility exists with all patients (p. 59). Regardless of whether or not parents follow-up for subsequent auditory-verbal therapy sessions, having an interpreter to speak to the family in their native language is a usually preferred by families in general (Douglas, 2011a, p. 7).

### **Roles of Interpreters**

The successful utilization of an interpreter during a diagnostic therapy session is dependent upon several factors. The first and one of the most important steps is selecting an interpreter (Johnson, 2012, p. 68). The interpreter should be selected on his/her ability to proficiently use English and the minority language with both oral and written proficiency (Johnson, 2012, p. 68; Rhoades et al., 2004, p. 293). The interpreter should be able to speak accurately about the type, degree, and configuration of hearing loss to the family in the minority language and also relay the parents' concerns about the child's hearing loss (Johnson, 2012, p. 68). Interpreters need to understand that their translation/interpretation needs to be as close to the therapist's original utterance as possible (Katz & de Melo, 2012, p. 47). Another important component that should be considered in selecting an interpreter is the background and the exposure the interpreter has in health sciences and medical translation (Johnson, 2012, p. 68).

A second important step in the use of interpreters is that auditory-based therapists, audiologists, speech-language pathologists, and all other hearing healthcare professionals should

ideally meet with the interpreter well in advance of the session to discuss each child's specific case (Johnson, 2012, pp. 68-69; Katz & de Melo, 2012, p. 47; Rhoades et al., 2004, p. 293). The members of the child's therapy team should examine the goals and objectives of the client with the interpreter while reminding him/her to only translate exactly what is being said and to not engage in other dialogue (Johnson, 2012, p. 69). Interpreters must also be made aware that during diagnostic testing, he/she must limit any sort of verbal, visual, or tactile cues to elicit a response from the child and very importantly—all that that has transpired during the session or evaluation is strictly confidential (Johnson, 2012, p. 70). Generally, if the interpreters are reminded of the importance of not providing inappropriate cues to the child during diagnostic measures, the test's administration will be considered more valid (Johnson, 2012, p. 70).

The last important step in the successful use of an interpreter during a therapy session with a child is consistency (Katz & de Melo, 2012, p. 47). If the clinicians and the interpreter already have an established working relationship and rapport, it is preferable for the child to have the same interpreter every session (p. 47). Consequently, the interpreter and the child and his/her family will become familiar with each other and also the format of the therapy session (p. 47). For example, if the relationships between the listening and spoken language therapist, the interpreter, and the child's family are well-established and foster the child's linguistic growth in both languages, the outcomes for the child's growth in listening and spoken language should be positive. Refer to Appendix B for more details about suggestions for using an interpreter in a diagnostic or therapy setting.

### **Myths of Bilingualism**

From a historical context, language development experts and educators have always been precautionous of second language learning in young children (Waltzman, McConkey Robbins,



Green, & Cohen, 2003, p. 757). One common rationale why clinicians thought children should not be raised bilingual was children sometimes learned the linguistic structures in the second language later than the first and as a result, the child was deemed to have a communication or language impairment (Waltzman et al., 2003, p. 757). Overall, this short “delay” does not typically have any significant effect on the bilingual child’s ability to develop both languages later on in life (Genesee, 2008, p. 18; Gutiérrez-Clellen et al., 2012, p. 64). It has been observed that if a child is exposed more to one language than another, the child’s natural preference for the more commonly used language will often cause the child to develop fluency in that language faster (Waltzman et al., 2003, p. 757). There exists no evidence however, to suggest that raising children to be bilingual is in any way detrimental to the child’s overall linguistic growth (Genesee, 2008, p. 18). Also, lack of support of the home language could negatively impact the parents’ abilities to communicate with their child. This can cause negative psychological issues in the parents, further compromising the child with hearing loss and his/her development (Bunta & Douglas, 2013, p. 288).

### **Hearing Impairment and Bilingualism**

For those who are hearing impaired, communicating using listening and spoken language in just one language remains a difficult task even with the use of hearing technology such as hearing aids and cochlear implants (McConkey Robbins, Green, & Waltzman, 2004, p. 644). Many children who are profoundly deaf or hard of hearing do not have access to the full range of the phonetic and prosodic aspects of language because of their hearing impairment (McConkey Robbins, 2007, p. 1). More importantly, deafness restricts children’s ability to overhear conversations and constrains their exposure to “casual” language, which is one of the most important ways children gain fluency in a language (Genesee, 2008, p. 21; McConkey Robbins

et al., 2004, p. 644). The brain's neuroplasticity during the early years of childhood enables children who grow up in bilingual or multilingual homes to learn as many languages to which the child is consistently exposed (McConkey Robbins, 2007, pp. 1-2, McConkey Robbins et al., 2004, p. 644).

Clinicians may have difficulty recommending bilingual language learning for the child with a hearing impairment, even if the child has a cochlear implant (McConkey Robbins et al., 2004, p. 644). Although cochlear implants typically provide children with more phonetic features of spoken language than hearing aids, they still supply the brain with only part of the acoustic information (McConkey Robbins et al., 2004, p. 644; Moreno-Torres, 2014, p. 575). Now that children are being implanted with cochlear implants at younger ages, however, these children are more likely to develop essential spoken language skills through incidental learning and during their critical period of language-learning (Genesee, 2008, p. 21; McConkey Robbins et al., 2004, p. 644; McConkey Robbins, 2007, p. 2).

### **Outcomes of Bilingual Cochlear Implant Patients**

Several studies have been conducted to see if children who are recipients of cochlear implants can develop fluency in two languages that is commensurable to their normal hearing peers. One of the first studies that tested the feasibility of children with cochlear implants developing listening and spoken language fluency in two languages was completed using a retrospective analysis (Waltzman et al., 2003, pp. 757-758). The majority of the children demonstrated age-appropriate receptive and expressive language skills in their primary language commensurate with normal-hearing children (p. 761). Overall, learning another language did not appear to cause a negative effect on the child's language acquisition in general, and if anything,

contact with other languages resulted in the children receiving more language support, which helped the child (Bunta & Douglas, 2013, p. 282; Waltzman et al., 2003, p. 761).

In another study, it was concluded that clinicians should not encourage parents of linguistically diverse backgrounds to speak English-only with their child, especially if the parents' proficiency in English is such that they are unable to provide an environment to help the child gain native English qualities (McConkey Robbins et al., 2004, p. 647). Another study added that children who were raised in bilingual environments whose primary language was English demonstrated similar scores to their monolingual-English peers on language proficiency tests when matched for age of implantation, cochlear anatomy, educational setting, and device type (Thomas, El-Kashlan, & Zwolan, 2008, p. 233). A different study concluded with similar findings—that when parents and clinicians support both languages, the two languages can be acquired at the same levels of competence (Bunta & Douglas, 2013, p. 287).

In contrast to the above-noted studies, one retrospective analysis did not support the use of bilingual language acquisition for cochlear-implanted children in an English and German context (Teschendorf, Janeschik, Bagus, Lang, & Arweiler-Harbeck, 2011, pp. 234-235). The authors noted, “Some children who live in bilingual homes could develop proficiency in a second language, but that was the exception rather than the rule” (p. 235). The authors stated that the results of their study might have differed from the aforementioned studies so drastically because of the discrepancies in the methodologies they used in their study. The authors did not control for socioeconomic status (SES), parental education, educational background of the child, parental motivation for the child, and parental compliance with therapy (p. 235). In conclusion, overall, the aforementioned studies help to dispel the myth that bilingualism causes language delays in children; and as it turns out—it may be a lack of sufficient speech and language in both

languages that causes bilingual children to have a speech/language “delay” (Bunta & Douglas, 2013, p. 283).

### **Conclusion**

If there is one central message the author of this study hopes to make clear, it is that children from linguistically and culturally diverse backgrounds have been “forgotten” for far too long. Speech, language, and hearing clinicians must now recognize how much knowledge they still need to gain in order to help these children. This review of the literature was designed to help both clinicians and parents of children who have hearing loss better understand what still needs to be done. Although there has been a significant body of literature devoted to the issues of dual-language acquisition for children with cochlear implants in therapy, there has been limited research on the policies and clinical practices implemented by cochlear implant center regarding the candidacy, auditory treatment, and referral process of these pediatric cochlear implant patients from linguistically diverse backgrounds. The following chapter will describe the method, participants, instruments, and procedures for this study and investigation.

## **CHAPTER III**

### **METHOD**

The purpose of this study was to examine cochlear implant centers' policies and clinical practices regarding candidacy and auditory treatment for monolingual Spanish, English as a second language (ESL), and bilingual English-Spanish pediatric cochlear implant patients. In order to complete this study, an online survey was administered electronically using Qualtrics, an online survey generator software and was forwarded to audiologists and auditory-based therapists across the United States. Using the information gathered from these hearing healthcare specialists, the researcher was able to determine specific clinical practices and the referral processes implemented by audiologists and auditory-based therapists who serve this cohort of Hispanic patients.

#### **Justification of Method**

This study made use of quantitative survey research using a purposive sampling technique. The researcher chose this method because survey research is considered an effective form of data collection for descriptive, explanatory, and exploratory studies (Babbie, 2014, p. 270). One major strength of surveys is that they can reach a large amount of qualified participants regardless of location. Online surveys, moreover, are suitable for respondents because they can be completed at their convenience, though it increases the risk that respondents will delete an email requesting participation (p. 301). Additionally, this study's online surveys were considered especially cost effective (p. 291). For this study, online survey research allowed for a broader sample size and quantitative data from hearing healthcare professionals on cochlear implant teams (e.g., audiologists, auditory-verbal therapists) across the United States.

## **Participants**

Participants in this study were members of cochlear implant teams across the United States. The population was limited to audiologists and auditory-based therapists over the age of 18 years who work at cochlear implant clinics that serve a large cohort of Hispanic pediatric cochlear implant patients. Surveys were distributed to the aforementioned qualified participants across the United States. These centers were found using the three cochlear implant manufacturers' respective "Find a Clinic" search bars on their websites, along with further investigation through the individual cochlear implant centers' websites. Additional contact information was identified using the "Find American Cochlear Implant Alliance (ACIA) Organizations" search bar on the ACIA website.

## **Instrument**

The instrument used for this study was an online survey developed by the researcher after a thorough literature review regarding hearing, hearing loss, auditory (re)habilitation, dual-language acquisition, and Hispanic multicultural issues. This online survey, created using Qualtrics, an online survey generator, consisted of 27 items for audiologists and 34 items for auditory-based therapists (see Appendix D). The questionnaire was carefully constructed based on topics from the literature, and then distributed electronically to identified participants. The survey was divided into three key sections: demographics; audiology specific-practices; and therapy-specific practices. The first section of the survey provided the researcher with important demographic information regarding the sample population being studied. The second section was developed in order to better understand the audiologists' clinical practices and their perspectives on how to best serve this specific cohort of Hispanic pediatric cochlear implant patients. This audiologist's section contained a matrix of statements regarding their clinical practices and

perceptions related to audiological practices for Hispanic pediatric cochlear implant patients. The third section addressed statements for auditory-based therapists about their clinical practices and experiences in relation to this cohort of Hispanic pediatric cochlear implant patients. This therapist's section included both a matrix of questions as well as three follow-up open-ended questions regarding their clinics' specific policies or clinical practices regarding therapy for these Hispanic pediatric cochlear implant patients.

All of the matrix statements were based on a scale of 1 through 7; 1 representing "Strongly Agree" and 7 symbolizing they "Strongly Disagree." The open-ended questions were developed to see if the researcher could gain more insight regarding if there were any bilingual auditory-based therapists; what experiences the therapists had working with Hispanic pediatric cochlear implant patients; and whether their cochlear implant clinic had a specific policy as to how to approach working with these children. All sections of the survey were ultimately designed in order to evaluate audiologists' and auditory-based therapists' policies and clinical practices regarding diagnostic cochlear implant processes and therapy practices for Hispanic pediatric cochlear implant patients. The survey concluded by asking participants if they would like to share any additional comments or questions.

### **Procedures**

Participants were asked to complete the survey, which had been approved via an Expedited Review by The College's Human Subjects Review Committee ("HSRC"). Email addresses of all participants were identified from the three cochlear implant manufacturers' websites, the American Cochlear Implant Alliance (ACIA) website, and individual cochlear implant centers' websites. On December 28, 2015, emails were sent out to audiologists and auditory-based therapists across the United States. The initial recruitment email sent to these audiologists and

auditory-based therapists is provided in Appendix E. On January 4, 2016, a brief description of the study and a link to the survey was posted on the American Speech-Language-Hearing Association's (ASHA) website to their Special Interest Group 9 (SIG-9), Hearing and Hearing Disorders in Childhood (see Appendix F). On January 15, 2016, a short description of the study and an online link to the survey was posted on the Alexander Graham Bell Association for the Deaf or Hard of Hearing website in order to gain more participants from approximately 12,000 various clinicians (see Appendix G). On January 25, 2016 a second and final email was sent out to major cochlear implant center contacts with a high demographic of Hispanics, in order to encourage those who had not already participated, to complete the survey.

In the initial recruitment email, a link was provided which directed potential participants to the online electronic survey. Participants were briefed on the nature of the study, and provided with contact information for the researcher and the researcher's Independent Study advisors, in case any questions were to arise. In order to proceed with the survey, participants were required to agree to a consent statement before proceeding with the first item (see Appendix D). Participants were informed the survey would take approximately 5 to 10 minutes, and to complete it at their convenience. They were asked to answer questions to the best of their abilities. Responses were intended to measure their overall clinical practices and knowledge on the topics being investigated. The survey was deactivated on Qualtrics on January 30, 2016, making it inaccessible. Data were downloaded from the completed surveys to be subjected to analysis with SPSS software. Findings and their interpretation will be further described in Chapter IV.



## **CHAPTER IV**

### **RESULTS AND DISCUSSION**

The purpose of this study was to examine the policies and clinical practices of audiologists and auditory-based therapists in cochlear implant centers across the United States regarding candidacy and auditory treatment of Hispanic pediatric cochlear implant patients from linguistically diverse backgrounds. A total of 81 licensed audiologists and auditory-based therapists were initially contacted and asked to participate in the study. These hearing healthcare professionals were also encouraged to redistribute the survey to other professionals within and outside of their respective cochlear implant team. Other professionals were contacted via the ASHA and AG Bell membership websites. A total of 59 clinicians ultimately participated. This chapter will provide a detailed analysis of the data obtained from the study, followed by a discussion regarding the presented results.

#### **Demographics**

A total of 81 audiologists and auditory-based therapists were initially requested to participate in this study. Of the initial participants, 59 responded to the survey. Out of those who started the survey, only 36 participants completed the survey in its entirety. This resulted in a 62.1% completion rate. Of the 54 completed responses to this question, 96.3% (n=52) were completed by audiologists and auditory-based therapists who serve any Hispanic pediatric cochlear implant candidates or recipients, and 3.7% (n=2) were completed by hearing healthcare professionals who do not serve any Hispanic pediatric cochlear implant patients. The data of professionals who responded that they do not serve any Hispanic pediatric cochlear implant patients were still included in the results because the researcher decided that these professionals'

perceptions of what the clinical practices should be for this cohort of pediatric patients were still seen as significant information.

In order to understand the backgrounds of participating audiologists and auditory-based therapists, the researcher asked 13 additional demographic questions—sex, highest degree earned, primary place of work, city/state of employment, years of experience working with pediatric cochlear implant patients, perception of the size of Hispanic population in their area of work, percentage of Hispanic pediatric cochlear implant patients on their caseloads, percentage of Hispanic pediatric cochlear implant patients that only speak Spanish, patients' English and Spanish speaking levels, modes of communication offered, percentage of pediatric cochlear implant patients who receive auditory-based therapy, if they are the auditory-based therapist, and primary role on their cochlear implant team. In order to analyze these items descriptive statistics were completed.

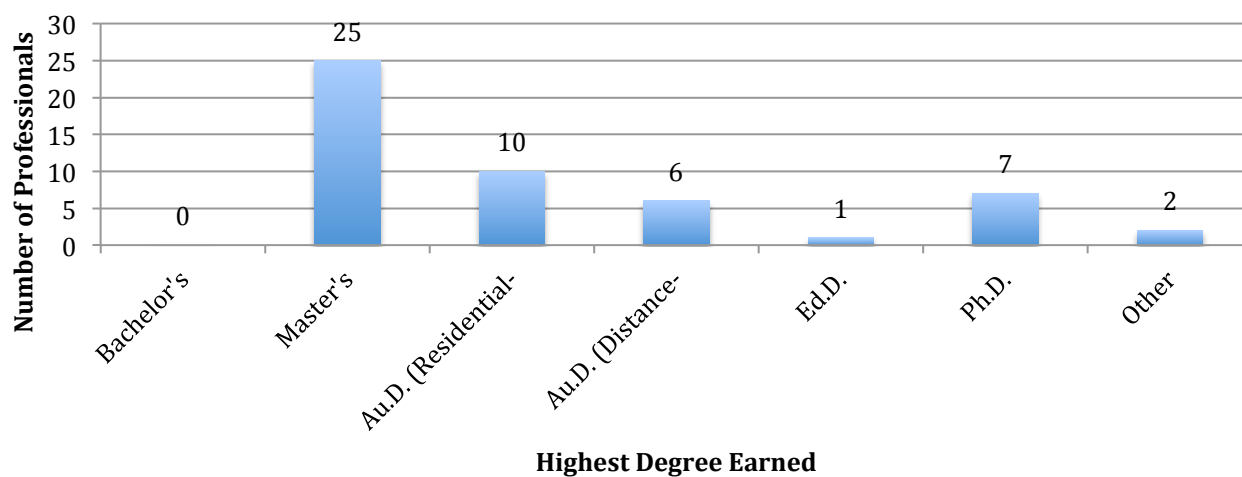
### **Sex**

The first question participants were asked was their sex. Of the 51 participants who answered the question 7.8% (n=4) were male, 88.2% (n=45) were female, and 3.9% (n=2) preferred not to answer.

### **Highest Degree Earned**

The researcher asked participants what their highest degree earned was. Participants were given the option to choose between seven options: Bachelor's; Master's; Au.D. (Residential program); Au.D. (Distance-learning program); Ed.D.; Ph.D.; and "Other". Of the 51 participants, 49.0% (n=25) responded Master's; 19.6% (n=10) responded Au.D. (Residential-Based program); 11.8% (n=6) responded Au.D. (Distance-Learning program); 2.0% (n=1) responded Ed.D.; 13.7% (n=7) responded Ph.D.; and 3.9% (n=2) responded Other. For those who selected "Other"

100% (n=2) responded “Sc.D.” No participants chose the “Bachelor’s” option. For a graphic representation of degrees earned see Figure 1.



*Figure 1.* Highest degrees earned by participants.

### **Primary Employment Site**

Participants were then asked to identify their primary employment site. Options included hospital-based cochlear implant center, cochlear implant clinic/center, ENT/otology physician office, speech and hearing clinic, private practice, and “other.” Out of the 51 participants, a total of 52.9% (n=27) worked at a hospital-based cochlear implant center; 7.8% (n=4) worked at a cochlear implant clinic/center; 7.8% (n=4) worked at an ENT/otology physician office; 5.9% (n=3) worked at a speech and hearing clinic; 2.0% (n=1) worked at a private practice; and 23.5% (n=12) responded with “other.” Individuals who chose the option “other” identified their primary employment site with a wide range of responses. “Other” responses included public school districts, hearing health and habilitation training programs, LSL preschools, Option schools, teletherapy, and colleges/universities. See Figure 2 for the full distribution.

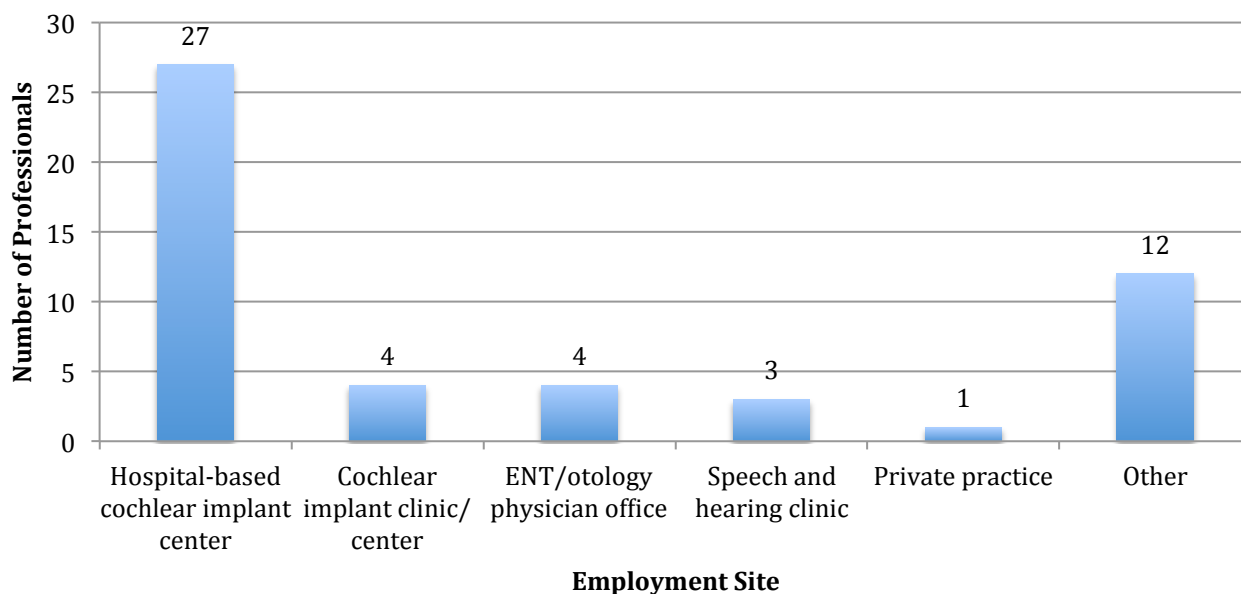


Figure 2. Primary employment sites of participants.

### City/State of Employment

The following open-ended question asked participants to identify the city and state in which their primary place of employment was located. Of the 47 participants, the state that responded the most to the survey was from Ohio (n=9), Illinois (n=6), and then California (n=5) and Maryland (n=5). See Appendix H for a full distribution of the cities and states where the respondents are employed.

### Experience Working with Pediatric Cochlear Implant Patients

Due to the nature of the study, the researcher asked participants how many years of experience he/she had working with pediatric cochlear implant patients. Participants were given six different ranges of experience to choose from including the following: less than a year, 1-5 years, 6-10 years, 11-15 years, 16-20 years, and more than 20 years. Out of the 51 participants who responded, 25.5% (n=13) answered 1-5 years; 31.4% (n=16) chose 6-10 years; 11.8% (n=6) responded 11-15 years; 5.9% (n=3) replied 16-20 years; and 25.5% (n=13) chose more than 20

years. No participants chose the “less than a year” option. To see a graphic representation of years of experience working with pediatric cochlear implant patients see Figure 3.

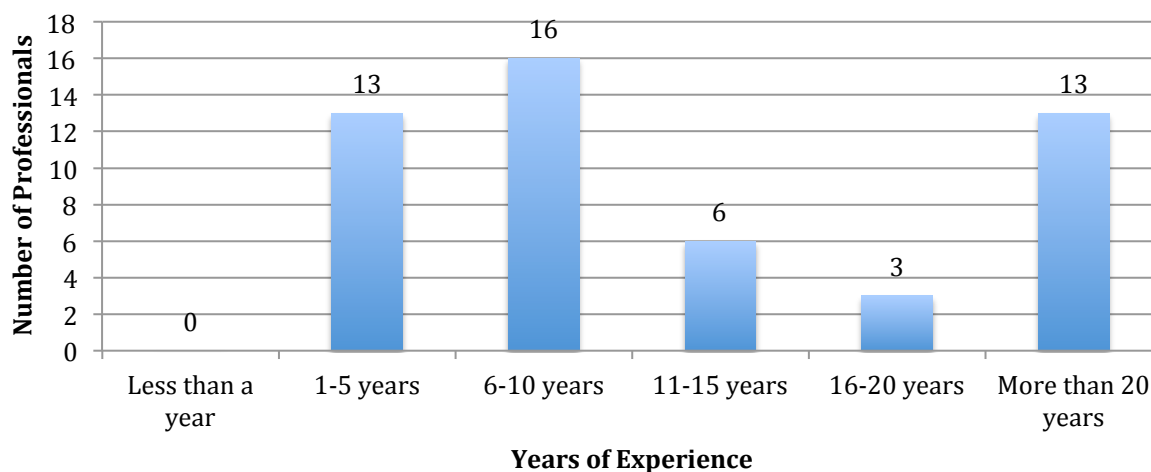


Figure 3. Experience working with pediatric cochlear implant patients.

### Size of Hispanic Population in their Area of Work

The researcher then asked participants to determine whether or not he/she would consider Hispanics to be a “large minority” population in the geographic area in which he/she worked. Of the 47 participants, 63.8% (n=30) responded “Yes” whereas 36.2% (n=17) chose “No.”

### Percentage of Hispanic Pediatric Patients on Caseload

Participants were asked to approximate the percentage of the professional’s current caseload was Hispanic. The percentages the participants were presented were divided into 5% segments. Interestingly, of the 46 participants who responded, 28.3% (n=13) answered 1-5% of their caseload was Hispanic, 8.7% (n=4) chose 6-10% of their caseload was Hispanic, 10.9% (n=5) responded 11-15% of their caseload was Hispanic, 4.3% (n=2) replied 16-20% of their caseload was Hispanic, 8.7% (n=4) replied 21-25% of their caseload was Hispanic, and 39.1% (n=18) chose more than 25% of their caseload was Hispanic. To see a graphic representation of the percentages of Hispanic pediatric patients on professional’s caseloads see Figure 4.

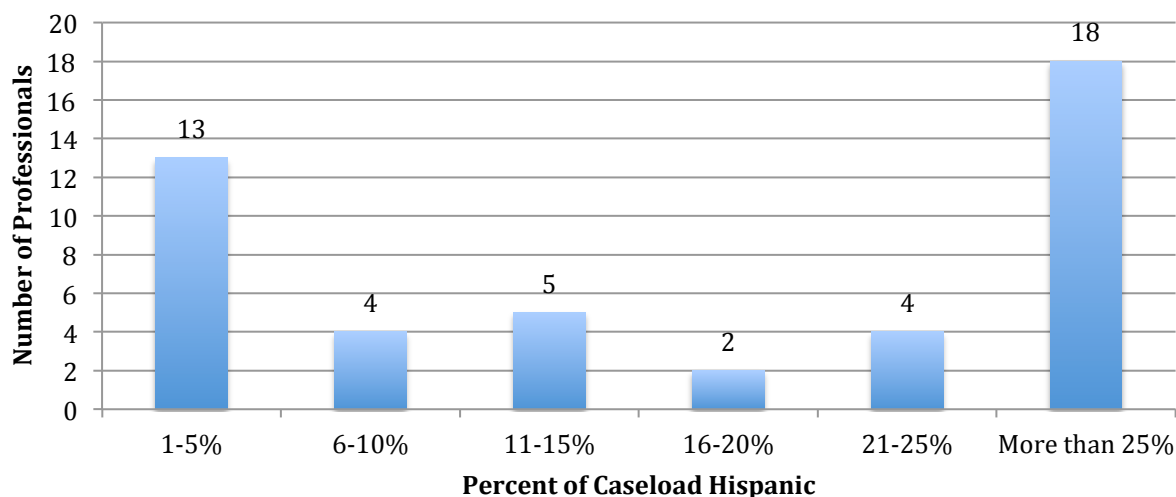


Figure 4. Percentage of Hispanic pediatric patients on caseload.

#### Percentage of Monolingual Spanish Speaking Patients

In order to further understand the nature of the Hispanic patients professionals are seeing on their caseloads, participants were asked to provide an approximate percentage of their caseload that only spoke Spanish. The response options for the participants were presented were divided into 10% segments. Of the 46 respondents, 52.2% (n=24) answered 1-10% of their Hispanic patients were monolingual Spanish speakers; 6.5% (n=3) chose 11-20% were monolingual Spanish speakers; 4.3% (n=2) responded 21-30% were monolingual Spanish speakers; 4.3% (n=2) replied 31-40% were monolingual Spanish speakers; 19.6% (n=9) chose 41-50% were monolingual Spanish speakers; and 13.0% (n=6) responded 51% or more were monolingual Spanish speakers. To see a graphic representation of the percentages of monolingual Spanish speaking Hispanic pediatric patients on professional's caseloads see Figure 5.

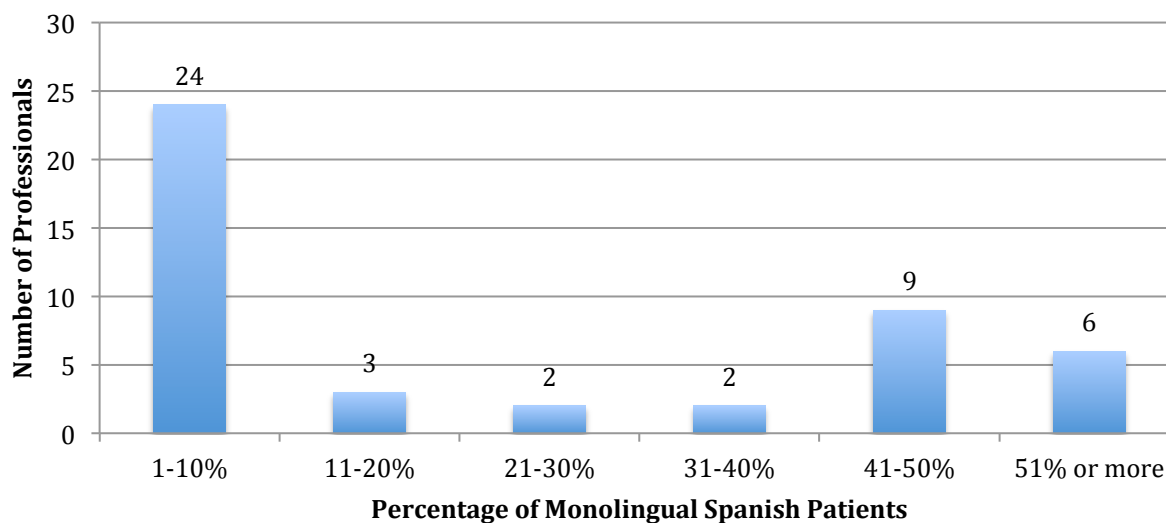


Figure 5. Percentage of monolingual Spanish speakers.

### “Types” of Hispanic Pediatric Cochlear Implant Patients

In order to gain a better understanding of the types of Hispanic pediatric cochlear implant patients seen in the professional’s clinic, the researcher asked participants to rank from 1 to 3 (1=Most Common and 3=Least Common) whether monolingual Spanish speakers, English as a Second Language (ESL), or bilingual English-Spanish speakers were the most commonly seen Hispanics seen in his/her clinic. See Table 5 for an overview of the results.

Table 5

#### *Ranking the “Types” of Hispanic Pediatric Patients*

Types	Most Common			Least Common	Mean	Standard Deviation
	1	2	3			
Monolingual Spanish	23.5% (n=8)	26.5% (n=9)	50.0% (n=17)	2.26	0.83	
English as a Second Language (ESL)	50.0% (n=17)	44.1% (n=15)	5.9% (n=2)	1.56	0.61	
Bilingual Spanish-English	26.5% (n=9)	29.4% (n=10)	44.1% (n=15)	2.18	0.83	

## Modes of Communication

The next question asked participants which mode of communication is most often used for the treatment of their cochlear implant recipients. Participants were given 3 different options: Listening and Spoken Language (e.g., Auditory/Oral, Auditory-Verbal); manual (e.g., American Sign Language [ASL], Manually Coded English [MCE]); or combined (e.g., Total Communication [TC], Cued Speech). Among the 46 respondents, 89.1% (n=41) chose Listening and Spoken Language and 10.9% (n=5) selected the combined approach. No participants picked the “manual” option as the most common mode of communication.

## Percentage Who Receive Auditory-Based Therapy

The researcher then followed up by asking participants approximately what percentage of their pediatric cochlear implant patients received auditory-based therapy. Participants were given five different ranges of percentages to choose from: 0-25%, 26-40%, 41-50%, 51-75%, or over 76%. Out of the 45 participants who responded, 22.2% (n=10) answered 0-25%; 8.9% (n=4) chose 26-40%; 2.2% (n=1) responded 41-50%; 22.2% (n=10) replied 51-75%; and 44.4% (n=20) chose over 76%. To see a graphic representation of the percentages of pediatric cochlear implant patients who receive auditory-based therapy see Figure 6.

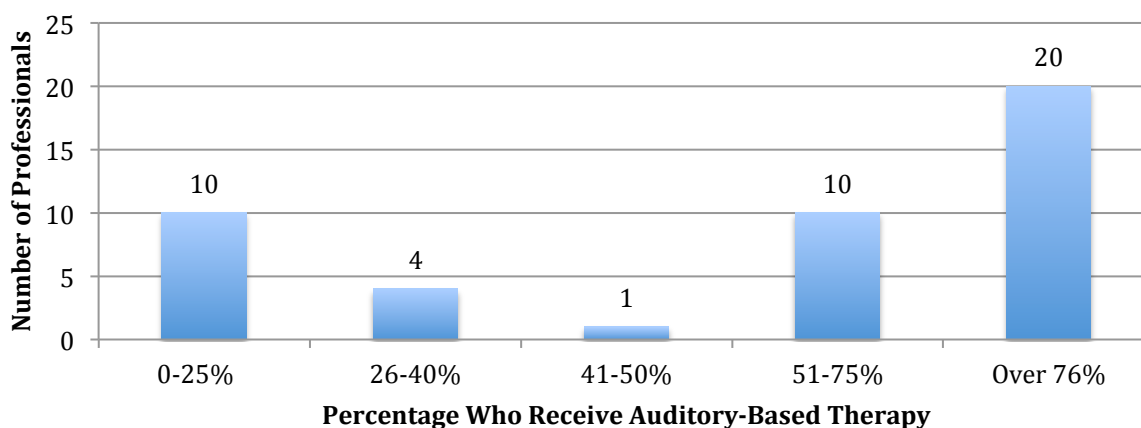


Figure 6. Percentage of pediatric patients who receive auditory-based therapy.



### Auditory-Based Therapist

The next question asked participants to note if they were considered the auditory-based therapist on their respective cochlear implant team. Of the 46 participants who answered the question 43.5% (n=20) indicated “Yes” whereas 56.5% (n=26) replied “No.”

### Primary Role on Cochlear Implant Team

Participants were finally asked to identify their primary role on their cochlear implant team. Options included audiologist (testing, programming/mapping), speech-language pathologist (SLP), educator of the deaf, Listening and Spoken Language Specialist (LSLS), or “Other.” Of the 47 participants who responded to the question, a total of 42.6% (n=20) were audiologists; 12.8% (n=6) were speech-language pathologists; 8.5% (n=4) were educators of the deaf; 23.4% (n=11) were LSLS; and 12.8% (n=6) responded with “Other.” Individuals who chose the option “other” identified their primary employment site with a wide range of responses. Responses included administrator, director of center (pediatric psychologist), educational audiologist, both LSLS and SLP, and professional development specialist and life coach (see Figure 7).

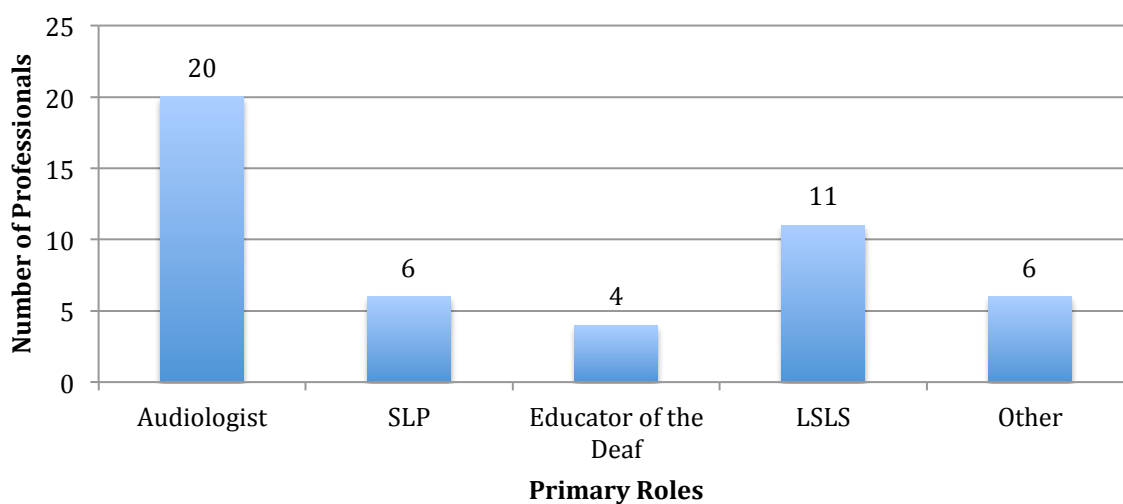


Figure 7. Primary role on cochlear implant team.

### Clinicians' Perceptions of Candidacy and Issues of Bilingualism

The second part of the analysis was developed in order to gain a more in-depth understanding of the perceptions of audiologists and auditory-based therapists regarding cochlear implant candidacy and issues of bilingualism associated with Hispanic pediatric cochlear implant patients. All participants were asked to select the answer that most closely corresponded with their clinic's policy or clinical practices. All statements were asked using a Likert-scale with a scale of 1 through 7; 1 representing "Strongly Agree" and 7 symbolizing they "Strongly Disagree."

#### Bilingualism and Cochlear Implants

Item 15 and Item 27 asked audiologists and auditory-based therapists whether they perceived bilingualism to be detrimental for children with cochlear implants. See Table 6 for an overview of the results.

Table 6

#### *Bilingualism Detrimental for Pediatric Cochlear Implant Patients*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Audiologists (n=24)	0.0% (n=0)	0.0% (n=0)	8.3% (n=2)	4.2% (n=1)	12.5% (n=3)	29.2% (n=7)	45.8% (n=11)	6.00	1.25
Therapists (n=19)	0.0% (n=0)	0.0% (n=0)	0.0% (n=0)	15.8% (n=3)	5.3% (n=1)	10.5% (n=2)	68.4% (n=13)	6.32	1.16
Total (N=43)	0.0% (n=0)	0.0% (n=0)	4.7% (n=2)	9.3% (n=4)	9.3% (n=4)	20.9% (n=9)	55.8% (n=24)	6.14	1.21

#### Maintenance of Cultural Identity

Item 16 and Item 28 asked audiologists and auditory-based therapists if they believed that Hispanic pediatric cochlear implant patients should speak Spanish to maintain their cultural identity. See Table 7 for an overview of the results.

Table 7

*Spanish Used to Maintain Hispanics' Cultural Identities*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Audiologists (n=24)	4.2% (n=1)	20.8% (n=5)	8.3% (n=2)	54.2% (n=13)	12.5% (n=3)	0.0% (n=0)	0.0% (n=0)	3.50	1.10
Therapists (n=19)	26.3% (n=5)	26.3% (n=5)	10.5% (n=2)	36.8% (n=7)	0.0% (n=0)	0.0% (n=0)	0.0% (n=0)	2.58	1.26
Total (N=43)	14.0% (n=6)	23.4% (n=10)	9.4% (n=4)	46.6% (n=20)	6.6% (n=3)	0.0% (n=0)	0.0% (n=0)	3.09	1.25

**Auditory-Based Therapy in Native Language**

The following items, 17 and 29 respectively, inquired audiologists and auditory-based therapists if they thought it was necessary for pediatric cochlear implants to receive auditory-based therapy in their native language. See Table 8 for an overview of the results.

Table 8

*Auditory-Based Therapy in Native Language*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Audiologists (n=23)	17.4% (n=4)	17.4% (n=4)	21.7% (n=5)	13.0% (n=3)	21.7% (n=5)	8.7% (n=2)	0.0% (n=0)	3.30	1.64
Therapists (n=18)	55.6% (n=10)	11.1% (n=2)	5.6% (n=1)	22.2% (n=4)	5.6% (n=1)	0.0% (n=0)	0.0% (n=0)	2.11	1.45
Total (N=41)	34.2% (n=14)	14.6% (n=6)	14.6% (n=6)	17.1% (n=7)	14.6% (n=6)	4.9% (n=2)	0.0% (n=0)	2.78	1.65

### Parents' English Skills and Cochlear Implant Candidacy

Statement 18 and Statement 30 investigated if Hispanic parents' English skills influenced their child's candidacy for a cochlear implant according to audiologists and auditory-based therapists. See Table 9 for an overview of the results.

Table 9

#### *Parents' English Skills and Cochlear Implant Candidacy*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Audiologists (n=24)	0.0% (n=0)	4.2% (n=1)	16.7% (n=4)	4.2% (n=1)	8.3% (n=2)	16.7% (n=4)	50.0% (n=12)	5.67	1.71
Therapists (n=19)	5.3% (n=1)	0.0% (n=0)	5.3% (n=1)	10.5% (n=2)	0.0% (n=0)	31.6% (n=6)	47.4% (n=9)	5.84	1.68
Total (N=43)	2.3% (n=1)	2.3% (n=1)	11.6% (n=5)	7.0% (n=3)	4.7% (n=2)	23.3% (n=10)	48.8% (n=21)	5.74	1.68

### Hispanic Parents' Understanding of Candidacy Criteria

Item 19 and Item 31 asked audiologists and auditory-based therapists to explore their perspectives related to Hispanic parents who are monolingual Spanish speakers understanding of the candidacy criteria to receive a cochlear implant. See Table 10 for an overview of the results.

Table 10

#### *Hispanic Parents' Understanding of Candidacy Criteria*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Audiologists (n=23)	21.7% (n=5)	47.8% (n=11)	0.0% (n=0)	13.0% (n=3)	8.7% (n=2)	4.3% (n=1)	4.3% (n=1)	2.70	1.72
Therapists (n=19)	5.3% (n=1)	31.6% (n=6)	15.8% (n=3)	10.5% (n=2)	21.1% (n=4)	15.8% (n=3)	0.0% (n=0)	3.58	1.64
Total (N=42)	14.3% (n=6)	40.5% (n=17)	7.1% (n=3)	11.9% (n=5)	14.3% (n=6)	9.5% (n=4)	2.4% (n=1)	3.10	1.72

### Hispanic Parents' Understanding of Expected Results

Statement 20 and Statement 32 inquired audiologists and auditory-based therapists about Hispanic parents who are monolingual Spanish speakers understanding of the expected outcomes associated with a cochlear implant. See Table 11 for an overview of the results.

Table 11

#### *Hispanic Parents' Understanding of Expected Results*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Audiologists (n=23)	21.7% (n=5)	43.5% (n=10)	0.0% (n=0)	13.0% (n=3)	13.0% (n=3)	4.3% (n=1)	4.3% (n=1)	2.83	1.78
Therapists (n=19)	5.3% (n=1)	15.8% (n=3)	31.6% (n=6)	10.5% (n=2)	21.1% (n=4)	15.8% (n=3)	0.0% (n=0)	3.74	1.52
Total (N=42)	14.3% (n=6)	31.0% (n=13)	14.3% (n=6)	11.9% (n=5)	16.7% (n=7)	9.5% (n=4)	2.3% (n=1)	3.24	1.71

### Differences Between Audiologists' and Therapists' Perceptions

Since the objective of this study was to not only analyze the clinical practices employed by audiologists and auditory-based therapists regarding candidacy and auditory treatment of pediatric Hispanic cochlear implant patients from linguistically diverse backgrounds, but also to compare the differences among audiologists and auditory-therapists responses, the researcher ran 6 Independent Samples *t*-tests. The researcher attempted to investigate if any significant differences existed between the perceptions of audiologists and auditory-verbal therapists.

Results revealed a significant difference between the groups on two of the items related to issues of bilingualism. A significant difference was found between auditory-based therapists ( $M=2.58$ ,  $SD=1.26$ ) compared to audiologists ( $M=3.50$ ,  $SD=1.10$ ) regarding whether Hispanics should speak Spanish to maintain their cultural identity:  $t(41)=2.55$ ,  $p < 0.015$ . There was also a

significant difference between auditory-based therapists ( $M=3.30$ ,  $SD=1.64$ ) and audiologists ( $M=2.11$ ,  $SD=1.45$ ) regarding the necessity for children with cochlear implants to receive auditory-based therapy in the patient's native language:  $t(39)=2.43$ ,  $p < 0.02$ .

Other variables tested based on the participants' profession (audiologist or auditory-based therapist) demonstrated no significant difference for the following items: bilingualism being detrimental for cochlear implant patients; Hispanic parents' English skills influencing their child's candidacy for a cochlear implant; parents who only speak Spanish fully understanding the candidacy criteria required to receive a cochlear implant; and parents who only speak Spanish fully understanding the expected results associated with a cochlear implant. It should be noted that the differences of opinions between audiologists and auditory-based therapists *trended* towards statistical significance regarding questions related to parent's understanding of cochlear implant candidacy and the expected results associated with a cochlear implant. For a full summary of the Independent Samples *t*-tests, see Table 12.

Table 12

*Independent Samples t-tests Between Audiologists and Therapists*

Item	Audiologists			Auditory-Based Therapists			<i>t</i>	df	<i>p</i>
	N	<i>M</i>	<i>SD</i>	N	<i>M</i>	<i>SD</i>			
“Bilingualism is detrimental for children with cochlear implants.”	24	6.00	1.25	19	6.32	1.16	-.85	41	.40
“Hispanic pediatric cochlear implant patients should speak Spanish to maintain their cultural identity.”	24	3.50	1.10	19	2.58	1.26	2.55	41	*.015
“It is necessary for children who receive cochlear implants to receive auditory- based therapy in their native language.”	23	3.30	1.64	18	2.11	1.45	2.43	39	*.02
“Hispanic parents English skills influence their child’s candidacy for a cochlear implant.”	24	5.67	1.71	19	5.84	1.68	-.34	41	.74
“Parents who only speak Spanish fully understand the candidacy criteria required to receive a cochlear implant.”	23	2.70	1.72	19	3.58	1.64	-1.69	40	.10
“Parents who only speak Spanish fully understand the expected results associated with a cochlear implant for their child.”	23	2.83	1.77	19	3.74	1.52	-1.74	40	.085

\*Note: *t*-test is significant at the 0.05 level (2-tailed).

### **Audiology and Therapy Perspectives**

The survey then made use of two separate matrices of statements designed to specifically target perceptions from the hearing healthcare professionals within their respective fields. The participants’ responses as to what his/her primary role was on the cochlear implant team determined which matrix of questions he/she was directed to answer. The first matrix of questions was devised for professionals who selected “Audiologist” and “Other” as their primary roles on their respective cochlear implant teams. The second matrix of questions and three open-

ended questions were used exclusively for clinicians who chose “Speech-Language Pathologist”, “Educator of the Deaf,” or “Listening and Spoken Language Specialist (LSLS),” as their primary roles on their cochlear implant teams.

### **Audiology Perspectives and Clinical Practices**

In order to understand the perceptions and clinical practices used by participating audiologists and those who selected “Other,” six statements were listed relating to audiological and social issues associated with Hispanic pediatric cochlear implant patients. The professionals were asked to select the answer that most closely corresponded with their clinic’s policy or typical clinical practices. All statements were framed using a Likert-scale with a scale of 1 through 7; 1 representing “Strongly Agree” and 7 symbolizing “Strongly Disagree” with the statement posited.

**Audiological Testing with Linguistically Diverse Patients.** The first statement required audiologists to answer whether or not they were formally trained how to conduct audiological testing with linguistically diverse patients. See Table 13 for an overview of the results.

Table 13

#### *Audiological Testing with Linguistically Diverse Patients*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Audiologists (N=24)	12.5% (n=3)	16.7% (n=4)	4.2% (n=1)	16.7% (n=4)	8.3% (n=2)	29.2% (n=7)	12.5% (n=3)	4.29	2.07

**English as the Language of Instruction.** The following item asked audiologists and other professionals to answer if children should learn English because most schools use English as the language of instruction. See Table 14 for an overview of the results.



Table 14

*English as the Language of Instruction*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Audiologists (N=24)	20.8% (n=5)	20.8% (n=5)	25.0% (n=6)	8.3% (n=2)	4.2% (n=1)	16.7% (n=4)	4.2% (n=1)	3.21	1.89

**Interpreters During Pre-Candidacy Audiology Testing.** The subsequent statement inquired if medical interpreters are used during pre-candidacy audiology testing assessments. See Table 15 for an overview of the results.

Table 15

*Medical Interpreters During Pre-Candidacy Audiology Testing*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Audiologists (N=24)	54.2% (n=13)	25.0% (n=6)	0.0% (n=0)	8.3% (n=2)	4.2% (n=1)	0.0% (n=0)	8.3% (n=2)	2.17	1.86

**Referral to Auditory-Based Therapy.** The next item examined if children who receive cochlear implants are routinely referred to auditory-based therapy. See Table 16 for an overview of the results.

Table 16

*Referral to Auditory-Based Therapy*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Audiologists (N=24)	54.2% (n=13)	29.2% (n=7)	4.2% (n=1)	4.2% (n=1)	0.0% (n=0)	8.3% (n=2)	0.0% (n=0)	1.92	1.47

**Clinical Practices and Cross-Cultural Issues.** The following statement asked if the professional's cochlear implant center's clinical practices address cross-cultural issues related to bilingualism. See Table 17 for an overview of the results.

Table 17

*Clinical Practices and Cross-Cultural Issues*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Audiologists (N=24)	29.2% (n=7)	20.8% (n=5)	20.8% (n=5)	4.2% (n=1)	8.3% (n=2)	8.3% (n=2)	8.3% (n=2)	3.00	2.00

**Spanish Phonetically-Balanced Word Lists.** The final statement asked if the professional's cochlear implant center provided phonetically-balanced word lists in Spanish during Word Recognition testing. See Table 18 for an overview of the results.

Table 18

*Spanish Phonetically-Balanced Word Lists*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Audiologists (N=23)	26.1% (n=6)	26.1% (n=6)	4.3% (n=1)	13.0% (n=3)	4.3% (n=1)	17.4% (n=4)	8.7% (n=2)	3.30	2.16

**Therapy Perspectives and Clinical Practices**

In order to understand the perceptions and typical clinical practices employed by participating Speech-Language Pathologists (SLPs), Educators of the Deaf, and Listening and Spoken Language Specialists (LSLS), 10 statements and three open-ended questions were developed relating to therapy practices and social issues associated with Hispanic pediatric cochlear implant patients. The professionals were requested to choose the answer that most closely corresponded with their clinic's policy or clinical practices. All statements were framed

using a Likert-scale with a scale of 1 through 7; 1 representing “Strongly Agree” and 7 symbolizing “Strongly Disagree” with the statement posited.

**Therapy with Linguistically Diverse Patients.** The first statement asked therapy professionals to address if they were formally trained how to conduct therapy with linguistically diverse patients. See Table 19 for an overview of the results.

Table 19

*Therapy with Linguistically Diverse Patients*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Therapists (N=19)	10.5% (n=2)	10.5% (n=2)	21.1% (n=4)	10.5% (n=2)	10.5% (n=2)	31.6% (n=6)	5.3% (n=1)	4.16	1.89

**Children Learn English in Therapy.** The following item asked therapists to note if children should learn English in therapy because most schools use English as the language of instruction. See Table 20 for an overview of the results.

Table 20

*English as the Language of Instruction*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Therapists (n=18)	0.0% (n=0)	0.0% (n=0)	38.9% (n=7)	11.1% (n=2)	16.7% (n=3)	16.7% (n=3)	16.7% (n=3)	4.61	1.58

**Medical Interpreters During Therapy.** The subsequent statement inquired if medical interpreters are used during therapy for monolingual Spanish speaking patients. See Table 21 for an overview of the results.

Table 21

*Medical Interpreters During Therapy*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Therapists (n=17)	23.5% (n=4)	23.5% (n=4)	17.6% (n=3)	17.6% (n=3)	0.0% (n=0)	11.8% (n=2)	5.9% (n=1)	3.06	1.89

**English Auditory-Based Therapy.** The next statement asked whether or not auditory-based therapy is usually conducted in English for Hispanic pediatric cochlear implant patients/families. See Table 22 for an overview of the results.

Table 22

*English Auditory-Based Therapy*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Therapists (n=16)	18.8% (n=3)	18.8% (n=3)	12.5% (n=2)	6.3% (n=1)	0.0% (n=0)	12.5% (n=2)	31.3% (n=5)	4.13	2.50

**English and Spanish Therapy Practices.** The following item posed if therapy practices used in English are the same in Spanish. See Table 23 for an overview of the results.

Table 23

*English and Spanish Therapy Practices*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Therapists (n=19)	42.1% (n=8)	15.8% (n=3)	10.5% (n=2)	10.5% (n=2)	10.5% (n=2)	5.3% (n=1)	5.3% (n=1)	2.68	1.95

**Standardized Assessment Measures in Spanish.** The next item questioned whether a therapist's particular clinic made use of standardized speech, language, and auditory assessment measures administered in Spanish. See Table 24 for an overview of the results.

Table 24

*Standardized Assessment Measures in Spanish*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Therapists (n=17)	17.6% (n=3)	17.6% (n=3)	5.9% (n=1)	11.8% (n=2)	0.0% (n=0)	23.5% (n=4)	23.5% (n=4)	4.24	2.39

**Availability of Bilingual Therapists.** The following statement asked the therapists if bilingual English-Spanish therapists should be available to conduct therapy for these patients.

See Table 25 for an overview of the results.

Table 25

*Availability of Bilingual Therapists*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Therapists (n=19)	42.1% (n=8)	26.3% (n=5)	0.0% (n=0)	21.1% (n=4)	0.0% (n=0)	0.0% (n=0)	10.5% (n=2)	2.53	1.95

**Conducting Therapy in One Language.** The next item inquired if therapy should be conducted exclusively in one language rather than both languages. See Table 26 for an overview of the results.

Table 26

*Conducting Therapy in One Language*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Therapists (n=19)	0.0% (n=0)	10.5% (n=2)	10.5% (n=2)	15.8% (n=3)	21.1% (n=4)	21.1% (n=4)	21.1% (n=4)	4.95	1.65

**Parents' Choice of Language.** The following statement asked whether parents should make a decision as to which language they would prefer their child use during auditory-based therapy. See Table 27 for an overview of the results.

Table 27

*Parents' Choice of Language*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Therapists (n=18)	22.2% (n=4)	33.3% (n=6)	27.8% (n=5)	5.6% (n=1)	5.6% (n=1)	5.6% (n=1)	0.0% (n=0)	2.56	1.38

**Cultural-Competency Issues Related to Bilingualism.** The last item questioned if therapists understand the cultural-competency issues related to bilingualism in auditory-based therapy. See Table 28 for an overview of the results.

Table 28

*Cultural-Competency Issues Related to Bilingualism*

Professionals	Strongly Agree						Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5	6			
Therapists (n=19)	21.1% (n=4)	68.4% (n=13)	0.0% (n=0)	10.5% (n=2)	0.0% (n=0)	0.0% (n=0)	0.0% (n=0)	2.00	0.82

**Open Ended Questions.** Three open-ended questions were developed to further identify if there were any bilingual “LSLS” auditory-based therapists; what experiences the therapists had working with Hispanic pediatric cochlear implant patients; and whether their cochlear implant clinic had a specific policy as to how to approach working with these children. All questions were initially posed using a nominal scale with “Yes” or “No” being the answer choices. Those who selected “No” were then prompted to the subsequent question. Those who selected “Yes,” however, were then prompted to further detail how many bilingual English-Spanish therapists

worked at his/her clinic; to describe his/her experiences working with Hispanic pediatric cochlear implants patients (see Appendix I); and/or to forward his/her clinic's policy to the researcher. After completing the above-noted questions, the survey concluded by asking participants in they would like to share any additional comments or questions.

***Bilingual English-Spanish Therapists at Clinic.*** The first open-ended question asked therapists to note if there were any bilingual English-Spanish speaking therapists working at his/her clinic. Of the 20 participants who answered the question 75.0% (n=15) indicated "Yes" whereas 25.0% (n=5) replied "No." Of those who responded "Yes," 60.0% (n=3) noted there was only one bilingual English-Spanish speaking therapist; 20.0% (n=1) stated there were three bilingual English-Spanish speaking therapists; and 20.0% (n=1) stated there were six bilingual English-Spanish speaking therapists working at his/her clinic.

***Auditory-Based Therapy Experiences.*** The second open-ended question asked therapists about any experiences conducting auditory-based therapy with a Hispanic pediatric cochlear implant patient. Of the 20 participants who responded, 90.0% (n=18) indicated "Yes" and 10.0% (n=2) replied "No." Those who responded, "Yes" were then prompted to describe their individual experience(s). Though each individual's experience varied widely, 88.9% (n=16) of the total 18 participants who responded "Yes" then detailed about their experiences. There were several themes identified among the responses such as: accommodating therapy to the preferred language of the family, making use of bilingual therapists or interpreters, difficulties and frustrations affiliated with therapy, and miscellaneous responses. To see a full accounting of the verbatim responses to this question, see Appendix I.

***Policy for Therapy with Bilingual Patients.*** The final open-ended question asked therapists if there was a clinic-wide written policy regarding how to conduct auditory-based

therapy with pediatric implant patients who are monolingual Spanish, English as a Second Language (ESL), and bilingual English-Spanish speakers at their work site. Of the 20 participants who responded, 100.0% (n=20) stated “No.” (No therapists replied “Yes”).

### **Discussion**

The remainder of this Chapter will use past literature in view of the current study’s statistical evidence and assorted findings in order to examine the policies and clinical practices implemented by audiologists and auditory-based therapists regarding candidacy and auditory treatment of Hispanic pediatric cochlear implant patients. The researcher will first provide a brief overview of some of the demographic questions on the survey, followed by a summary of results regarding the clinical practices of these hearing healthcare professionals.

### **Demographics**

In order to gain an understanding of the policies and clinical practices implemented by hearing healthcare professionals with pediatric patients who are monolingual Spanish, English as a Second Language (ESL), and bilingual English-Spanish speakers—the researcher needed to first verify that the participating professionals actually served this cohort of Hispanic pediatric cochlear implant patients.

**Professionals’ Demographics.** According to previous studies conducted on the demographics of audiologists, there exists an unbalanced distribution of professionals in the field. The overwhelming majority of professionals in the United States who work with children who are deaf or hard of hearing are female, monolingual English, Caucasians (Rhoades, Price, & Perigoe, 2004, p. 290). And according to Kirkwood (2012), the 4:1 ratio of female audiologists to male audiologists demonstrates the lopsided gender distribution (para. 11). Data from this study are consistent with the general findings in past research studies of gender inequality. Of the



51 participants, over 88% (n=45) were female whereas less than 8% were male (n=4) (with the last 4% [n=2] who preferred not to answer).

**Professionals' Experience.** The overwhelming majority of the participating clinicians at these cochlear implant centers did indeed serve Hispanic pediatric cochlear implant patients. No other research findings were available regarding the number of clinicians working with Hispanic pediatric cochlear implant patients. The researcher asked participants to detail their years of experience as professionals working with pediatric cochlear implant patients. The responses yielded quite a range of experience, but of the 51 participants, almost 45% (n=22) noted they had worked 11 years or more with pediatric cochlear implant patients. Many of these patients are reportedly referred to an auditory-based therapist to learn how to listen and talk similar to the majority of people in the "hearing world." In fact, almost 90% (n=41) of cochlear implant candidates/recipients of the total 46 respondents use Listening and Spoken Language as their main mode of communication or communication "opportunity" compared with about 10% (n=5) who reported patterns using Total Communication. Additionally, nearly two thirds (n=30) of the 45 participants reported that more than 50% of their pediatric cochlear implant patients receive auditory-based therapy at his/her particular cochlear implant center.

These findings are consistent with results that are suggested in the literature. For example, Black and her colleagues (2011) systematically reviewed the prognostic factors that influence outcomes of children with hearing loss who have received cochlear implants (p. 67). The results suggested that children who use oral or verbal communication demonstrate higher levels of language and auditory performance than children who use Total Communication (p. 73). Similarly, research by Archbold and her colleagues (2006) regarding parents' perspectives on the implantation process three years after their child received a cochlear implant stated that

parents believed that listening and spoken language should be emphasized, though signing can be useful during some transitional periods (p. 204).

**Patient Population.** According to the U.S. Census Bureau in 2010, the Hispanic population is the largest and fastest growing minority group in the United States, representing 16.3% of the total population (p. 2). As noted above, Hispanics also demonstrate a higher prevalence of hearing loss in the pediatric Hispanic-American population compared to all other minority groups (Mehra, Eavey, & Keamy, 2009, p. 464). In order to examine the prevalence of Hispanic pediatric cochlear implant patients across the United States, the researcher asked participants several questions relating to the Hispanic population with whom he/she worked. The researcher found that almost all of the 54 participants (n=52) who completed the surveys were by audiologists and auditory-based therapists who do indeed serve Hispanic pediatric cochlear implant candidates or recipients compared to only 3% (n=2) who do not. When questioned about whether participants believed that Hispanics were a “large minority” population in the geographic area in which he/she worked, almost two-thirds of the 47 respondents (n=30) agreed that Hispanics were a large minority population. Interestingly, almost 40% of the participants (n=18) reported that more than 25% of his/her caseload were Hispanic pediatric patients.

**“Types” of Hispanics.** Language is a vital aspect of ethnic identity that contributes to an individual’s socialization and emotional, behavioral, and social self-regulation (Dale, 1996, p. 5). Considering an individual’s native language is a major contributing factor to a person’s ethnic identity, Hispanics in the United States are often faced with a difficult decision as to how and to what capacity they speak Spanish compared to English (Portes & Zhou, 1993, p. 88). The language proficiencies of children depend upon the linguistic environment in which the parent(s) want to raise their sons and daughters.

In order to better understand the “types” of Hispanic pediatric cochlear implant patients these professionals are serving, the researcher posed several questions related to the language skills of these patients. Participants were asked to rank the “types of Hispanic pediatric cochlear implant patients are seen in the professional’s clinic.” Based on this ranking question, English as a Second Language (ESL) was the most common ( $M=1.56$ ), followed by bilingual English-Spanish speakers ( $M=2.18$ ), and then finally monolingual Spanish speakers ( $M=2.26$ ) Results from this question provide a clear explanation as to why over half of the 46 respondents ( $n=24$ ) stated that only 1-10% of their Hispanic pediatric cochlear implant patients in this study only spoke Spanish. This statistic suggests that many Hispanics develop at least some level of linguistic acculturation to English.

This is of particular interest due to the dynamic migratory patterns of Hispanics in the United States. It is essential for professionals who work with children who are deaf or hard of hearing to have some specific guidelines to conduct effective therapy with children from culturally and linguistically diverse backgrounds. Unfortunately and as stated previously, the overwhelming majority of professionals in the United States who work with children who are deaf or hard of hearing are female, monolingual English, Caucasians—not Spanish speakers (Rhoades, Price, & Perigoe, 2004, p. 290). In order for therapy to be delivered effectively by audiologists and auditory-based therapists, the researcher believes that clinicians need more experience and knowledge on the speech productions of Spanish-speaking children with cochlear implants (Moore, Prath, & Arrieta, 2006, p. 338).

### **Differences Between Audiologists’ and Therapists’ Perceptions**

The results from the 6 independent *t*-tests indicated significant differences between the two groups on two of the survey items. Auditory-based therapists ( $M=2.58$ ) were significantly

different compared to audiologists ( $M=3.50$ ) on a scale of 1 through 7 (1 representing “Strongly Agree” and 7 symbolizing “Strongly Disagree) regarding the issue that Hispanics should speak Spanish to maintain their cultural identity. This suggests that auditory-based therapists more highly regard Hispanics’ maintenance of cultural identity than audiologists. Auditory-based therapists were also significantly different in their ratings ( $M=2.11$ ) compared to audiologists ( $M=3.30$ ) regarding if it is necessary for children with cochlear implants to receive auditory-based therapy in the patient’s native language. This implies that auditory-based therapists more highly value Hispanics’ contact with their native language in auditory-based therapy compared to audiologists.

These findings may be due to a variety of factors. For example, one of the responsibilities of an auditory-based therapist is to address the patient’s issues of bilingualism and language identity (Johnson, 2012, p. 288). As a result, it is possible that due to their increased exposure auditory-based therapists may be more sensitive to issues related bilingualism and language identity. Auditory-based therapy is rooted as a *family-centered approach*, in which the auditory-based therapist guides, coaches, and expects the parents on the parents to focus their efforts on the development of listening and spoken language for their child (Estabrooks, 2012, p. 4; Madell & Flexer, 2008, p. 207). Another rationale as to why this study’s results could be due to the fact that auditory-based therapists usually have weekly auditory (re)habilitation sessions with the cochlear implant patients whereas the audiologists only see the patient on an as needed basis. Due to the increased exposure and contacts auditory-based therapists have with these patients, it is possible that they are more likely to talk with patients about their concerns relating to bilingualism and identity.

**Training with Linguistically Diverse Patients.** A central issue that remained was the backgrounds of the study's auditory-verbal therapists did not resemble the same cultural and linguistic diversity demonstrated by the families they assisted (Rhoades et al., 2004, p. 290). Despite the clinicians' apparent lack of diversity, hearing and language specialists are now expected to develop both cross-cultural and linguistic competence in order to facilitate therapy as efficiently as possible (Douglas, 2011a, p. 5; Johnson, 2012, p. 61; Rhoades et al., 2004, p. 290). It was not until recently, however, that cultural and linguistic differences and standards of linguistic development for languages other than English have even been introduced in Au.D. and related graduate training programs (Douglas, 2011a, p. 5; Moore et al., 2006, p. 322). Responses the audiologists (M=4.29) and the auditory-based therapists (M=4.16) indicated on a scale of 1 through 7 (1 representing "Strongly Agree" and 7 symbolizing "Strongly Disagree) that they were neutral about whether they were formally instructed on how to conduct audiological testing and/or therapy respectively with linguistically diverse patients. This means that even though professionals serve this cohort of cochlear implant patients, many of them were not formally trained on how to properly address these linguistically diverse patients' needs.

**English as the Language of Instruction.** Due to the growing linguistic diversity in the United States, public school systems have adapted to their language of instruction to better serve the dynamic social demographic found in today's classrooms. According to the National Center for Education Statistics (NCES) in 2005, 18.7% of the U.S. population older than the age of 5 years speaks a language other than English at home (p. 174). In 2003, 40% of all public school students were considered to be part of a minority group compared to 22% in 1972 (Perie, Grigg, & Donahue, 2005, p. 12).

One instructional transformation that has been implemented to assist with this issue was the establishment of bilingual education (Cavazos-Rehg & DeLucia-Waack, 2009, p. 47). The objective is to develop mastery in both the primary language and English, while expanding the student's knowledge of his/her ethnic heritage (Cavazos-Rehg & DeLucia-Waack, 2009, p. 47; Negy et al., 2003, p. 334). Contrary to the growing trend though, on a scale of 1 through 7 (1 representing "Strongly Agree" and 7 symbolizing "Strongly Disagree) audiologists in this study (M=3.21) tended to agree that children should learn English in school because most schools use English as the language of instruction. Auditory-based therapists were much more "divided" on the topic (M=4.61) concerning whether children should learn English in therapy arguably because most schools use English as the language of instruction.

**Medical Interpreters.** Most auditory-based therapy sessions with culturally or linguistically diverse children require an interpreter during the sessions to explain the purpose of what the clinician is doing (Katz & de Melo, 2012, p. 46). Since auditory-based therapy sessions are diagnostic in nature, the auditory-verbal therapist usually includes both informal (diagnostic therapy) and standardized assessments during most therapy sessions. The interpreter plays a large role in both formal and informal assessments because of the clinician's typical inability to interpret the child's utterances (Katz & de Melo, 2012, p. 46). Results from this study indicated that audiologists (M=2.17) and auditory-based therapists (M=3.06) reported on a scale of 1 through 7 (1 representing "Strongly Agree" and 7 symbolizing "Strongly Disagree) making use of medical interpreters during pre-candidacy audiological testing and during therapy with monolingual Spanish speaking patients. This signifies that both of these groups agree that they make use of medical interpreters.

**Clinical Practices and Cross-Cultural Issues.** Due to the multifaceted nature of culture, there are several factors (e.g., social, economic, behavioral, cognitive, psychological, religious, and linguistic) each individual Hispanic person confronts when (sub)consciously deciding how to become acculturated to the United States (Roitman, 2009, p. 2). In order for professionals to learn how to most effectively treat and help patients from linguistically diverse backgrounds, clinicians must learn to develop cross-cultural competency. Cultural competence refers to the “learned ability to function in a culture in a manner that is congruent with the values, beliefs, customs, mannerisms, and language of the majority of the members of the culture” (Padilla & Perez, 2003, p. 42). Though having a level of cultural competence is necessary to be considered an “insider” of the home culture, each individual’s perception of prejudice and ethnocentrism affects the level to which an individual is willing to acculturate. According to the data found in this study, the audiologists reported on a scale of 1 through 7 (1 representing “Strongly Agree” and 7 symbolizing “Strongly Disagree) that nearly 63% (n=17) of their 24 respondents believed their center’s clinical practices did address cross-cultural issues related to bilingualism (M=3.00). Nearly 90% (n=17) of the 19 participating auditory-based therapists supported this (M=2.00) to an even greater level and appeared to understand the cross-cultural competency issues related to bilingualism in auditory-based therapy.

**Standardized Assessment Measures in Spanish.** When the auditory-based therapist needs to conduct formal assessments, he/she must understand that the use of tests that were designed for English-speaking children cannot automatically be used for children speaking other languages (Katz & de Melo, 2012, p. 46). Clinicians should administer standardized tests in the native language, or, use a test that may have already been translated (Douglas, 2011a, pp. 10-11). Results from the “adapted” tests can only be used in a criterion-referenced manner, or compared

to a patient's own previous performances (Katz & de Melo, 2012, p. 46). When the auditory-based therapist receives some results from the assessments, one must not consider dialectal, cultural, or language differences as communication *impairments*, but as spoken language *differences* (Douglas, 2011a, p. 11). Findings from this study affirmed this notion on a scale of 1 through 7 (1 representing "Strongly Agree" and 7 symbolizing they "Strongly Disagree") that audiologists somewhat agreed (M=3.30) that they use phonetically-balanced word lists in Spanish during Word Recognition testing. Auditory-verbal therapists, however, were less in agreement about the usage of standardized speech, language, and auditory assessment measures administered in Spanish (M=4.24).

### **Audiology Policies and Clinical Practices**

In order to understand the policies and clinical practices used by participating audiologists, one additional result relating to audiological and social issues associated with Hispanic pediatric cochlear implant patients will next be discussed.

**Referral to Auditory-Based Therapy.** According to the findings of this study, of the 24 participating audiologists, approximately 84% (n=20) indicated that children who receive cochlear implants have been routinely referred to auditory-based therapy (M=1.92). These data also reflected the research literature concerning the importance of coupling cochlear implants with auditory-based therapy, for example, Listening and Spoken Language practice. Past research has demonstrated that family members of children using cochlear implants and listening and spoken language were more satisfied with their child's progress in speech sound clarity and speech perception, than were family members of children using hearing aids and sign language (see Jackson et al., 2010, p. 203).



## **Therapy Policies and Clinical Practices**

In order to understand the policies and typical clinical practices used by participating auditory-based therapists, five additional findings relating to therapy and social issues associated with Hispanic pediatric cochlear implant patients will next be discussed.

**Auditory-Based Monolingual English Therapy.** For children with a cochlear implant, the implications of acquiring one language that emphasizes listening and spoken language may be remarkably difficult. For those children, however, who grow up in culturally and linguistically diverse backgrounds, it is more common to have to learn not only their native language, but English as well. Several studies have been conducted to see if children who are recipients of cochlear implants can develop fluency in two languages that is commensurable to their normal hearing peers.

In a study conducted by Waltzman and her colleagues (2003), the majority of the children demonstrated age-appropriate receptive and expressive language skills in their primary language compared to children with normal-hearing (p. 761). Overall, learning another language was not perceived as causing any negative effects on the child's language acquisition in general, and if anything, contact with other languages resulted in the children receiving more language support, which helped the child (Bunta & Douglas, 2013, p. 282; Waltzman et al., 2003, p. 761).

In order to see if auditory-based therapists supported bilingualism for Hispanic pediatric cochlear implant patients, the researcher asked these participants if therapy at his/her respective clinic was conducted in English for Hispanic pediatric cochlear implant patients. On a scale of 1 through 7 (1 representing "Strongly Agree" and 7 symbolizing they "Strongly Disagree"), the ranges of responses were varied and yielded a mean score of 4.13, demonstrating that therapy was not exclusively conducted in English. Surprisingly, of the 19 auditory-based therapists who

answered the following item, almost 70% (n=13) of the participants noted that the therapy techniques used in English were the same for therapy conducted in Spanish. Again, almost 70% (n=13) of the 19 participants agreed that ideally bilingual auditory-based therapists should be available to conduct therapy for these patients. Finally, auditory-based therapists reported that therapy should not be conducted exclusively in one language but rather in both languages (M=4.95).

**Parents' Choice of Language.** Auditory-based clinicians universally would support that parents play the most significant role in the ultimate success of their child in his/her growing ability to use listening and spoken language, arguably because they are always with the child; whereas the auditory-based therapist who is only with the child for usually one hour/week (Estabrooks, 1996, p. 57; Estabrooks, 2012, p. 4; Johnson, 2012, p. 288). Findings from this confirmed that over 80% of the auditory-based therapists (n=15) believed that parents should make the decision as to what language the child should use during therapy.

### **Open-Ended Responses**

In order to understand the policies and typical clinical practices used by the participating auditory-based therapists, three additional question areas were investigated—were there “LSLS” auditory-based therapists; what experiences did the therapists have in working with Hispanic pediatric cochlear implants patients; and whether their cochlear implant center had a specific written policy as to how to approach working with these children.

**Bilingual English-Spanish Therapists at Clinic.** A total of 25% (n=5) of the 20 participants to this question, reported there was at least one, and in some cases multiple, bilingual English-Spanish auditory-based therapists working at these clinics. While this topic has not yet been reported in the literature, this is consistent with the researcher's expectations. In more

densely populated Hispanic regions, the need for bilingual English-Spanish auditory-based specialists is critical and needs to increase. And if the clinician is a competent and native speaker in the language the family uses, the therapist should ideally conduct therapy in the family's home language (Katz & de Melo, 2012, p. 45).

**Auditory-Based Therapy Experiences.** A total of 90% (n=18) of these 20 participants reported he/she had conducted some degree of auditory-based therapy with a Hispanic pediatric cochlear implant patient. The general themes interpreted from the 16 open-ended responses to this question indicated three major themes. (1) Therapists either allowed the family to choose their preferred language, (2) made use of bilingual therapists or interpreters, or (3) expressed some frustration associated with therapy in English for this cohort of Hispanic pediatric cochlear implant patients.

**Policy for Therapy with Bilingual Patients.** Finally when the 20 participants were asked if their clinic had a written policy regarding how to conduct auditory-based therapy and cochlear implant-related services to their Hispanic pediatric cochlear implant patients from linguistically diverse backgrounds, ALL responded "No." While this supported the researcher's prediction that no cochlear implant center would yet have a formalized policy concerning how to most effectively provide therapy and other services for Hispanic pediatric cochlear implant patients, this dramatic finding amplified the reality that this sample population of patients is not being provided the most appropriate and clinically effective treatment and this may continue to grow until policies are written and followed by all clinicians serving these patients.

### **Conclusion**

This Chapter provided statistical findings from the survey completed by audiologists and auditory-based therapists as well as a discussion of the results. The following Chapter will

present the major conclusions, implications of research findings, limitations, ideas for future research, and final thoughts of the study.

## **CHAPTER V**

### **CONCLUSIONS AND RECOMMENDATIONS**

This study has examined the policies and clinical practices of audiologists and auditory-based therapists regarding cochlear implant candidacy and auditory treatment of Hispanic pediatric cochlear implant speakers who are monolingual Spanish, English as a Second Language (ESL), and bilingual English-Spanish speakers in cochlear implant centers across the United States. Electronic surveys were distributed to participants via email. This chapter contains the major conclusions found in this study, implications, limitations, recommendations for further research, and final thoughts regarding this investigation.

#### **Major Conclusions**

The first major conclusion of this study was that pediatric cochlear implantation coupled with auditory-based therapy could be considered the standard of practice for the pediatric cochlear implant patients discussed in this study. The vast majority of audiologists and auditory-based therapists surveyed in this study indicated that most of their pediatric cochlear implant patients receive auditory-based therapy. Pediatric cochlear implant patients/recipients were also consistently referred to auditory-based therapy post-cochlear implantation. Though the aforementioned finding does support the trend in the literature that auditory-based therapy should be paired with those who receive cochlear implants, it is not the intention of this study to negate the benefits provided by other modes of communication or that in certain cases, other modes of communication may be more appropriate.

The second major conclusion of this study was that a large cohort of Hispanic pediatric cochlear implant patients appears to exist, even though clinicians, in general, were not properly trained to assist patients from linguistically diverse backgrounds. Although past literature

discussed the large increase and size of Hispanics in the United States, there have not been many studies that noted the prevalence of Hispanic children with hearing loss, or even more specifically, Hispanic children who receive cochlear implants. The findings of this study confirm that audiologists and auditory-based therapists do in fact serve a large Hispanic pediatric population at their respective cochlear implant centers. Though clinicians who participated in this study reported that many of these patients do speak English at varying levels, the results suggested that overall, clinicians do not feel that they are properly trained to assist patients from linguistically diverse backgrounds. The research findings did show, however, that clinicians did understand the cross-cultural issues related to bilingualism, regardless of the fact that they did not feel they were suitably trained to serve these patients.

A third major conclusion of this study was that bilingualism was not considered detrimental for pediatric cochlear implant patients, but rather can offer a variety of benefits to children who come from linguistically diverse backgrounds. It should be noted though, this recommendation is only applicable to pediatric cochlear implant patients who do not demonstrate other special needs or comorbid conditions and have parents or families who are fluent in the second language, and are committed to assisting their child in becoming bilingual. According to the results of this study, the majority of clinicians supported that parents should make the decision as to what language the child should use during therapy. Many of the auditory-based therapists noted that therapy was not exclusively conducted in English, and several of the therapy techniques implemented in both English and Spanish were the same. Clinicians remarked that most of their clinics made use of medical interpreters during audiological testing and auditory-based therapy, but agreed that bilingual auditory-based therapists would ideally be the best option, even though there are not many cochlear implant centers that have them.

The fourth major conclusion of this study was that there were two significant differences between audiologists and auditory-based therapists on survey items related to candidacy and issues of bilingualism. Auditory-based therapists significantly differed from audiologists regarding if Hispanics should speak Spanish to maintain their cultural identity and if it is necessary for children with cochlear implants to receive auditory-based therapy in the patient's native language. These findings suggest that auditory-based therapists agreed more strongly with the maintenance of cultural identity and children's use of native language in auditory-based therapy. Audiologists also differed from auditory-based therapists regarding monolingual Spanish parents' understanding of the candidacy criteria and the expected results associated with their child receiving a cochlear implant. These latter findings *trended* towards significance, but did *not* yield a statistically significant difference. One rationale as to why audiologists may have reported more strongly agreeing with parents' understanding of the candidacy criteria and expected results from cochlear implants could be due to the desire to answer questions viewed favorably by others—*social desirability* (Babbie, 2014, p. 297).

The final major conclusion of this study was that apparently no cochlear implant clinic has a written or formalized policy regarding how to conduct auditory-based therapy with Hispanic pediatric cochlear implant patients. Though this finding confirmed the researcher's expectations, it also suggested a fairly glaring issue. Since the overwhelming majority of clinicians indicated they were not formally trained to assist pediatric cochlear implant patients from linguistically diverse backgrounds, cochlear implant centers who do not have regarding clinical guidelines of how to best serve this cohort of pediatric cochlear implant patients will presumably continue to struggle to provide the most appropriate treatment for a population that continues to rapidly grow in the United States.

### **Implications of the Research Findings**

Results from this study have three main implications that are relevant to audiologists and auditory-based therapists who serve pediatric cochlear implant patients from linguistically diverse backgrounds, as well as society as a whole. The first implication of this study was audiologists and auditory-based therapists need to be better educated and trained regarding how to properly assess and assist patients from linguistically diverse backgrounds so that they can provide them with the most effective care possible. This would benefit clinicians directly because they would have a better understanding of the needs of their patients, while also benefitting the patients themselves, by providing them the most clinically effective intervention.

The second implication of this study was that in order for auditory-based therapy to be the most effective for their pediatric cochlear implant patients from linguistically diverse backgrounds, the fields of audiology and speech-language pathology need more bilingual or multilingual auditory-based therapists. In order to best serve patients from linguistically diverse backgrounds, both fields should recruit more clinicians who also come from a linguistically diverse background or design specific programs to teach clinicians how to best assist this cohort of pediatric cochlear implant patients.

The final implication of this study was that cochlear implant centers need standardized policies regarding cochlear implant candidacy and how to most effectively provide auditory treatment to their patients from linguistically diverse backgrounds. Until a written policy is established on how to most appropriately serve these patients, clinicians will continue to wrestle with clinical decisions concerning the specific needs of pediatric cochlear implant patients who are from linguistically diverse backgrounds.



### **Limitations**

There were several limitations to this study. The first limitation of this study was the manner in which participants were recruited to be part of the study. Most of the participants' emails were found using the Cochlear Americas, Advanced Bionics, and MED-EL's "Find a Clinic"-type search bars on their respective websites. Many of the links associated with particular cochlear implant center's websites were filled with assorted demographic information, but oftentimes did not have any listed emails for the professionals working at the specific clinics. Additional contact information was identified using the "Find American Cochlear Implant Alliance (ACIA) Organizations"-type search bar on the ACIA website, which only yielded a small amount of emails to specific audiologists who were institutional members of ACIA. Brief descriptions about the study, however, were posted on the American Speech-Language-Hearing Association's (ASHA) website for Special Interest Group 9 (SIG-9)—Hearing and Hearing Disorders in Childhood, and via an e-blast to 12,000 Alexander Graham Bell Association for the Deaf or Hard of Hearing contacts in order to gain more responses. And yet, only 59 participants responded to the survey.

The second limitation of this study was that the contacted audiologists and other professionals were asked to forward the survey on to their professionals/colleagues on their cochlear implant team—specifically auditory-based therapists who also serve this cohort of pediatric cochlear implant patients. This could have also contributed to the lower response rate from the auditory-based therapists. This request on behalf of the researcher for survey distribution, also presupposed that both the audiologists and auditory-based therapists worked in an interdisciplinary fashion—in which professionals collaborate and communicate often on

behalf of their shared patients, and that the referral processes between the two groups were successfully carried out.

A third limitation was that the sample population only reflected a small percentage of audiologists and auditory-based therapists who work with Hispanic pediatric cochlear implant patients who come from linguistically diverse backgrounds across the United States. This obviously limits the generalizability of the results, particularly since the prevalence of hearing loss among the Hispanic population is the largest among any minority group in the United States (Mehra et al., 2009, p. 464; Ramkissoon & Khan, 2003, para. 2). Although the sample population was not considered large, it should be noted that these policies and clinical practices of audiologists and auditory-based therapists were from professionals at major cochlear implant centers in 16 different states within the United States. It should also be stated that over 40% (n=22) of the 51 participants noted that they had 11 years or more experience working with pediatric cochlear implant patients.

The fourth limitation of this study was that it was conducted using anonymous online survey research techniques. Online survey research poses several limitations relating to sampling issues (Babbie, 2014, p. 294). Though the survey clearly stated that the study was designed for audiologists and auditory-based therapists who work with Hispanic pediatric cochlear implant patients, the researcher could not truly control who completed the survey. The completion rate is also indicative that in online surveys, participants often opt out of starting or completing the survey in its entirety (Babbie, 2014, p. 301). A final common issue related to online survey research is several of the emails of the participants that were discovered online resulted in receiving return emails from the email provider noting that certain email addresses did not exist (Babbie, 2014, p. 299).

A final limitation of this study was that in order to create two separate groups of responses between audiologists and auditory-based therapists, those who selected “Other” regarding the participant’s primary role on his/her cochlear implant team were subsequently routed to answer questions on the audiological matrix of questions (versus separate therapist questions). This allowed participants to respond to statements related to audiological practices, but some of these participants were potentially not qualified to answer the questions posed. This limitation, as well as the aforementioned, however, should not hinder this study’s contribution to the literature concerning the policies and clinical practices of audiologists and auditory-based therapists regarding candidacy and auditory treatment of Hispanic pediatric cochlear implant patients from linguistically diverse backgrounds.

### **Recommendations for Future Research**

There are several recommendations that can be suggested for future research regarding the policies and clinical practices of audiologists and auditory-based therapists for this cohort of pediatric cochlear implant patients. In reference to the limitations, the first recommendation is to increase the sample size and improve the manner in which audiologists and auditory-based therapists are contacted to participate in future studies. This would allow for a more representative sample of clinical practices that these clinicians are following, which would in turn enable the results to be more generalizable and potentially of more significance.

A second recommendation for future research would be to interview audiologists and auditory-based therapists as well as administer a survey. Although survey research is an effective method to obtain a large quantity of data, it can also obscure results due to participants not responding honestly (often due to social desirability). Though conducting interviews as an

additional method to obtain data would be much more time-consuming, it could potentially qualitatively corroborate the validity of the quantitative data from the surveys.

A third recommendation for future research would be to study the policies and typical clinical practices of candidacy and auditory treatment for pediatric cochlear implant patients who speak languages other than Spanish. Though this study does not claim to be comprehensive or generalizable to all other languages of minority populations that exist within the United States, it should be noted that the researcher would expect similar results for other pediatric cochlear implant patients who seek to become bilingual listening and spoken language speakers. Considering the Hispanic population is rapidly growing and will soon become the largest minority population in general, one can assume that if audiologists and auditory-therapists do not have policies in place for working with the Hispanic population, they likely lack policies for addressing the needs of all bilingual pediatric cochlear implant patients and recipients.

A final recommendation for future research is to compare policies and therapy practices implemented in Spain to those used in the United States. Spain is a country where bilingualism is not only valued, but encouraged by the Spanish constitution. Castilian Spanish is spoken in addition to many other languages that are specific to autonomous communities of Spain (e.g., Aranese, Catalan, Galician, Basque, Valencian). According to Guiberson (2014), over a quarter of the Spanish population speaks one of these autonomous community languages as their native language (p. 88). Furthermore, 53% of Spanish adults are bilingual or multilingual, speaking both Castilian Spanish and a Spanish autonomous community language or a foreign language (Instituto Nacional de Estadística, 2012). Considering the vast array of autonomous community languages, the high percentage of bilinguals, and the positive view of bilingualism, observing and comparing the policies and clinical practices employed in Spain and the United States could

provide researchers with a better understanding of how to conduct therapy with Spanish-speaking and bilingual patients in general.

### **Final Thoughts**

Not only was this the first study to examine the policies and clinical practices regarding candidacy and auditory treatment for Hispanic pediatric cochlear implant patients, but it also was the first study to examine the referral processes between audiologists and auditory-based therapists for these cochlear implant patients. The results obtained from this study suggested that based on the centers studied, most pediatric cochlear implant patients receive auditory-based therapy; clinicians do not feel that they are properly trained to assist patients from linguistically diverse backgrounds; bilingualism should be encouraged for pediatric cochlear implant patients; audiologists and auditory-based therapists differ on certain issues related to cochlear implant candidacy and bilingualism; and no cochlear implant clinic reported having a written policy regarding how to conduct auditory-based therapy with Hispanic pediatric cochlear implant patients. Therefore, the researcher hopes that this study will become a catalyst for further research studies investigating the relationship between candidacy and auditory treatment for pediatric cochlear implant patients who speak languages other than Spanish.

The projected rate of minority language growth in the United States is increasing, and due to the researcher's own personal ties related to Hispanic culture, I therefore hope that future research will reflect increased efforts to assist patients who do not fit the "typical" mold of a cochlear implant candidate.

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## Appendix A

### 10 Principles of Auditory-Verbal Therapy

According to the Alexander Graham Bell Association for the Deaf or Hard of Hearing, the principles of Listening and Spoken Language Specialists (LSLS) Auditory-Verbal Therapy are (2007):

1. Promote early diagnosis of hearing loss in newborns, infants, toddlers, and young children, followed by immediate audiologic management and Auditory-Verbal therapy.
2. Recommend immediate assessment and use of appropriate, state-of-the-art hearing technology to obtain maximum benefits of auditory stimulation.
3. Guide and coach parents to help their child use hearing as the primary sensory modality in developing listening and spoken language.
4. Guide and coach parents to become the primary facilitators of their child's listening and spoken language development through active consistent participation in individualized Auditory-Verbal therapy.
5. Guide and coach parents to create environments that support listening for the acquisition of spoken language throughout the child's daily activities.
6. Guide and coach parents to help their child integrate listening and spoken language into all aspects of the child's life.
7. Guide and coach parents to use natural developmental patterns of audition, speech, language, cognition, and communication.
8. Guide and coach parents to help their child self-monitor spoken language through listening.
9. Administer ongoing formal and informal diagnostic assessments to develop individualized Auditory-Verbal treatment plans, to monitor progress and to evaluate the effectiveness of the plans for the child and family.
10. Promote education in regular schools with peers who have typical hearing and with appropriate services from early childhood onwards.

**\*An Auditory-Verbal Practice requires all 10 principles.**

*The term "parents" also includes grandparents, relatives, guardians, and any caregivers who interact with the child.*

(Adapted from principles originally developed by Pollack, 1970)

## **Appendix B**

### **Tips for Working with an Interpreter**

#### **Selecting an Interpreter**

- Determine the interpreter's level of proficiency in English and in the language used by the client/patient
- Assess the interpreter's educational background and experience
- Be aware of the interpreter's communication style
- Try to use the same interpreter for multiple assignments so that you may establish a familiar working relationship

#### **Prior to the Session**

- Meet with the interpreter in advance to allow adequate preparation time
- Review the goals and procedures of the test and/or treatment materials
- Ensure that the interpreter understands your confidentiality policies
- Explain that the oral interpreter will need to limit non-verbal cues, such as hand gestures and vocal variation, that may impact assessment results
- Review test validity and reliability to ensure that the interpreter understands the need to avoid unnecessary rewording of testing prompts
- Establish a rapport with the interpreter
- Remind the interpreter to take notes on the client's responses
- Learn greetings and the appropriate pronunciation of names in the family's primary language or signs

#### **During the Session**

- Introduce yourself (as the speech-language pathologist, etc.) and the interpreter in the client's native language if possible
- Describe your roles and clarify expectations
- Ensure that the interpreter is taking notes
- Use short, concise sentences
- Pause frequently to allow the interpreter to translate information
- Allow enough time for the interpreter to organize the information for effective translation
- Periodically check with the interpreter to see if you are speaking too fast or too slowly, too softly, or unclearly
- Understand that words of feeling, attitude, and qualities may not have the same meaning when directly translated
- Talk directly with your client
- Be aware of non-verbal body language and gestures that may be offensive to the family's culture
- Provide written materials in the family's native language whenever possible
- Build in extra time for the session

#### **After the Session**

- Review the client's errors
- The interpreter should report the client's response as well as the anticipated response
- Avoid use of professional jargon
- Discuss any difficulties in the testing process
- Discuss any difficulties in the interpretation process

(Adapted from ASHA, 2006, Retrieved from <http://www.asha.org/practice/multicultural/issues/interpret.htm>)

## Appendix C

### Research Protocol

Unfortunately for many families, hearing loss is one of the most common impairments related to infants with 1-3 in every 1,000, born with some level of hearing loss. For parents, hearing that their child is deaf can be a crushing blow; however, given the child meets all of the criteria, cochlear implants may be an option. These devices enable people who are deaf to develop listening abilities like their peers; and if they want, spoken language as well. In order for the children to have success listening and talking, professionally trained clinicians teach them how to develop these skills. Oftentimes, clinicians support these children to gain fluency in English, despite it not being the native language for many families. As a result, children whose native language is Spanish for example, are either forced to learn English, or the responsibility falls on the parents to teach their child Spanish.

The purpose of this study is to examine cochlear implant centers' policies and clinical practices regarding therapy for cochlear implant patients. More specifically, the study will target therapy provided to pediatric patients who are monolingual Spanish, English as a second language (ESL), and bilingual English-Spanish speakers. The study will also highlight what therapy techniques are implemented to provide effective therapy in Spanish and how this compares to English.

For this study, the researcher will utilize quantitative survey research with a purposive sampling technique to electronically distribute surveys via email to cochlear implant audiologists and "auditory-based" therapists at major cochlear implant centers in the United States regarding the referral processes and typical clinical practices related to auditory-based therapy for Spanish-speaking pediatric cochlear implant patients. In order to observe the differences in therapy strategies between English and Spanish, the researcher will be traveling to Spain for a shadowing opportunity at *Clave*, a robust hearing-impairment advocacy organization located in Madrid that focuses on auditory-based therapy. The results of this study will be shared with my academic advisors Donald Goldberg, Ph.D. and John Gabriele, Ph.D. The conclusions will be available in my Independent Study, which has been made aware to my participants.

## Appendix D

### Survey Instrument

Greetings:

My name is Matthew Ehrenburg and I am a senior studying Communication Sciences and Disorders and Spanish at The College of Wooster in Wooster, OH. Along with my advisors Donald M. Goldberg, Ph.D., CCC-SLP/A, LSLS Cert. AVT, and John Gabriele, Ph.D., I am investigating the policies and clinical practices implemented by cochlear implant centers regarding auditory treatment of Hispanic/Latino pediatric cochlear implant patients. The College of Wooster's Human Subjects Research Committee (HSRC) or Institutional Review Board (IRB) has approved this study. There are no direct risks or benefits to participating in this study. If you decide to complete the survey, your participation is completely voluntary. All responses will remain confidential. Please answer each question completely, honestly, and to the best of your ability. You may skip any question you do not wish to answer. If at any time you want to terminate your participation in the study, you may do so without any penalty or adverse consequences. The survey will take about 10 minutes to complete. If you have any questions about this study, I can be contacted at mehrenburg16@wooster.edu and my advisors, Dr. Donald M. Goldberg and Dr. John Gabriele, can be contacted at dgoldberg@wooster.edu (or goldbed@ccf.org) and jgabriele@wooster.edu, respectively.

Thank you for your hoped for participation.

**By completing this survey, you are indicating that you have read and understand the aforementioned information, you are at least 18 years of age, and you consent to allow information you provide to be used for research purposes.**

Do you accept the above terms and conditions and willingly choose to participate in this study?

- Yes
- No

**For the following questions, please select the best answer.**

Does your cochlear implant center serve any Hispanic/Latino pediatric cochlear implant candidates and/or recipients?

- Yes
- No

What is your sex?

- Male
- Female
- Prefer not to answer



What is your highest earned degree?

- Bachelor's Degree
- Master's Degree
- Au.D. (Residential-Based)
- Au.D. (Distance Learning Program)
- Ed.D.
- Ph.D.
- Other (Please Specify) \_\_\_\_\_

What is your primary place of work?

- Hospital-based Cochlear Implant Center
- Cochlear Implant Clinic/Center
- ENT/Otology Physician Office
- Speech and Hearing Clinic
- Private Practice
- Other (Please Specify) \_\_\_\_\_

In which state and city is your primary place of employment?

\_\_\_\_\_

Approximately how many years of experience have you had with pediatric cochlear implant patients?

- Less than a year
- 1-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- More than 20 years

Would you consider Hispanics/Latinos to be a "large minority" population in the geographic area in which you work?

- Yes
- No

Approximately what percentage of your current pediatric cochlear implant caseload is Hispanic/Latino?

- 1-5%
- 6-10%
- 11-15%
- 16-20%
- 21-25%
- 25% or more

Approximately what percentage of those Hispanic/Latino pediatric cochlear implant patients **only** speak Spanish?

- 1-10%
- 11-20%
- 21-30%
- 31-40%
- 41-50%
- 51% or more

Rank the following choices from 1 to 3 (1=**MOST** common and 3=**LEAST** common) regarding the types of Hispanic/Latino pediatric cochlear implant patients seen at your clinic.

- \_\_\_\_\_ Monolingual Spanish speakers  
 \_\_\_\_\_ English as a second language (ESL) speakers  
 \_\_\_\_\_ Bilingual English-Spanish speakers

**For the following questions, please select the best answer.**

At your cochlear implant center, what mode of communication or "communication opportunity" is most often used for the treatment of your cochlear implant candidates/recipients?

- Listening and Spoken Language (e.g., Auditory/Oral, Auditory-Verbal)
- Manual (e.g., American Sign Language [ASL], Manually Coded English [MCE])
- Combined (e.g., Total Communication [TC], Cued Speech)

Approximately what percentage of your pediatric cochlear implant recipients receive "auditory-based" therapy at your facility?

- 0-25%
- 26-40%
- 41-50%
- 51-75%
- Over 76%

Are you the auditory-based therapist on the cochlear implant team?

- Yes
- No

What is your primary role in your clinic's cochlear implant team?

- Audiologist (Testing, Programming/Mapping)
- Speech-Language Pathologist
- Educator of the Deaf
- Listening and Spoken Language Specialist (LSLS)
- Other (Please Specify) \_\_\_\_\_

1. If Audiologist is selected, then skip to first set of matrix questions.
2. If Speech-Language Pathologist is selected, then skip to second set of matrix questions.
3. If Educator of the Deaf is selected, then skip to second set of matrix questions.
4. If Listening and Spoken Language Specialist (LSLS) is selected, then skip to second set of matrix questions.
5. If Other (Please Specify) is selected, then skip to first set of matrix questions.



I was formally instructed with how to conduct audiological testing with linguistically-diverse patients.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Children should learn English because most schools use English as the language of instruction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medical interpreters are used during pre-candidacy audiology testing assessments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Children who receive cochlear implants are routinely referred to auditory-based therapy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our center's clinical practices address cross-cultural issues related to bilingualism.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our clinic provides phonetically-balanced word lists in Spanish during Word Recognition testing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

1. If participant answered the first set of matrix questions, then skip to thank you for participating...





<p>make a decision as to which language they would prefer the child use during auditory-based therapy.</p> <p>I understand the cultural-competency issues related to bilingualism in auditory-based therapy.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Are there bilingual English-Spanish speaking therapists working at your clinic?

- Yes  
 No

Answer If Are there bilingual English-Spanish speaking therapists working at your clinic? Yes Is Selected

If Yes, how many bilingual English-Spanish speaking therapists work at your clinic?

---

Have you ever conducted auditory-based therapy with a Hispanic/Latino pediatric cochlear implant patient?

- Yes  
 No

Answer If Have you ever conducted auditory-verbal therapy with a Hispanic/Latino pediatric cochlear implant... Yes Is Selected

If Yes, please describe your experience(s).

---

Is there a written policy regarding how to conduct auditory-based therapy with pediatric cochlear implant patients who are monolingual Spanish, English as a second language (ESL), or bilingual English-Spanish speakers?

- Yes  
 No



Answer If Is there a written policy regarding how to conduct auditory-verbal therapy with pediatric cochlea... Yes Is Selected

Yes, please copy and forward the policy to the researcher.

---

Thank you for taking the time to participate in this study. As mentioned above, all responses will be kept confidential. As stated above, if you have any questions or concerns, please contact me, Matthew Ehrenburg, by email at [mehrenburg16@wooster.edu](mailto:mehrenburg16@wooster.edu) or my advisors Donald M. Goldberg, Ph.D., by email at [dgoldberg@wooster.edu](mailto:dgoldberg@wooster.edu) (or [goldbed@ccf.org](mailto:goldbed@ccf.org)), and Dr. John Gabriele, Ph.D., at [jgabriele@wooster.edu](mailto:jgabriele@wooster.edu). If you would like a copy of a summary of the study results, which will be completed in April 2016, please forward a separate email to [mehrenburg16@wooster.edu](mailto:mehrenburg16@wooster.edu).

## Appendix E

### Sample Email to Participants

Dear Cochlear Implant Professional:

Hello. My name is Matthew Ehrenburg and I am a senior studying Communication Sciences and Disorders and Spanish at the College of Wooster in Wooster, Ohio. I am currently working on my senior thesis regarding the policies and clinical practices implemented by cochlear implant centers regarding the management and the auditory habilitation for Hispanic pediatric cochlear implant patients. In order to gain a better understanding of the typical clinical policies of cochlear implant centers, I am collecting quantitative survey data from select cochlear implant audiologists and “auditory-based” therapists from cochlear implant centers who serve a cohort of Hispanic/Latino pediatric cochlear implant candidates/recipients. I was encouraged to reach out to you for your hoped-for assistance and expertise. From these surveys I am hoping to expand my knowledge on both the referral processes related to auditory habilitation and typical clinical practices of how to conduct therapy with pediatric cochlear implant patients whose primary language is Spanish.

I believe professionals, such as yourself, can add a great deal of clinical knowledge that cannot be conveyed through a review of the literature on bilingualism and cochlear implants. I am emailing you today in the hopes that you will complete the survey and respectfully request that you will forward this to any other members of your team who are providing post-activation therapy treatment. I look forward to your favorable response to this sincere request. I can be contacted by email.

Thank you for your time and consideration.

Matthew Ehrenburg  
The College of Wooster Class of 2016  
Departments of Communication and Spanish  
[mehrenburg16@wooster.edu](mailto:mehrenburg16@wooster.edu)

Advisors: Donald M. Goldberg, Ph.D.  
Professor, College of Wooster  
[dgoldberg@wooster.edu](mailto:dgoldberg@wooster.edu)

John Gabriele, Ph.D.  
Professor, College of Wooster  
[jgabriele@wooster.edu](mailto:jgabriele@wooster.edu)

## Appendix F

### ASHA SIG-9 Message

Greetings:

My name is Matthew Ehrenburg and I am a senior studying Communication Sciences and Disorders and Spanish at The College of Wooster in Wooster, OH. The reason for my message is to encourage cochlear implant audiologists and/or auditory therapists to participate in my undergraduate study, which focuses on policies and clinical practices related to auditory habilitation for Spanish-speaking pediatric (birth to 5 years old) cochlear implant patients. If you have already completed the survey, I thank you for your participation. The link will be active until \_\_\_\_\_. Below is the link to the survey. I would appreciate your participation in this study.

Thank you in advance for your consideration and help.

Matthew Ehrenburg: The College of Wooster 2016  
Advisors: Donald M. Goldberg Ph.D, CCC-SLP/A  
John P. Gabriele Ph.D  
Departments of Communication and Spanish

## Appendix G

### AG Bell Association E-Blast

#### *Hispanic Patient Study:*

Matt Ehrenburg is a Communication Sciences and Disorders and Spanish double major at the college. He is interested in recruiting U.S. audiologists and communication specialists (speech-language pathologists, teachers of the deaf and Listening and Spoken Language Specialists), to learn about their clinical procedures/practices working with pediatric cochlear implant (CI) candidates and CI recipients who come from Spanish-speaking homes. Professionals interested in participating in this study should email [Matt](#) or go to his project's [survey link](#) if they meet the study's participation criteria.

## Appendix H

### Item 5: In which city and state is your primary place of employment?

#### Responses:

- California (n=5)
  - Los Angeles
  - Orange
  - San Francisco
- Colorado (n=2)
  - Boulder
  - Englewood
- Florida (n=2)
  - Miami
- Georgia (n=1)
  - Atlanta
- Illinois (n=6)
  - Chicago
- Maryland (n=5)
  - Baltimore
- Minnesota (n=1)
- Nevada (n=2)
  - Las Vegas
- New Jersey (n=4)
  - Hackensack
- New York (n=2)
  - New York
- North Carolina (n=1)
- Ohio (n=9)
  - Cincinnati
  - Cleveland
  - Columbus
- Oregon (n=1)
  - Portland
- South Carolina (n=1)
  - Tega Cay
- Texas (n=3)
  - Bryan
- Wisconsin (n=1)
  - Milwaukee
- “Developing countries mostly” (n=1)

## Appendix I

### Item 45-Auditory-Based Therapists' Experiences

#### Verbatim Responses:

- *Preferred Language of the Family*
  - Bilingual, leaning towards more English early elementary school-aged patient. Therapy in English at parental request.
  - Conducted in the preferred language of the family (Spanish only or English and Spanish). Positive experience
  - They have been positive experiences. In the 0-3 years of age our sessions are conducted in Spanish using an interpreter to communicate with parents. Once the children are school age, most times sessions are conducted in English connecting the 2 languages.
  - Child speaks both English and Spanish, mom speaks fair English. Since child is in elementary school and speaks English, sessions were conducted in English.
  - 75% of my clients with CI's are from Spanish-speaking families... I educated parents on communication mode options as well as the importance of creating a language plan in order to achieve their goals for their child's communication. I am happy to discuss my experience in greater detail with you, if you'd like.
  
- *Bilingual Therapists or Interpreters*
  - Joint therapy with bilingual English-Spanish speech language pathologist and the child and caregiver
  - I have always had an interpreter and the sessions are very similar to sessions without the interpreter
  - Scenario A: If parents are not fluent English speakers, the a Spanish-English interpreter has been incorporated: however, my perception is that this negatively affects the parent-clinician relationship and the flow of a therapy session. Scenario B: Parent is at least fairly fluent in English. Instruction is given to parent in English and modeled. Parents can continue activities using English or Spanish. Spanish children's books and songs are incorporated, as well as, the English versions.
  - Services are provided with Spanish interpretation for either the family and/or patient depending on the recipient's age. Cultural issues are addressed with the interpreter on an ongoing basis. Again, depending on the age, therapy may be presented in English, Spanish or a combination of both languages.
  - It looked like a typical session for a native-English speaking patient, only conducted with an Spanish interpreter.
  - I taught several families in Spanish only while working in D.R.; in U.S. I spoke Spanish for parent sessions in family's home to partially bi-lingual (mother mono-lingual Spanish); also work with clients whose family ethnicity and second language used at home is Spanish--client learned English in therapy sessions.

- *Difficulties*
  - I have a student that has Spanish speakers at home, in bilingual classroom for years- has trouble understanding both Spanish we finally had him taken out of bilingual classroom and only focus on English in school - he is improving with his reading and comprehension
  - Frustrating at best. Education is needed in this area for us and for the families.
  - Challenging
  - Most of the CI patients I have worked with who have Spanish speaking families were late implant or late ID, or have other multiple diagnosis. Therefore, spoken language was not an expected outcome for them. Therapy is more about developing listening skills and using ASL as a primary mode of expressive communication
  
- *Miscellaneous*
  - as a TOD (Teacher of the Deaf)
  
- No Response (n=2)

## CAPÍTULO I

### INTRODUCCIÓN

Para la mayoría de los padres, la idea de dar la luz a un bebé evoca una multitud de emociones y expectativas. Para muchos de ellos, su mayor preocupación es la salud del recién nacido. Desafortunadamente para algunos, hay complicaciones o problemas que afectan a algunos infantes. Uno de los impedimentos más comunes relacionados con los recién nacidos es la hipoacusia, con uno a tres infantes de cada 1.000 nacidos que tienen alguna pérdida auditiva neurosensorial (Joint Committee on Infant Hearing [JCIH], 2007, p. 907). Para los padres, la noción de que su hijo es sordo puede ser un golpe duro a sus esperanzas, sueños y aspiraciones para su hijo (Young & Tattersall, 2007, p. 213). Los prestadores de servicios médicos, sin embargo, aseguran a esos padres que sus esperanzas para su niño no deberían desaparecer.

Si el niño se adecua a todos los criterios requeridos, los implantes cocleares pueden ser una opción viable para el infante sordera prelocutiva. Los implantes cocleares permiten a los niños sordos aprender a escuchar y desarrollar el lenguaje oral como la mayoría de sus pares (Cosetti & Waltzman, 2012, p. 165). Aunque la tecnología expone a estos niños al “mundo de la audición,” los implantes cocleares ciertamente no “curan” la sordera. Para asegurar que estos niños tengan éxito escuchando y usando el lenguaje oral, ellos idealmente deben ser remitidos a los centros de implantes cocleares a los médicos con formación profesional como: logopedas, audiólogos, y terapeutas auditivo-verbales para ser enseñados a escuchar y hablar. A menudo, los médicos apoyan a estos niños para obtener fluidez en inglés, a pesar del hecho que muchas familias cuyo idioma nativo no es inglés. Como resultado, los niños cuya lengua nativa no es inglés podrían ser obligados a aprender inglés porque los terapeutas no tienen los conocimientos



ni los recursos para conducir la terapia en la lengua nativa del niño, o la responsabilidad recae en los padres a enseñar a sus hijos su idioma nativo.

### **Declaración del propósito**

El propósito de este estudio fue examinar las políticas de centros de implantes cocleares y las prácticas clínicas en relación con la (re)habilitación auditiva para los pacientes pediátricos que tienen implantes cocleares. Más específicamente, el estudio investigó los servicios de tratamiento provistos a los pacientes pediátricos que son criados en hogares en que hablan únicamente el español, el inglés como segunda lengua (ISL), o son bilingües en inglés-español. El estudio investigó a través de encuestas que fueron distribuidas a centros de implantes cocleares en los Estados Unidos con respecto a sus políticas y sus procesos referenciales para este grupo específico de pacientes que tienen implantes cocleares. Además, el estudio también subraya las técnicas que fueron implementadas durante la terapia y cómo estas prácticas se comparan con las prácticas utilizadas actualmente en inglés. Al mismo tiempo, el estudio afirma la importancia de la adquisición de dos idiomas, o el aprendizaje de dos idiomas simultáneamente; generalmente antes de los 3 años de edad, y cómo los profesionales auditivos pueden ayudar en el desarrollo de los pacientes pediátricos como aprendices de dos idiomas.

### **Justificaciones**

La identificación de las políticas y prácticas clínicas utilizadas en la terapia de (re)habilitación auditiva para receptores pediátricos de implantes cocleares que son monolingües español, ISL, y bilingües que hablan inglés-español se considera de gran valor tanto por razones académicas y prácticas. En primer lugar, este estudio es significativo porque refleja dos tendencias crecientes en los Estados Unidos; uno, el aumento de los hispanohablantes en los

Estados Unidos y dos, la tendencia creciente de implantación de los implantes cocleares para los niños a edades más jóvenes.

La inmigración de los hispanos a los Estados Unidos fluctúa entre 350.000 y 1,3 millones por año con 47,7 millones de residentes se esperan estar viviendo en los EE.UU. en el año 2010 (Douglas, 2011b, p. 20). Se estima que casi 308,7 millones de personas viven en los Estados Unidos. El grupo minoritario más grande en los EE.UU. es la población hispana, que consiste en 50,5 millones de personas o 16,3% de la población total (US Census Bureau, 2010). Según la Oficina del Censo de los Estados Unidos, la población hispana se prevé a aumentar al 29% para el año 2050, que reflejará el 60% del crecimiento total de la población de Estados Unidos (como se cita en Douglas, 2011a, p. 4). Puesto que existe una mayor incidencia de la pérdida auditiva en la población hispanoamericana pediátrica en comparación con otros grupos minoritarios, se ha sugerido que los pacientes con implantes cocleares pediátricos bilingües seguirán crecer (Mehra, Eavey, & Keamy, 2009, p. 469). Además, con el avance de la tecnología relacionada con los implantes cocleares, el esfuerzo por implantar los niños con edades menores de 12 meses sigue aumentando (Heman-Ackah, Roland, Haynes, & Waltzman, 2012, p. 57). Los programas de cribado auditivo neonatal están detectando a niños sordos a edades más tempranas, por lo que ha llevado a suponer que el impulso a la implantación coclear a una edad menor de 12 meses de edad (la edad actual aprobado por la *Food and Drug Administration* [FDA] de los EE.UU. y necesario para obtener un implante coclear) (Heman-Ackah et al., 2012, p. 57).

La segunda justificación de este estudio es que esta tesis puede servir como un punto de partida para la creación de un conjunto de guías clínicas para los clínicos sobre cómo recomendar efectivamente y/o proporcionar servicios de tratamiento a los receptores de implantes cocleares pediátricos quien habla español. “Although laden with presumptions, there

remains a scarcity of research, recommendations, and guidelines for working with children who are deaf or hard of hearing and from linguistically diverse backgrounds”<sup>1</sup> (Guiberson, 2005, p. 30). Dado que la gran mayoría de los profesionales en los Estados Unidos que trabajan con los niños sordos o con dificultades auditivas son mujeres, monolingües inglés, de raza blanca, es esencial para estos profesionales tener algunas directrices específicas para conducir una sesión de terapia eficaz con los niños de orígenes diversos cultural y lingüísticamente (Rhoades, Price, & Perigoe, 2004, p. 290). Para que la terapia sea dirigida efectivamente por los logopedas y audiólogos, ellos necesitan más conocimiento sobre las producciones del habla de los niños hispanos con los implantes cocleares (Moore, Prath, & Arrieta, 2006, p. 338). Este estudio también es significativo porque se refiere a la aplicación de técnicas específicas de terapia (aprendizaje del escucha y del lenguaje hablado) utilizadas alrededor de los Estados Unidos para los pacientes hispanos pediátricos que tienen implantes cocleares. Un componente importante de este razonamiento es la posibilidad de estudiar las técnicas específicas de la terapia y las medidas de evaluación del habla, el lenguaje, y la audición empleadas en España para los niños que son sordos o tienen alguna pérdida auditiva y discuten las similitudes y/o las diferencias entre la terapia que existe entre el Estados Unidos y España.

Una tercera razón por la que este estudio es importante es porque los resultados del estudio ayudarán a contribuir a la escolaridad en apoyo del bilingüismo para los pacientes pediátricos que tienen implantes cocleares. Durante muchos años, la mayoría de padres señaló que algunos especialistas de audición y lenguaje hablado sugiere fuertemente que dos idiomas podría causar un retraso en la adquisición del lenguaje del niño (Bunta & Douglas, 2013, p. 281;

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<sup>1</sup> “Aunque cargado de presunciones, sigue habiendo una escasez de investigación, recomendaciones, y directrices para los niños sordos o tienen alguna pérdida auditiva que son de orígenes diversos lingüísticamente” (Guiberson, 2005, p. 30).

Genesee, 2008, p. 17; Waltzman, McConkey Robbins, Green, & Cohen, 2003, p. 757). Según estudios recientes, sin embargo, no hay ninguna razón para creer que la adquisición de dos idiomas causarían un retraso en el lenguaje (McConkey Robbins, Green, & Waltzman, 2004, pp. 644-645; Moore et al., 2006, p 322;. Thomas, El-Kashlan, & Zwolan, 2008, p. 230;. Waltzman et al., 2003, p. 757). Como resultado, la escolaridad ya mencionada parece haber resuelto el “debate” que el apoyo de dos idiomas ofrece más ventajas que desventajas. Uno de los muchos beneficios del aprendizaje de dos idiomas es que estos niños parecen demostrar ventajas cognitivas comparativamente a hablantes monolingües (Genesee, 2008, p. 17). Aunque los terapeutas auditivo-verbales contribuyen significativamente al crecimiento lingüístico del niño, los padres son los que desempeñan un papel mucho más importante en el éxito de su hijo en el uso de dos o más idiomas (Nevins & Garber, 2007, pp. 1-2; Rhoades, Price, & Perigoe, 2004, p. 645; McConkey Robbins, 2007, pp. 2-3). La realización de este estudio espera apoyar el bilingüismo como una oportunidad que todos los niños y sus familias deberían ser alentados a aprovechar, incluso los que tienen una pérdida de audición.

Una cuarta razón que este estudio es vital es porque ayudará a promover la escolaridad relacionada con la importancia de la contribución de la lengua española a la identidad cultural hispana en los Estados Unidos. Los inmigrantes hispanos involucrados en las transiciones culturales como resultado de la migración deben aprender los matices de las normas sociales, las presiones, y las estándares asociadas con los Estados Unidos (Padilla & Pérez, 2003, p. 42). Cada individuo debe establecer su propia identidad étnica con el fin de determinar hasta qué punto que él/ella está dispuesta a aculturarse. Según Phinney en (1991), la identidad étnica es una construcción utilizada para aclarar la auto-identificación (por ejemplo, las actitudes acerca de ser un miembro del grupo, el grado de su conocimiento étnico, comportamientos y prácticas étnicas,

etc.) dentro de un grupo en particular (p. 194). El lenguaje es un aspecto instrumental en el desarrollo de la identidad étnica que contribuye a la socialización de los individuos y sus emociones, comportamientos, y auto-regulación social (Dale, 1996, p. 5). Teniendo en cuenta que el idioma nativo de un individuo es un factor importante que contribuye a la identidad étnica de una persona, los hispanos en los Estados Unidos a menudo se enfrentan a una decisión difícil en cuanto a cómo y en qué capacidad hablan español en comparación con inglés (Portes & Zhou, 1993, p. 88). Según Ghavami y sus colegas, las personas pertenecientes a minorías que se identifican más fuertemente con su grupo minoritario reportan mayor bienestar psicológico (Ghavami, Fingerhut, Peplau, Grant, & Wittig, 2011, p. 79).

La quinta justificación de este estudio es que la escolaridad disponible es limitada en cuanto a las políticas de los centros de implantes cocleares en relación con el proceso de referencia para la (re)habilitación auditoria para los pacientes pediátricos de implantes cocleares en general, y mucho menos en los casos cuando el inglés no es el idioma principal. La mayor parte de la literatura presenta casos prácticos sobre los pacientes pediátricos y sus búsquedas de la adquisición de dos idiomas después de la implantación de los implantes cocleares; sin embargo, ninguno de los estudios identificados han abordado donde estos pacientes están recibiendo servicios para la (re)habilitación auditiva. Pocos estudios han proporcionado estadísticas en relación con los terapeutas auditivo-verbales que son bilingües y calificados a apoyar a estos pacientes o incluso la forma de conducir la terapia cuando los terapeutas bilingües no están disponibles. También no parece haber datos que aclaren si la terapia siempre está financiado privadamente o si el seguro cubre los honorarios. Los estudios previos carecen de datos y cifras de la prevalencia de estos casos en todo el país. En general, este estudio abordará

los temas mencionados y clarificará un tanto sobre este tema tan importante para las investigaciones audiológicas.

Aunque existen numerosas razones académicas que sustentan el propósito de este estudio, hay una justificación práctica que tiene sus raíces en mi interés personal. A lo largo de mi educación universitaria, me han fascinado los procesos y construcciones utilizadas en la comunicación y los idiomas. Mi interés aumentó mientras que exploraba la aparente relación “simbiótica” entre la audición y el lenguaje a través de los diferentes clases que se ofrecen en el departamento de Audiología y Logopedia. Durante mis años universitarios, mi pasión por estas dos áreas de estudio me ha dado varias oportunidades para emplear mis conocimientos en situaciones del “mundo actual”.

Como un asistente médico estudiantil en una clínica hospitalaria famosa por su programa con implantes cocleares, tuve la oportunidad de ver de primera mano algunas de los asuntos que pacientes pediátricos hispanos con implantes cocleares enfrentan durante sesiones de (re)habilitación auditiva. Un caso particular fue con un niño, inquisitivo, de 3 años de edad, que tenía implantes cocleares bilaterales (dos oídos). Cada semana a las 10:00 de la mañana, el muchacho llegaba a la clínica con su madre y su hermana por su sesión semanal de rehabilitación auditiva. Su madre y yo conversábamos en español sobre su hijo mientras esperábamos al logopeda para encontrarnos en el vestíbulo. Después de que el intérprete médico llegó, todos nos congregamos en el mismo despacho pequeño para empezar la terapia. La sesión comenzaba y el intérprete se traducía lo que el logopeda estaba diciendo en inglés a la madre, y a veces al niño, en español y entonces traducía sus respuestas de español al inglés. A medida que cada sesión de terapia pasaba, contemplaba más y más lo que sucedería si la clínica de este hospital no tuviese algunos intérpretes médicos. ¿Cómo sería la terapia para los terapeutas auditivo-verbales que no

tuviesen intérpretes disponibles y sólo hablaban inglés? ¿Hay terapeutas auditivo-verbales bilingües? A medida que continuaba a reflexionar, la madre del niño interrumpió bruscamente mi proceso de pensamiento. Ella me miró y con una sonrisa y dijo: “Me da piel de gallina ver a un joven, un hombre blanco como usted que le importa mucho mi hijo. No puedo expresar mi gratitud que no sólo se preocupa por mi familia, sino que también se esfuerza por ayudar a otras familias hispanas como la nuestra.” Como un caucásico que no creció bilingüe en inglés y español interesado en los implantes cocleares, sin duda soy una parte de un grupo nicho en los campos de audiología y logopedia. No obstante, varias experiencias similares a la mencionada sólo han añadido a mi deseo de servir a esta población pediátrica hispana con implantes cocleares mediante la investigación de los temas relacionados con este estudio.

### **Definiciones**

Para obtener una mejor comprensión de este estudio, es necesario proporcionar varias definiciones para términos esenciales. En primer lugar, un *implante coclear* es un dispositivo médico implantado que proporciona estimulación eléctrica directa al octavo nervio craneal, el nervio vestibulococlear, por medio de un conjunto de electrodos, que luego transmite señales eléctricas a la corteza auditiva para aportar la sensación de oír (Vincenti et al., 2014, p. 72). El uso de implantes cocleares está creciendo rápidamente como resultado de los programas de *Detección Precoz de la Sordera* (DPS), que son programas que requieren la práctica de cribado auditivo para identificar a todos los recién nacidos que tienen alguna pérdida auditiva antes de salir el hospital. Los infantes que no aprueban el cribado auditivo idealmente deben recibir una evaluación diagnóstica antes de los tres meses de edad, y cuando sea necesario, están inscritos en un programa de intervención logopédica cuando tienen seis meses de edad (ASHA, 2015b, párr. 1). El crecimiento de los programas DPS ha promovido otros desarrollos como *el cribado*

*universal*, una política obligatoria instituida por los Institutos Nacionales de Salud (National Institutes of Health [NIH]) en 1993 que se establecía “que todos los recién nacidos deben ser examinados para la pérdida de audición antes del alta hospitalaria o dentro de los tres primeros meses de la vida” (National Institutes of Health [NIH], 1993, p. 3). Aunque muchos niños son evaluados y remitidos para su pérdida de audición, un porcentaje mucho más pequeño tiene el propio grado/severidad de la pérdida de audición para ser un candidato de implantes cocleares. El *grado/severidad de pérdida de audición* se refiere a un sistema de clasificación utilizado para demostrar la gravedad de la pérdida de audición del paciente (Clark, 1981, p. 497).

Los criterios de candidatura de implante coclear han sido establecidos por la *Administración de Drogas y Alimentos* (Food and Drug Administration [FDA]) de los Estados Unidos, una agencia reguladora federal “responsible for protecting the public health by assuring the safety, efficacy and security of human and veterinary drugs, biological products, medical devices and our nation’s food supply, cosmetics, and products that emit radiation”<sup>2</sup> (FDA, 2014, párr. 1). Si el paciente cumple los requisitos, un grupo interdisciplinario de profesionales médicos y terapeutas componen un *equipo de implante coclear*, incluyendo pero no limitado a, “audiologists, speech-language pathologists, educators, surgeons, medical specialists, psychologists, and counselors.”<sup>3</sup> Los padres y la familia del paciente juegan una parte integral del equipo, quien debe defender y garantizar los mejores resultados posibles para el paciente (ASHA, 2015a, párr. 6). La Asociación Americana del Habla, Lenguaje, y Audición (American Speech-Language-Hearing Association [ASHA]) define un *audiólogo* como “healthcare

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<sup>2</sup> ...“responsable de proteger la salud pública asegurando la seguridad y la eficacia de los medicamentos humanos y veterinarios, productos biológicos, dispositivos médicos, y el suministro de alimentos de nuestra nación, cosméticos y productos que emiten radiación”.

<sup>3</sup> ...“audiólogos, logopedas, educadores, cirujanos, especialistas médicos, psicólogos y consejeros.”



professionals who provide patient-centered care in the prevention, identification, diagnosis, and evidence-based treatment of hearing, balance, and other auditory disorders for people of all ages”<sup>4</sup> (ASHA, 2015d, párr. 2). *Logopedas* son los profesionales de la salud que “prevent, assess, diagnose, and treat speech, language, voice, cognitive-communication, and swallowing disorders in children and adults”<sup>5</sup> (ASHA, 2015c, párr. 1). Después de que un paciente recibe un implante coclear, él/ella debe estar inscrito en terapia, es decir, auditiva (re)habilitación. *Habilitación auditiva* es una “particular methodology used to develop the auditory, speech, and language skills through a child’s use of his or her residual hearing”<sup>6</sup>, mientras que *la rehabilitación auditiva* requiere tratamiento audiológico de los adultos cuya discapacidad auditiva suelen ser más gradual (Johnson, 2012, pp. 348-349; Martin & Clark, 2015, p. 428).

Términos afiliados con la adquisición del lenguaje también se deben definir. La *adquisición del lenguaje* es el proceso por el cual los seres humanos adquieren la capacidad de percibir y comprender el lenguaje, así como la producción y el uso de palabras y oraciones para comunicarse (Goldfield, Nieve, & Willenberg, 2013, pp. 257- 258). La *adquisición de la primera lengua* (APL) estudia cómo los niños adquieren sus lenguas nativas, mientras que la *adquisición de una segunda lengua* (ASL) investiga los procesos involucrados con el desarrollo de otros idiomas, tanto en niños como adultos (Deacon, 1997, p. 107, p. 127). El *monolingüismo* es la habilidad de comunicar en un solo idioma, mientras que el *bilingüismo* es “proficient

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<sup>4</sup> ...“profesionales de la salud que brindan atención centrada al paciente en la prevención, la identificación, el diagnóstico, y el tratamiento basado en la evidencia de la audición, el equilibrio, y otros trastornos auditivos para personas de todas las edades”.

<sup>5</sup> ...“impiden, evaluar, diagnosticar y tratar el habla, lenguaje, voz, comunicación cognitiva y trastornos de la deglución en niños y adultos”.

<sup>6</sup> ...“metodología particular utilizada para desarrollar la audición, el habla y las habilidades lingüísticas a través del uso de un niño de su audición residual.”

conversational fluency in at least two languages”<sup>7</sup> (Rhoades, 2012, p. 237; Thordardottir, Cloutier, Ménard, Pelland-Blais, & Ravachew, 2015, p. 287). En lo que refiere a este estudio en particular, el hincapié del bilingüismo está en los pacientes que son *hispanos*—“an ethnonym to people of country heritage that speak the Spanish language, which roughly comprised the Iberian Peninsula including the contemporary states of Spain, Portugal, Andorra, and Gibraltar”<sup>8</sup> (Vega, 2001, p. 166). Los hispanos que luego aprenden inglés podrían entonces considerarse como *estudiantes que aprenden inglés* (English Language-Learners [ELL]), que son los individuos que están aprendiendo el idioma inglés, además de su lengua nativa, pero no necesariamente desde la infancia (Collins, 2014, pp. 389-390). Muchos estudiantes ELL, sin embargo, también pueden ser considerados *bilingües simultáneos*, que son bebés y niños pequeños que aprenden dos idiomas desde el nacimiento (Genesee, 2008, p. 17). La *identidad cultural* se refiere al sentido individual de pertenencia de una persona dentro de una cultura o grupo (Tajfel & Turner, 1986, pp. 15-16). Más información acerca de los términos antes mencionados se proporcionará en la revisión de la literatura.

### **Descripción del método**

Para este estudio, el investigador condujo el estudio mediante cifras cuantitativas derivadas de encuestas para mejorar la comprensión de las políticas de los centros de implantes cocleares en relación con los procesos referenciales para los receptores pediátricos de implantes cocleares cuya lengua nativa es el español. La encuesta plantea preguntas para resaltar y aclarar las técnicas de terapia específicas utilizadas en la (re)habilitación auditiva de niños que tienen implantes cocleares y vienen de familias monolingües español, ISL, y bilingües inglés y español.

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<sup>7</sup> ...“fluidez conversacional competentes en al menos dos lenguas,”

<sup>8</sup> ...“un etnónimo a personas de origen país que hablan el idioma español, que más o menos comprendía la Península Ibérica incluyendo los estados contemporáneos de España, Portugal, Andorra, y Gibraltar”

La encuesta se distribuyó electrónicamente a través del software de encuestas en línea Qualtrics por correos electrónicos a los audiólogos y otros profesionales auditivos en los principales centros de implantes cocleares en todo los Estados Unidos que sirven una gran población hispana. Los centros de implantes cocleares fueron seleccionados de los directorios en línea “Encuentre una clínica” (Find A Clinic) en los sitios de web de las manufacturas de los implantes cocleares como: Cochlear Americas, Advanced Bionics, y MED-EL. Basado en las tasas de respuesta obtenidas de estos centros, la encuesta podría ser redistribuida en algunas fechas posteriormente. Los participantes en el estudio fueron dirigidos usando una técnica de muestreo de conveniencia. La encuesta contiene una variedad de preguntas demográficas, Likert, y abiertas.

### **Conclusión**

Este estudio tiene la intención de ampliar el conocimiento disponible sobre el proceso de referencia de los centros de implantes cocleares con respecto a la (re)habilitación auditiva para los niños cuya lengua nativa es el español. Este estudio también investigará las técnicas de terapia utilizadas para estos niños. El investigador espera lograr esto mediante encuestas a centros de implantes cocleares alrededor de los Estados Unidos con respecto a la forma en que se refieren y proporcionan terapia o facilitar los servicios de tratamiento para estos pacientes.

Para las poblaciones monolingües español, inglés como segundo idioma (ISL), y bilingües en inglés y español que tienen una pérdida auditiva, los Estados Unidos puede ser un país difícil de navegar. La expectativa social de que estos pacientes pediátricos se asemejen lingüísticamente al inglés es a la vez presuntiva e ignorante y este estudio pretende disipar cualquier pensamiento que acredite lo contrario. Si los Estados Unidos realmente quiere cumplir

su apodo social como “un crisol de razas”, primero tiene que aceptar a todos los estadounidenses sin que importen la raza, etnia, religión, orientación sexual, discapacidad, etc.

En el siguiente capítulo se discutirá y analizará la escolaridad anterior relacionada con la adquisición de dos idiomas para los pacientes con implantes cocleares y las técnicas de terapia utilizadas en los servicios típicos de intervención o tratamiento auditivo-verbal.

## **CAPÍTULO II**

### **RISEÑA DE LITERATURA**

Casi de uno a tres de cada 1.000 bebés nacen con una pérdida auditiva permanente, por eso, la pérdida auditiva es una de las discapacidades más comunes en los Estados Unidos para los recién nacidos (Joint Committee on Infant Hearing [JCIH], 2007, p. 907). Puesto que se han establecido programas del cribado universal de audición para los recién nacidos alrededor de los Estados Unidos, se ha estimado que hay aproximadamente 12.000 recién nacidos con una pérdida auditiva cada año (JCIH, 2007, p. 912). Como se indicó anteriormente, algunos de estos niños que nacen sordos o con pérdidas auditivas pueden calificar para convertirse en receptores de implantes cocleares. Según la U.S. Food y Drug Administration (FDA) en 2010, había en todo el mundo aproximadamente 219.000 personas que habían recibido un implante coclear (National Institute on Deafness and Other Communication Disorders [NIDCD], 2013, p. 2). En los Estados Unidos, 28.400 niños y adultos alrededor de 42.600 habían recibido un implante coclear en el año 2010 (NIDCD, 2013, p. 2).

Aunque hay una gran cantidad de investigaciones realizadas sobre los niños con pérdidas de la audición, todavía existe áreas de estudio que necesitan ser exploradas. Para ayudar en esta exploración, el estudio actual va a investigar las políticas y las prácticas clínicas de los centros de implantes cocleares con respecto a la candidatura y el tratamiento auditivo para los niños que son monolingües español, Inglés como Segunda Lengua (ISL) y bilingües inglés-español. Hay varios aspectos de la escolaridad que deben considerarse antes de emprender este estudio. Dicha información incluye las opciones del tratamiento, los modos de comunicación, las cuestiones

multiculturales, las prácticas de terapia utilizadas por terapeutas auditivas, y los resultados de los pacientes pediátricos bilingües que tienen implantes cocleares. Cada una de estas áreas se examinarán en este capítulo para proporcionar el contexto y dirección para este estudio.

### **La habilitación auditiva**

La habilitación auditiva incluye una gama de servicios de tratamiento proporcionados a las familias con sus niños que tienen una pérdida de audición prelocutiva. El propósito de estos servicios es el desarrollo de las habilidades auditivas, verbales, y lingüísticas a través de la audición residual del niño (Johnson, 2012, pp. 348-349). Aunque audiólogos se ven como los líderes en asuntos relacionados con la audición, un enfoque equipal es generalmente adoptado, usando una variedad de profesionales médicos y los padres del niño (Johnson, 2012, p. 87). El principal objetivo del equipo es reducir los efectos negativos de la pérdida de audición del paciente y promover el conocimiento de la lengua hablada (Johnson, 2012, p. 7). Hoy en día, la mayoría de los padres eligen un medio de comunicación basada en el escuchar y hablar para sus niños que son los receptores pediátricos de implantes cocleares porque 92% de los niños con una discapacidad auditiva nacen de dos padres que tienen audición típicas (Mitchell & Karchmer, 2004, p. 17). En cualquier caso, debe tenerse en cuenta que también existen otras “oportunidades” de comunicación.

### **Medios de comunicación/Oportunidades comunicativas**

Hay una multitud de medios comunicativos disponibles para la enseñanza de los niños que son sordos o tienen alguna pérdida auditiva (Madell & Flexer, 2008, p. 205). Algunos de estos medios son de naturaleza auditiva, mientras que otros son principalmente visuales. Una gran oportunidad de la comunicación visual es la enseñanza de la Lengua de Señas Estadounidense (LSE). LSE es un idioma manual y visual, que tiene sus propias estructuras

gramaticales y lingüísticas, utilizadas principalmente en las comunidades sordas en los Estados Unidos (Beginnings, n.d., párr. 1; MED-EL, n.d. b, párr. 3). Para los que utilizan LSE, el inglés es adquirido como una segunda lengua (ASL) y para algunos miembros de la comunidad sorda, no hay ninguna enseñanza de inglés (Beginnings, n.d., párr. 1; MED-EL, n.d. b, párr. 3). LSE destaca la creación de una comprensión básica del lenguaje en general, que ofrece oportunidades para aquellos que quieren aprender inglés como ASL (Beginnings, n.d., párr. 2). No obstante, las implicaciones del aprendizaje de inglés como ASL es un poco polémico. En una investigación realizada por Kumar y sus colegas (2009), los niños que fueron expuestos predominantemente a un lenguaje manual al mismo tiempo que un poco de lenguaje oral no adquirieron el lenguaje con la misma rapidez que los niños monolingües de audición típica (p. 142). Estos niños generalmente sacaron mejores notas en el vocabulario y la gramática en el lenguaje manual que en el lenguaje oral, independientemente de lo que fueron expuestos predominantemente (Pág. 142).

El objetivo principal de los que usan LSE es el desarrollo de habilidades de comunicación apropiadas para su edad y escribir inglés (Beginnings, n.d., párra.1; MED-EL, n.d. b, párra. 2). LSE proporciona una oportunidad para algunos que son sordos o con pérdidas auditivas para formar una identidad en la comunidad sorda sin la necesidad de amplificación a través de audífonos o la estimulación eléctrica por los implantes cocleares (Beginnings, n.d., párra. 4; MED-EL, n.d. b, párra. 5). Para los que tienen tecnología auditiva, LSE probablemente no es el medio de comunicación seleccionado; sin embargo, LSE es una opción viable para los individuos que optan por no recibir la ayuda de tecnología auditiva y tienen fuertes lazos con la comunidad sorda.

Otra oportunidad de comunicación que conecta la identidad de la cultura sorda mientras que integra y establece una identidad dentro del “mundo auditivo” se conoce como *Bilingüe-Bicultural (Bi-Bi)*. Bi-Bi enfatiza un enfoque bilingüe en la lengua, que incluye el desarrollo y uso de LSE como la lengua nativa y el inglés como ASL (Beginnings, n.d., párr. 1; Gallimore, 1996, p. 91; Madell & Flexer, 2008, p. 207). Esta práctica de ambos idiomas permite al niño identificarse con la comunidad sorda y el “mundo auditivo” (Beginnings, n.d., párr. 5; Gallimore, 1996, p. 92; Madell & Flexer, 2008, p. 207). Existen algunas limitaciones en el uso de Bi-Bi sin embargo, estas giran principalmente alrededor del hecho de que los programas de enseñanza educativa de este medio de comunicación a menudo no tienen usuarios con fluidez y dominio de LSE (Gallimore, 1996, p. 93). Como resultado, los estudiantes no desarrollan competencia de LSE o inglés con la misma fluidez. Los profesores también necesitan ser conscientes de la sensibilidad cultural de los usuarios de Bi-Bi debido a su afiliación con la comunidad sorda (Gallimore, 1996, p. 93).

Más allá de las opciones de comunicación visual o manual como ASL y Bi-Bi, hay medios de comunicación que combinan ambos sistemas de comunicación manual y oral. Una de las oportunidades de comunicación combinada para los niños que son sordos o con pérdidas de audición se llama la *Comunicación Total (CT)*. La filosofía de comunicación total es usar todos los medios necesarios para comunicarse con el niño sordo o con la pérdida auditiva (Madell & Flexer, 2008, p. 207; MED-EL, n.d. b, párr. 1). Este modo de comunicación combina un sistema de una lengua de signos (p. ej., LSE o Manually Coded English [MCE])<sup>9</sup> *fingerspelling*<sup>10</sup> (alfabeto manual), lectura, lenguaje corporal, gestos naturales, lengua hablada, y exposición de amplificación para el niño (Beginnings, n.d., párr. 2; Bodner-Johnson, 1996, p. 210; MED-EL,

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<sup>9</sup> Inglés Codificado Manualmente (ICM)

<sup>10</sup> la ortografía de dedos



n.d. b, párr. 1). El propósito principal de este método de comunicación es darle al niño más oportunidades para comunicarse con los demás alrededor de él/ella, mientras utilizar todos los sentidos disponibles y recursos para ayudarlo (Bodner-Johnson, 1996, p. 211; Madell & Flexer, 2008, p. 207; MED-EL, n.d. b, párr. 2). Aunque al niño se le dan todas las herramientas necesarias para aprender a hablar inglés, se recomienda que los miembros de la familia todavía aprenden la forma manual de comunicación (p. ej., LSE) para apoyar al niño en su forma primaria de comunicación (Bodner-Johnson, 1996, p. 214; MED-EL, n.d. b, párr. 6).

Otro método de comunicación combinado se llama habla la Palabra Complementada (PC). La PC es un sistema de comunicación visual que combina inglés con ocho formas de mano para representar grupos de consonantes y cuatro posiciones cerca de la boca que simbolizan los vocales (MED-EL, n.d. b, párr. 1; Madell & Flexer, 2008, p. 207; Williams-Scott, 1996, p. 118). Estas formas de mano y colocaciones en combinación con la lengua hablada ayuda a los niños no sólo para escuchar, sino también ver cada fonema individual del altavoz (Beginnings, n.d., párr. 2; Madell & Flexer, 2008, p. 207; Williams-Scott, 1996, p. 119). Estas pistas ayudan a clarificar *speechreading*<sup>11</sup>, que es normalmente un método claro de comprender lo que otra persona está diciendo (Williams-Scott, 1996, p. 119). La lectura articulada es una técnica de comprender mediante la interpretación de los movimientos visuales de los labios, cara, y lengua del altavoz (Gallimore, 1996, p. 92). Estas señales de discurso ayudan a desarrollar habilidades lingüísticas y sintácticas necesarias para que estos niños se integren en la comunidad auditiva (MED-EL, n.d. b, párr. 2). Este método de comunicación recomienda el uso de amplificación para darle la máxima oportunidad para usar su audición restante (MED-EL, n.d. b, párr. 5). Aunque los logopedas y terapeutas enseñan a los padres como pueden usar la PC con su hijo,

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<sup>11</sup> la lectura articulada

los padres deben ser los profesores de PC con en hijo/a y se espera que usen este medio de comunicación en todo momento para ayudar al niño a distinguir entre fonemas (MED-EL, n.d. b, párr. 6). En comparación con otros métodos de comunicación combinados, los medios de comunicación verbal dependen exclusivamente del uso de la lengua verbal.

Una forma importante de comunicación de lengua oral o verbal es el enfoque auditivo-oral. El medio de comunicación auditiva-oral hace hincapié en que el niño usa su audición residual o “eléctrica” mediante tecnologías auditivas tales como audífonos e implantes cocleares, mientras que también con la lectura del hablar para promover la mejor comprensión de la persona que está hablando (Madell & Flexer, 2008, p. 207; MED-EL, n.d. b, párr. 1). Por lo general los principales puntos de énfasis de este enfoque es que al participar en la conversación, el niño con la pérdida auditiva sólo utilice la lengua hablada (Gatty, 1996, p. 163). Aunque el uso de gestos con las manos natural puede ayudar, no hay ningún estímulo de cualquier tipo de lenguaje formal manual (Madell & Flexer, 2008, p. 207; MED-EL, n.d. b, párr. 1). Estadísticas muestran que más del 90% de los niños que nacen con alguna discapacidad auditiva severa a profunda, tienen dos padres que oyen típicamente (Gatty, 1996, p. 168). Por lo tanto, este medio de comunicación es lógico para un niño, por ejemplo, que recibe un implante coclear debido al hecho que la gran mayoría de los niños que reciben estos aparatos son de familias cuyos padres no son sordos o con algunas pérdidas auditivas. Teniendo en cuenta uno de los aspectos más importantes de desarrollo de la comunicación es la exposición constante y la fluidez de la lengua de los padres del niño, para muchos, el enfoque auditivo-oral tiene sentido para aquellos que no usan un sistema de comunicación manual.

El último medio de comunicación principal del tema “oral” o hablado se conoce como el enfoque auditivo-verbal. El enfoque comunicativo auditivo-verbal tiene el énfasis más fuerte en

la enseñanza auditiva para la comunicación (Johnson, 2012, p. 288; Madell & Flexer, 2008, p. 207). Este método de comunicación anima a los niños con pérdidas auditivas a utilizar solamente su audición residual, amplificación, o audición eléctricamente auxiliado a entender lo que está diciendo (Johnson, 2012, p. 288). El logopeda o la terapeuta a menudo cubre su boca para acentuar el punto que los niños no deben confiar en señales visuales como la lectura articulada para comprender la conversación. Como resultado, los terapeutas están enseñando al individuo como puede aumentar la fuerza de su audición y su habilidad de escuchar (Estabrooks, 1996, p. 54; Johnson, 2012, p. 288; Madell & Flexer, 2008, p. 207). El objetivo principal del enfoque auditivo-verbal es desarrollar sus capacidades auditivas y orales mediante el uso de la audiencia asistida sola, con el fin de integrar al niño en la comunidad del escucha y habla (MED-EL, n.d. b, párr. 2). El enfoque auditivo-verbal intenta anima a los niños a ganar competencia conversacional a través del lenguaje hablado y escuchado y además, que tienen acceso a un entorno educativo típico y una cantidad ilimitada de oportunidades educativas y sociales para el resto de sus vidas (Estabrooks, 2012, p. 2; Madell & Flexer, 2008, p. 207). Para asegurar que el niño tenga todos los resultados positivos de este medio de comunicación, los médicos profesionales y los padres trabajan juntos para crear un ambiente estimulante para el niño (Estabrooks, 2012, p. 4).

### **Terapia auditiva-verbal**

Las sesiones de terapia auditiva-verbal se consideran sesiones diagnósticos en las que un niño y sus padres progresan en el aprendizaje de cómo interactuar en un entorno centrado en escuchar y hablar (Estabrooks, 1996, p. 54). Los objetivos generales para los niños en la terapia tienen dos funciones mayores. La primera es que la audición tiene que ser integrado en la vida cotidiana y el desarrollo personal del niño con la pérdida auditiva independientemente de la

severidad de la pérdida auditiva o la tecnología el niño utiliza. Por otro lado, el crecimiento del niño en la terapia se pretende preparar al niño para la máxima participación e independencia en un entorno educativo típico, en lugar de una educación “especial” (Estabrooks, 1996, p. 54; Pollack, Goldberg & Caleffe-Schenck, 1997, p. 39). En última instancia, el lenguaje hablado y escuchado que el niño aprende debe incorporarse en todos los aspectos de desarrollo personal, social y académico del niño (Estabrooks, 2012, p. 2).

**Principios de la terapia auditiva-verbal.** Favor de consultar el Apéndice A para más detalles sobre los 10 principios fundamentales de la terapia auditiva verbal (Alexander Graham Bell Association for the Deaf and Hard of Hearing [AG Bell], 2007; Pollack, 1970).

**Participación de los padres.** Todos los clínicos auditivo-verbales están de acuerdo, los padres tienen el papel más importante en el éxito de su hijo en su capacidad para usar el lenguaje hablado y escuchado porque ellos siempre están con el niño; mientras que el terapeuta auditivo-verbal tiene lugar sólo con el niño por lo general una hora por semana (Estabrooks, 1996, p. 57; Estabrooks, 2012, p. 4; Johnson, 2012, p. 288). A menudo, la terapia auditiva verbal se conoce como un *enfoque centrado en la familia* debido a su importante dependencia de los padres para centrarse en el desarrollo del lenguaje hablado y escuchado de sus hijos (Estabrooks, 2012, p. 4; Madell y Flexer, 2008, p. 207). Al trabajar con terapeutas auditivo-verbales y otros profesionales, los padres aprenden a crear un ambiente enriquecido con sonidos y el aprendizaje que permite al niño a practicar sus habilidades relacionadas con la audición, el habla, el lenguaje, la cognición, y la comunicación y alcanzan sus metas específicas (Estabrooks, 1996, p. 56). Durante las primeras pocas sesiones entre el terapeuta auditivo verbal, los padres, y el niño, es importante elegir un medio de comunicación para el niño a desarrollar objetivos realistas para el futuro del niño (Pollack et al., 1997, p. 279). Como se mencionó anteriormente, los niños

aprenden mejor a través del aprendizaje incidental en un ambiente informal y relajado, todo lo cual imita el ajuste de la terapia auditiva verbal (Estabrooks, 2012, p. 4; Genesee, 2008, p. 21). La Tabla 3 proporciona alguna información específica acerca de las responsabilidades de los padres durante las sesiones de terapia auditiva-verbal y el programa auditivo-verbal en general

Tabla 3

*Responsabilidades de los padres en un programa auditivo-verbal*

<u>Responsabilidades: En la sesión</u>	<u>Responsabilidades: En general</u>
<ul style="list-style-type: none"> <li>· Modelar técnicas para estimular algún discurso, lenguaje, y comunicación en las rutinas diarias</li> <li>· Comunicarse como socios en ejercicios terapéuticos y educativos</li> <li>· Discutir y practicar técnicas apropiadas de manejo del comportamiento</li> <li>· Anotar y discutir el progreso</li> <li>· Informar a los profesionales de los intereses y capacidades del niño</li> <li>· Preparar al niño socialmente</li> <li>· Hacer preguntas de aclaración</li> </ul>	<ul style="list-style-type: none"> <li>· Planifica estrategias para integrar la escucha, el habla, el lenguaje y la comunicación en las rutinas diarias</li> <li>· Mantener los audífonos o implantes cocleares en una condición buena y limpia</li> <li>· Aprender todo lo posible sobre la pérdida de la audición, amplificación, etc.</li> <li>· Interpretar los objetivos de corto y largo plazo</li> <li>· Llegar a todas citas y hacer todas las tareas</li> <li>· Enseñar autodisciplina</li> <li>· Aplicar estrategias de afrontamiento cuando sea necesario</li> </ul>

(Adaptado de Estabrooks, 2012, p. 4; Pollack et al., 1997, p. 281).

**Técnicas de la terapia auditiva-verbal.** Los especialistas del lenguaje hablado y escuchado enseñan a los padres una variedad de diferentes técnicas para fomentar el crecimiento del niño en la comunicación de la lengua hablada y escuchada. En el núcleo de la terapia auditiva verbal, hay por lo menos cuatro prácticas fundamentales utilizadas por terapeutas auditivo-verbales para ayudar a enseñar al niño las habilidades de escuchar y hablar. La primera técnica importante es utilizar “mensajes de escucha” en las sesiones de terapia y a lo largo de la vida cotidiana del niño. Esta práctica pretende llamar la atención del niño al altavoz y localizar de qué dirección proviene el sonido. El terapeuta auditivo-verbal se señalan a menudo a su oreja para

indicar al niño que es el momento de prestar atención y centrarse en lo que dijo (Goldberg, 2013, p. 1).

Una práctica común adicional de la terapia es modelar y tiene los 6 sonidos de Ling cada día. Los 6 sonidos de Ling son sonidos (/m/, /u/, /i/, /a/, /f/, /s/) que representan un rango de diferentes frecuencias o tonos (Ling, 2012, p. 59). Estos sonidos fueron diseñados para probar la gama auditiva de un niño con pérdida auditiva y asegurar que el niño tiene acceso a todos los sonidos del discurso necesarios para aprender el lenguaje hablado (HOPE: Cochlear (Re)habilitation Resources, 2014, p. 1; Ling, 2012, p. 59). El terapeuta o uno de los padres inicialmente se supone presentar cada sonido individualmente al niño unas pocas pulgadas de su micrófono con una voz conversacional y en un ambiente tranquilo y calmado (HOPE: Cochlear (Re)habilitation Resources, 2014, p. 2). Cuando el niño mejora su distinción entre los sonidos usando solamente su audición y sin ningunas pistas visuales, el profesional o uno de los padres puede aumentar la distancia de presentación a 3 pies, 6 pies, y finalmente 9 pies (HOPE: Cochlear (Re)habilitation Resources, 2014, p. 2, Ling 2012, p. 59).

Otra técnica de terapia utilizada generalmente en la práctica auditiva-verbal es el uso de los sonidos asociados de “Aprender a escuchar”. Estos sonidos corresponden a imágenes u objetos asociados con variaciones en la duración, intensidad, y frecuencia y le exponen al niño a una variedad de sonidos diferentes (Cochlear, 2005, p. 13). Algunos ejemplos de sonidos comunes son “aaahhh” para un avión, “choo choo” para un tren, “bip bip bip” para un coche, “miau” para un gato y “baaa” para una oveja (Cochlear, 2005, p. 72). Los profesionales y los padres a menudo harían un libro “Aprender a escuchar” para el niño, que cuenta con grandes fotografías coloridas de los objetos que representan el sonido que hace (Goldberg, 2013, p. 1). Otra opción es colocar algunos objetos por la casa en lugares que son fáciles de ver para el

niño, que le permite estar inmerso constantemente en un ambiente lleno de diferentes sonidos “asociados” (Cochlear, 2005, p. 95). También, desarrollando un “Libro de experiencias” para el niño es una manera eficaz de discutir verbalmente acontecimientos en su vida (Goldberg, 2013, p. 2; Sindrey, 2012, p. 142). Un “libro de experiencias” efectivamente involucraría a un niño dirigiéndose a palabras, frases, y oraciones que son significativas para él/ella relacionadas con eventos, premios, o actividades diarias (Sindrey, 2012, pp. 142-143). Este tipo de libro también puede ser útil para el desarrollo de la comprensión de un niño de una secuencia de acciones en un evento, o *esquema* (Sindrey, 2012, p. 143). Estos libros pueden utilizarse eventualmente como elementos de estímulo para los padres con sus hijos así que él/ella puede describir lo que sucede en la trama del libro, sino también, practicar sus habilidades de turnos en la conversación (Sindrey, 2012, p. 145). En última instancia, estos estímulos se utilizan para promover la conciencia en el niño de los sonidos ambientales y actividades alrededor de él/ella en un ambiente interactivo y divertido.

Otra técnica de terapia utilizada en las sesiones auditivas-verbales incluyen responder a todos las vocalizaciones y verbalizaciones del infante o niño (Goldberg, 2013, p. 1). Esto asegura que el niño sabe que él/ella está siendo recompensado/a o reforzado/a de cualquier producción verbal. Aunque las anteriores son algunas de las técnicas de la terapia mayores utilizadas en práctica auditiva-verbal, la Tabla 4 ofrece una lista adicional de otros procedimientos comunes y técnicas utilizadas en muchas sesiones auditivas-verbales.

Tabla 4

*Técnicas en terapia auditiva-verbal*


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<u>Señales clínicas y parentales utilizados en el enfoque auditivo verbal</u>	
<ul style="list-style-type: none"> <li>· Entrenamiento de los padres como los modelos primarios para escuchar y hablar</li> <li>· Narrar la vida como sucede cuando el niño no tiene las palabras</li> <li>· Pide al niño, “¿Qué has oído?” en lugar de repetir los estímulos</li> <li>· Redacta, proporciona alternativas, y repite información previamente escuchada</li> <li>· Regresar a señales de la lengua hablada inmediatamente después de una pista diferente</li> <li>· Dirigir al niño a “¡Escuchar!”</li> </ul>	<ul style="list-style-type: none"> <li>· Responder con lenguaje hablado a gestos faciales</li> <li>· Prestando <i>acústica subrayada</i>: susurrando, cantando, etc.</li> <li>· Acercándose al micrófono del niño al hablar</li> <li>· Espera para la respuesta del niño para continuar la conversación</li> <li>· Utilizando diferentes <i>técnicas de distracción visual y ganchos auditivos</i></li> <li>· Utilizando la <i>señal de mano</i>: que cubre la boca para asegurar sólo señales auditivas</li> </ul>

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(Adaptado de Estabrooks, 1996, págs. 59-60; Estabrooks, 2012, pp. 4-5)

**Resultados auditivo-verbales.** Recientemente, se han realizado varios estudios para ver si los niños que tienen implantes cocleares que usan el medio de comunicación auditiva-verbal realmente son las dos opciones más adecuadas para los niños con alguna discapacidad auditiva profunda. Un estudio examinó las percepciones de los miembros de la familia de sus calidades de vida después de la identificación temprana de la sordera en su niño. Un análisis de los datos demostraron que los familiares de los niños con implantes cocleares y el lenguaje hablado y escuchado estaban más satisfechos con el progreso de su niño en la percepción de la claridad y la expresión que los miembros de la familia de los niños sordos que usa un lenguaje manual (Jackson, Wegner, & Turnbull, 2010, p. 203).



En otro estudio realizado por Black y sus colegas (2011), reseñó sistemáticamente los factores pronósticos que influyen los resultados de los niños con pérdida auditiva que han recibido implantes cocleares (p. 67). Los resultados sugirieron que los niños que usan la comunicación oral o verbal demuestran niveles más altos de rendimiento auditivo y lenguaje que los niños que utilizan la comunicación total (p. 73). Semejantemente, en un artículo publicado por Archbold y sus colegas (2006) sobre las perspectivas de los padres en el proceso de implantación tres años después de que su hijo/a recibió un implante coclear, los padres están de acuerdo que debe hacerse hincapié en idioma hablado y escuchado, aunque la lengua manual puede ser útil durante los períodos de transición (p. 204).

Dornan y sus colegas (2010) organizaron un estudio longitudinal evaluando si la terapia auditiva-verbal es eficaz para los niños con pérdida auditiva. El estudio evaluó los resultados de lenguaje y del habla para niños con hipoacusia en un programa auditivo- verbal en comparación con un grupo control de compañeros de la audición típica (p. 365). Los resultados no mostraron diferencias significativas entre los grupos del habla, el lenguaje, y la autoestima (pp. 376-377). Puntuaciones de lectura y matemáticas, sin embargo, fueron comparables entre los grupos, concluyendo que la terapia auditiva- verbal es una opción de comunicación efectiva para esta población de niños con pérdida auditiva (p. 378).

En otro estudio, los niños con pérdidas auditivas que sólo habían recibido 20 semanas de la terapia auditiva-verbal mejoraron significativamente en la percepción del habla, producción del habla, y lenguaje receptivo habilidades (Fairgray, Purdy, & Smart, 2010, p. 430). Por último, cuando se compararon tres grupos bien emparejados de los niños que usan implantes cocleares sobre cómo sus métodos de comunicación (p. ej., auditivo-verbal, auditivo-oral y bilingüe-bicultural) impactaron su percepción del habla y lenguaje, los resultados apoyaron un énfasis

constante en el lenguaje hablado y escuchado para obtener los mejores resultados (Dettman, Wall, Constantinescu, & Dowell, 2013, pp. 456-457).

**Terapia auditiva-verbal conclusión.** Aunque el enfoque auditivo-verbal es el método seleccionado en el presente estudio, esto no indica de ninguna forma que este método es la única o necesariamente el mejor medio de comunicación para todos los niños con pérdidas auditivas. Para este estudio en particular, este método fue seleccionado para resaltar su importancia y relevancia para la población que reciben implantes cocleares. Además, el enfoque auditivo-verbal no intenta negar de ninguna manera el impacto psicológico y emocional que la sordera puede causar en los padres de los niños que tienen alguna pérdida de audición (Pollack et al., 1997, p. 39). El propósito del enfoque no es provocar que el niño con la pérdida auditiva sienta que él/ella tiene que ser lo mismo que sus pares con audición típica porque francamente, el niño con la pérdida auditiva no es “especial” (Pollack et al., 1997, p. 39). La pérdida de la audición del niño, sin embargo, no puede ser un factor que define quién es como persona. La terapia auditiva-verbal o práctica proporciona a los padres y los niños con pérdidas auditivas una opción de integrarse a un mundo que no era posible antes de programas del cribado universal y el desarrollo de la tecnología; lo que resulta es en una oportunidad para ser parte de un mundo oyente (Pollack et al., 1997, p. 39).

### **Adquisición de dos idiomas**

Para los niños con implante cocleares, las implicaciones de la adquisición de una lengua que hace hincapié en escuchar y el lenguaje hablado es notablemente difícil. Para los niños, sin embargo, que crecen de orígenes culturas lingüísticamente diversos, es más común que estos niños tienen que aprender no sólo su lengua nativa, pero también inglés. La siguiente sección examina las teorías del bilingüismo cuando tiene un implante coclear.

## Teorías del bilingüismo

Uno de los retos más difíciles para los niños que son criados escuchando dos lenguas, es crear un sistema neural lingüístico que les permite recordar instantáneamente ambos idiomas (Gardner-Chloros, 2009, p. 124; Montrul, 2013, p. 166). Para que los niños desarrollen esta red neuronal, la calidad y cantidad de estímulos de habla que oye el niño es esencial para su crecimiento en los dos idiomas (Montrul, 2013, p. 165; Silva-Corvalán, 2014, p. 17). Los niños bilingües pueden reconocer correctamente los sonidos de ambas lenguas (Montrul, 2013, p. 165). Por lo cual plantea una pregunta importante, ¿los recién nacidos perciben ambos idiomas como uno o son capaces de distinguirlos como dos idiomas separados desde una edad joven?

Durante años, dos hipótesis principales han dominado el campo de la memoria bilingüe. La primera hipótesis, conocida como la *compartida o memoria hipótesis de interdependencia* propone una estructura bilingüe en que dos lenguas del individuo se almacenan en una memoria del cerebro (Altrarriba & Heredia, 2008, p. 41). Este modelo especula que las palabras de ambos idiomas se almacenan como conceptos-gratis, sugiriendo que las palabras y las etiquetas tienen un significado singular (Altrarriba & Heredia, 2008, p. 41; Montrul, 2013, p. 169). Con el fin de identificar palabras en el lenguaje apropiado, existe algún mecanismo de “agregar”, que ayuda a distinguir la palabra apropiada en el momento de recuperación (Altrarriba & Heredia, 2008, p. 41). La *hipótesis de memoria independiente o independencia* contrasta la hipótesis compartida. La hipótesis independiente postula que dos idiomas de bilingüe se organizan en dos memorias independientes con información para un idioma no disponible para los otros (Altrarriba & Heredia, 2008, p. 45; Gardner-Chloros, 2009,

p. 142; Montrul, 2008, p. 169). La única interacción entre los dos idiomas es a través de procesos de traducción.

### **Efectos socioculturales del bilingüismo**

En la sociedad moderna, las personas se encuentran con una pluralidad de identidades con las que se pueden asociar. La complejidad de nuestra estructura social proporciona a las personas la oportunidad de identificarse con una variedad de grupos sociales a base de unas categorías como la raza, la etnia, la orientación/preferencia sexual, el idioma, la religión, entre muchos otros. Para muchas personas que pertenecen a una población minoritaria, especialmente aquellos que han inmigrado recientemente a los Estados Unidos, la sociedad dicta y clasifica sus identidades con una narrativa oficial y rígida.

### **La aculturación social hispánica**

A lo largo de la mayor parte de los siglos 20 y 21, los científicos sociales han teorizado acerca de los procesos de asimilación de los inmigrantes con el fin de incorporarse en el tejido social de los Estados Unidos. Las investigaciones sobre estos procesos, debido a la Ley de Inmigración de 1965 entre otras, han tomado nota de los flujos de las primeras generaciones de europeos, asiáticos y etnias africanas durante las olas migratorias a los Estados Unidos (Portes & Zhou, 1993, p. 75). De acuerdo con las tendencias raciales y étnicas en las estadísticas migratorias, la población migratoria más grande y de mayor crecimiento ha venido de las regiones de América Central y del Sur a finales del siglo XX hasta los principios del siglo XXI (U.S. Census Bureau, 2010, p. 2).

Los inmigrantes hispanos están involucrados en las transiciones culturales -como resultado de la migración- ya que deben aprender los matices de las normas sociales, sus presiones intrínsecas, y también los estándares sociales asociados con los Estados Unidos

(Padilla & Pérez, 2003, p. 42). Portes y Zhou (1993) que observaron al pasar por la adolescencia en una familia de inmigrantes conlleva cargas difíciles debido a las "demandas sociales y culturales conflictivos mientras se enfrentan al reto de situarse en un mundo desconocido y frecuentemente hostil" (p. 75).

Debido a la índole multifacética de la cultura, hay varios factores (por ejemplo, sociales, económicos, de comportamiento, cognitivos, psicológicos, religiosos y lingüísticos) con que cada hispano se enfrenta cuando decide cómo aculturarse a la vida en los Estados Unidos (Roitman, 2009, p. 2). La aculturación psicológica se entiende como las transformaciones internas que experimenta el inmigrante al tener contacto con la gente de la cultura de acogida (Padilla & Pérez, 2003, p. 35). La aculturación es un proceso mutuo y co-dependiente, que cuenta en gran medida con la relación de poder entre los grupos dominantes y no dominantes. Por ejemplo, los prejuicios del grupo dominante y sus prácticas discriminatorias son unos factores determinantes en si el grupo no-dominante puede mantener su propia cultura y al mismo tiempo participar en la cultura dominante (Padilla & Pérez, 2003, p. 39).

Cada individuo debe establecer su propia identidad étnica con el fin de determinar hasta qué punto está dispuesto a aculturarse. Según la argumentación de Phinney (1991), la identidad étnica es una construcción utilizada para aclarar la auto-identificación (por ejemplo, las actitudes acerca de formarse parte del grupo, el nivel de su conocimiento étnico y los comportamientos étnicos y sus prácticas) dentro de un grupo en particular (Négy, Shreve, Jensen, & Uddin, 2003, p. 334). Hay tres etapas involucradas en el desarrollo de la identidad étnica. En la etapa inicial, no se analizan la etnia y los sistemas de valores del individuo ya que corresponden a la juventud y adolescencia. La segunda etapa es un período en que las personas se interesan más por la historia, las tradiciones, costumbres o prácticas de su grupo étnico. La fase final, se basa en una

auto-valoración positiva de uno mismo dentro de su grupo étnico además de conocer su situación colectiva como grupo. (Ghavami et al., 2011, p. 80; Phinney, 1996, p. 921).

Una vez que alguien ha establecido un entender concreto de su propia identidad étnica, el proceso de transición continua a sus preferencias al nivel de grupos étnicos. Por lo general, estas percepciones de otros grupos se atribuyen a algún tipo de competencia cultural. La competencia cultural se refiere a la “learned ability to function in a culture in a manner that is congruent with the values, beliefs, customs, mannerisms, and language of the majority of the members of the culture” (Padilla & Pérez, 2003, p. 42)<sup>12</sup>. A pesar de tener cierto nivel de competencia cultural *a priori* para ser respetado de la cultura de origen, la percepción de cada individuo sobre los prejuicios y el etnocentrismo afecta el nivel en que alguien está dispuesto a aculturarse. El prejuicio es un tipo de juicio preformado y no corroborado que denota una actitud irracional u hostil hacia los miembros de otro grupo racial o étnico (Funk & Wagnalls, 2014, p. 1). Las referencias etnocentristas se aplican a las normas decididas de un grupo sobre otro grupo y para juzgarlos como inferiores o menos valiosos si todas las normas no se cumplen (Négy et al., 2003, p. 335).

**Cambio de código.** El cambio de código, se produce cuando un individuo bilingüe habla un idioma y luego cambia a otro (Altarriba & Herida, 2008, p. 86; Garder-Chloros, 2009, p. 20). Hay una variedad de razones sociales, culturales y lingüísticas que provoca el cambio de código en la conversación (Altarriba & Herida, 2008, p. 86). Por ejemplo, si una persona cambia de código en una conversación puede que esté compensando por su falta de competencia lingüística en un idioma, al reemplazarlo con otro lenguaje que domine mejor. Para muchos hispanos que

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<sup>12</sup> ...“capacidad aprendida a desenvolverse en una cultura de una manera que sea congruente con los valores, creencias, costumbres, gestos y el lenguaje de la mayoría de los miembros de la cultura” (Padilla & Pérez, 2003, p. 42).

usan el idioma español como parte de su identidad cultural, el cambio de código podría significar simplemente que prefieren hablar su idioma nativo en vez de cualquier otro (Altarriba & Herida, 2008, p. 87; Garder-Chloros, 2009, p. 142 ).

### **Las teorías de la aculturación**

Estos procesos sociales cognitivos de aculturación provocaron la producción de dos grandes teorías sobre cómo las identidades étnicas dan forma a las percepciones de un individuo, los grupos y las relaciones intergrupales. En un estudio sin precedentes de 1986, Tajfel y Turner formaron la idea de la Teoría Social de la Identidad (TSI), que hace hincapié en cómo el comportamiento individual refleja unidades sociales más grandes de los individuos (Tajfel & Turner, 1986, pp. 15-16). Por consiguiente, los miembros del grupo consideran que su grupo es especial o distinto a los otros grupos y tratan de preservar su carácter distintivo con el fin de mantener una identidad social positiva (Négy et al., 2003, p. 336; Padilla & Pérez, 2003, p 42.).

Por ejemplo, si los hispanos demuestran un cierto nivel de inglés con acento hispanohablante y aceptan esta teoría, sería menos probable la aculturación, ya que la estigmatización negativa a causa de sus producciones de habla acentuada persistirán independientemente de su competencia cultural (Padilla & Pérez, 2003, p. 43). Contrariamente, el acercamiento multicultural postula que los individuos que tienen una sensación positiva de su propia identidad cultural y étnica demuestran actitudes positivas hacia otros grupos tanto como una mayor autoestima (Berry, 2011, p. 6). A partir de esta teoría, se considera un alto nivel de identidad étnica como lo ideal para reflejar una aceptación mayor de los otros grupos sociales (Phinney, 1996, p. 926).

El lenguaje es un aspecto vital de la identidad étnica. Contribuye a muchas características de un individuo: a nivel de la socialización, a nivel emocional, de comportamiento, y la auto-

regulación social (Dale, 1996, p. 5). Tener en cuenta la lengua materna de un individuo es un factor importante que contribuye a la identidad étnica de alguien, los hispanos en los Estados Unidos a menudo se enfrentan a una decisión difícil; cuándo y en qué registro hablan español comparado con el inglés (Portes & Zhou, 1993, p. 88). Según Ghavami y sus colegas, las personas minoritarias que se identifican más fuertemente con su grupo minoritario reportan un mayor bienestar psicológico (Ghavami et al., 2011, p. 79).

No obstante, existe cierto debate en la literatura sobre cómo los atributos, tales como un acento en inglés, puede causar la estigmatización social, lo cual supone una amenaza de la seguridad y la sensación de valor personal de alguien (Padilla & Pérez, 2003, p. 49). Por ejemplo, el idioma más común que se habla en la mayoría de las instituciones de educación pública es el inglés en los Estados Unidos. Como resultado, a los que hablan otro idioma o demuestran una producción acentuada de inglés (que indica que es no-nativo hablante) la gente les trata como “bebés”, debido a su diferencia de entonación (Cavazos-Rehg & DeLucia-Waack, 2009, p. 47). Los estigmas relacionados con los niños hispanos con acentos no se ocultan con facilidad y hacen más difícil el proceso de hacer frente a los estereotipos y prejuicios de sus colegas. Por lo tanto, muchos individuos a menudo auto-monitorean su comportamiento, vestimenta, y la manera en que hablan con la intención de recibir mayor respeto social por sus compañeros del grupo dominante (Padilla & Pérez, 2003, p. 45).

### **Sistemas de educación bilingüe**

Debido a la creciente diversidad étnica y racial en los Estados Unidos, los sistemas educativos públicos han tenido que adaptarse a las características demográficas sociales las cuales siempre evolucionan. La mayoría de los niños hispanos que están aprendiendo inglés (ELL) comienzan a sus estudios al entrar en preescolar/pre-kínder (Gutiérrez-Clellen, Simon-



Cereijido, & Sweet, 2012, p. 64). Una transformación escolar que se ha implementado para ayudar con este problema fue el establecimiento de la educación bilingüe (Cavazos-Rehg & DeLucia-Waack, 2009, p. 47). Los programas de educación bilingüe apoyan un enfoque pedagógico basada en la enseñanza en dos idiomas, generalmente el inglés junto con otro idioma dominado por el estudiante. El objetivo es desarrollar el dominio del idioma primario y el inglés, mientras que se profundizan los conocimientos de su herencia étnica (Cavazos-Rehg & DeLucia-Waack, 2009, p. 47; Négy et al., 2003, p. 334). A menudo, la instrucción sobre la cultura de herencia del niño tiene la intención de fomentar una actitud positiva hacia su origen étnico, y se espera además que mejore su concepto de sí mismo. En contraste, los programas de inglés como segundo idioma (ESL) dirigen sus esfuerzos a mejorar el dominio limitado del inglés (LEP) para manejar mejor las habilidades académicas, sociales y culturales asociadas con el idioma inglés (Cavazos-Rehg & DeLucia-Waack, 2009, p. 47). Este recurso ha sido esencial para los niños hispanos, los cuales tienden a ser bilingües que hablan inglés-español con mayor frecuencia en comparación con sus padres inmigrantes recién llegados a los Estados Unidos. (Portes & Zhou, 1993, p. 78). Según el Centro Nacional de Estadísticas de Educación (NCES) en 2005, el 18,7% de la población estadounidense que supera los 5 años de edad habla un idioma en casa que no sea el inglés (p. 174). En 2003, el 40% de todos los estudiantes de las escuelas públicas se consideran parte de un grupo minoritario comparado con el año 1972 cuando solamente 22% de ellos formaron parte de un grupo minoritario (Perie, Grigg, & Donahue, 2005, p. 12). Este aumento se debe en gran medida al crecimiento de la proporción de estudiantes hispanos, que se estima constatando más de 19% de todos los estudiantes matriculados en los grados K-12 (Perie et al., 2005, p. 22).

Puesto que la adolescencia es un período crítico para el desarrollo de la identidad, los

estudiantes matriculados en programas de la educación bilingüe deben aprender y apreciar más su identidad étnica que los que están matriculados en la educación tradicional (Cavazos-Rehg & DeLucia-Waack, 2009, p. 48; Ghavami et al., 2011, p. 81) Varios estudios han examinado la relación entre la autoestima y la educación bilingüe, pero los resultados son contradictorios. Según Cavazos-Rehg y DeLucia-Waack (2009), los adolescentes hispanos en un programa de educación tradicional eran más propensos a la aculturación de los Estados Unidos que los adolescentes que se encontraban en un programa de educación bilingüe (p. 51). No hubo una fluctuación de estadística calculable entre los dos programas de educación respecto a los niveles de autoestima (Cavazos-Rehg & DeLucia-Waack, 2009, p. 51).

Otro estudio de Gutiérrez-Clellen y sus colegas (2012) indicó que un acercamiento pedagógico bilingüe de la enseñanza de idiomas en la educación preescolar demuestra efectos más positivos en comparación con un enfoque exclusivamente en inglés (p. 64). Al contrario, Huang (1992) examinó la competencia de español entre adolescentes estadounidenses de origen mexicano y su vinculación con la autoestima. Según sus resultados, el dominio de español no mejora de manera indiscriminada autoestima de los estudiantes de origen mexicano. Además, el establecimiento de una escuela con una alta proporción de estudiantes de minorías raciales y étnicas también facilita la función de dominio del español en la promoción de la autoestima de los niños estadounidenses de origen mexicano (p. 20).

Aunque existen resultados contradictorios sobre la autoestima de los hispanos en los Estados Unidos en los programas de educación bilingüe, no cabe la menor duda que ayuda a fortalecer su auto-concepto (Collins, 2014, p. 390). En el mundo post-moderno, la paradoja de vivir en un mundo sin fronteras, mientras, al mismo tiempo, afirmar las identidades étnicas, raciales, lingüísticas, etc. es algo contradictorio (Roitman, 2009, p. 2). La sociedad asocia a las

personas con grupos basados en las similitudes en vez de dejar que la opción sea elegida abiertamente por la persona, dado que, “El lenguaje es la identidad y la identidad es política” (Ramsdell, 2004, p. 166).

### **Asuntos multiculturales**

A medida que la población de los Estados Unidos sigue creciendo tanto en número como en diversidad, los profesionales en la comunicación audiovisual deben reconocer esta tendencia creciente y adaptarse a la población de clientes para mejor servirles (Moore, Prath, y Arrieta, 2006, p. 322). Sin embargo, hay una gran variedad de factores clínicos que uno debe considerar para proporcionar el tratamiento adecuado y efectivo (Katz y de Melo, 2012, p. 44). Hay aproximadamente 308,7 millones de personas que viven en los Estados Unidos, 50,5 millones de ellos son latinos / hispanos. Dicho grupo minoritario es el más grande del país que representa el 16,3% de la población total (U.S. Census Bureau, 2010, p. 2). La población hispana se triplicará en número para el año 2050 y los blancos / caucásicos ya no se considerarán la mayoría en cantidad numérica—perdiendo a una tasa de 47% de la población (Gans, 2013, p 34.).

Casualmente, existe una mayor prevalencia de la pérdida auditiva en la población pediátrica hispanoamericana en comparación con todos los demás grupos minoritarios, con el 10,3% proviniendo de hogares monolingües de habla hispana (Mehra, Eavey, & Keamy, 2009, p. 464; Ramkissoon & Khan, 2003, párr. 2).

Con esta tendencia creciendo a un ritmo tan rápido, un tema central que queda por estudiar son los trasfondos profesionales y personales de los terapeutas audio-verbales que, en mayor medida, no pertenecen a la misma diversidad cultural y lingüística de las familias que piden su ayuda (Rhoades et al., 2004, p. 290). No obstante, no se puede inculpar a los terapeutas audio-verbales por este problema. Ha habido recientemente algunos programas de postgrado que

están llevando a cabo una campaña para inculcar a su alumnado las normas culturales y lingüísticas para idiomas distintos del inglés (Douglas, 2011a, p. 5; Moore et al., 2006, p. 322).

A pesar de la falta de conocimiento, se espera que los médicos de audición tengan una competencia intercultural y lingüística con el fin de facilitar la terapia de la forma más eficaz posible (Douglas, 2011a, p. 5; Johnson, 2012, p. 61; Rhoades et al., 2004, p. 290). Los médicos también deben utilizar su conocimiento acerca de los niños que tienen problemas auditivos y aplicarlo a la información sobre el desarrollo típico de los niños bilingües (Douglas, 2011a, p. 5).

Aunque los datos sobre la información demográfica de los terapeutas audio-verbales no están disponibles actualmente, es importante tener en cuenta que existe una barrera lingüística significativa entre el terapeuta y el niño bilingüe (Rhoades et al., 2004, p. 290). Las barreras del idioma que a menudo se producen entre el terapeuta y el niño y su familia se están convirtiendo en un problema creciente y se plantea cada vez más con mayor frecuencia cuando las familias sólo hablan español. Como resultado, muchos terapeutas audio-verbales están encontrando su trabajo más difícil para ayudar adecuadamente a esta población creciente (Johnson, 2012, p. 68).

### **Barreras del idioma**

Las barreras del idioma entre el terapeuta auditivo-verbal y la familia de un niño con alguna pérdida auditiva pueden causar una variedad de diferentes asuntos. Algunos de estos obstáculos en la comunicación pueden provocar problemas que el niño y su familia tienen con el proceso de referencia, la programación de citas, la discusión sobre los asuntos del niño, la evaluación adecuada del niño, y aún las recomendaciones asociadas con el tratamiento (Douglas, 2011a, p. 7; Johnson, 2012, p. 55).

Desde la introducción del cribado universal de audición para los recién nacidos desarrollado por la Joint Committee on Infant Hearing (JCIH)<sup>13</sup> y programas de Early Hearing Detection and Identification (EHDI)<sup>14</sup>, se ha recomendado que todos los niños hacen una criba para detectar si ello tiene alguna pérdida de la audición dentro de 1 mes de edad; recibir un diagnóstico de hipoacusia por 3 meses de edad; y si es necesario, la intervención clínica debe ser por 6 meses de edad (Johnson, 2012, p. 56). Aunque estos programas muy valiosos fueron establecidos para diagnosticar y ayudar a las personas con pérdidas auditivas lo antes posible, muchas veces las barreras del idioma han causado que algunos padres de distintos orígenes culturales y lingüísticos no hayan entendido la importancia de la prueba diagnóstica, las consecuencias de la pérdida auditiva no tratada, y el significado de la programación y el seguimiento de la asistencia de las citas (Johnson, 2012, p. 56; Katz & de Melo, 2012, p. 45).

Las barreras del idioma además pueden resultar en una “desconexión” en la comunicación entre el terapeuta y los padres cuando los padres necesitan discutir varios temas que observan con sus hijos. Una herramienta que los terapeutas utilizan para obtener alguna información sobre sus clientes es un historial médico (Douglas, 2011a, p. 8). Un *historial médico* es un documento de evaluación normalmente utilizado para recoger información relevante del paciente en una manera organizada (p. 8). Por desgracia, los historiales médicos no siempre se presentan en la lengua nativa de la familia y pueden ser difícil para los padres que no comprenden el idioma o la información presentada en el documento (Douglas, 2011a, p. 8; Johnson, 2012, p. 58).

Una mejor alternativa podría ser una encuesta del idioma nativo. Una *encuesta del idioma nativo* es “a questionnaire completed prior to an assessment to information on the language or

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<sup>13</sup> Comisión Juntada para la Audición de los Infantiles

<sup>14</sup> Detección auditiva e intervención temprana

languages used in the home” (Douglas, 2011a, p. 8).<sup>15</sup> Una encuesta del idioma nativo también debe considerarse para mejorar su comprensión de la lengua y las normas culturales asociadas para el niño (Douglas, 2011a, pp. 8-9). También, los padres que no hablan inglés competentemente pueden experimentar problemas hablando de las dificultades del niño y pueden ser desafiados con los servicios de seguimiento requeridos que se necesitan cumplir para el tratamiento y terapia adecuada durante las actividades de la sesión (Katz & de Melo, 2012, p. 45). En general, la familia y los padres en particular pueden luchar con la comprensión de las metas, técnicas, y estrategias de la terapia que puedan haber sido introducidos o incorporados en la sesión (Katz y de Melo, 2012, p. 44).

Si el médico es un hablante competente o nativo en la lengua que la familia utiliza, sin embargo, el terapeuta idealmente debe conducir la terapia en lengua de la familia (Katz & de Melo, 2012, p. 45). Si es necesario, más sesiones de la terapia auditiva-verbal pueden requerir un intérprete durante las sesiones con niños diversos culturalmente o lingüísticamente para explicar el razonamiento por lo que el terapeuta está haciendo (Katz & de Melo, 2012, p. 46). Un *intérprete* es “a person who serves as a conduit for communication between individuals who use two different languages” (Johnson, 2012, p. 58)<sup>16</sup>.

Debido a las sesiones de terapia auditiva-verbal son diagnósticas, el terapeuta auditivo-verbal generalmente incluye ambas evaluaciones informales y estandarizadas durante las sesiones de terapia. El intérprete desempeña un papel grande en la evaluación informal debido a su capacidad de interpretar las producciones del niño (Katz & de Melo, 2012, p. 46). Si los intérpretes no están disponibles, algunos miembros de la familia pueden ser capaces de actuar

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<sup>15</sup> ...“un cuestionario completado antes de una evaluación a la información sobre la lengua o lenguas utilizadas en el hogar” (Douglas, 2011a, p. 8).

<sup>16</sup> ...“una persona que sirve como un conducto para la comunicación entre los individuos que usan dos idiomas diferentes” (Johnson, 2012, p. 58).

como intérprete entre el niño y el terapeuta auditivo-verbal (Johnson, 2012, p. 58). Las familiares divulgan a menudo la respuesta apropiada al terapeuta auditivo-verbal, no obstante, en vez de lo que el niño realmente había producido. Si el terapeuta auditivo-verbal no puede interpretar la declaración del niño con precisión, cualquiera de las producciones incorrectas del niño pueden pasar inadvertidamente por el terapeuta (Katz & de Melo, 2012, p. 46).

Cuando el especialista de lengua hablada y escuchada tiene que llevar a cabo evaluaciones formales, él/ella debe entender que las pruebas que fueron diseñadas para los anglohablantes no funcionan automáticamente de la misma manera para los niños que hablan otros idiomas (Katz & de Melo, 2012, p. 46). Estas evaluaciones formales pueden ser problemáticas porque hay muy pocas pruebas creadas para otros idiomas aparte del inglés y español (Douglas, 2011, p. 5; Rhoades et al., 2004, p. 293). Los terapeutas deben administrar pruebas estandarizadas en la lengua nativa, o, utilizar una prueba de que puede haber sido ya traducida (Douglas, 2011a, pp. 10-11). Los resultados de las pruebas adaptadas sólo pueden utilizados en una manera frente a sus propias actuaciones anteriores (Katz & de Melo, 2012, p. 46). Cuando el especialista de lengua hablada y escuchada recibe resultados de las evaluaciones no debe considerar diferencias dialectales, o culturales de la lengua como impedimentos de la comunicación, sino como “diferencias” en la lengua hablada (Douglas, 2011a, p. 11). Basado en los resultados para el niño de la historia del caso, las medidas de evaluación, y las sondas de estimulabilidad, los terapeutas auditivo-verbales deben desarrollar recomendaciones necesarias para el programa para el niño, como la duración que el niño necesita la terapia, y hacer cualquier adaptación que el niño va a necesitar en el futuro (Douglas, 2011a, p. 11).

A veces los resultados de las evaluaciones no siempre rinden buenas noticias para la familia sobre la audición del niño. Si hay un intérprete o alguien que habla el idioma nativo de la

familia, es importante que él/ella le dé a la familia algún pronóstico o alguna cuestión relacionada con el niño en la lengua materna de la familia (Johnson, 2012, p. 59). Los terapeutas y los intérpretes deben evaluar la forma en que los padres reciben la noticia para determinar si o no entienden la situación (Johnson, 2012, p. 59). Además, los terapeutas deben comprender que los padres de los niños de orígenes diversos culturalmente o lingüísticamente podrían no seguir las recomendaciones de los terapeutas; sin embargo, esta posibilidad existe con todos los pacientes (Johnson, 2012, p. 59). Independientemente de si los padres proceden con la sesiones de terapia auditiva- verbal, teniendo un intérprete para hablar con la familia en su lengua nativa generalmente es preferido por las familias (Douglas, 2011a, p. 7).

### **Papeles de los intérpretes**

La utilización exitosa de un intérprete durante una sesión de diagnóstico terapéutico depende de varios factores. El primero y uno de los pasos más importantes es la selección de un intérprete (Johnson, 2012, p. 68). El intérprete debe ser seleccionado por su capacidad de utilizar con soltura el inglés y el idioma minoritario tanto en el habla oral como en la escrita (Johnson, 2012, p. 68; Rhoades et al., 2004, p. 293). El intérprete debe ser capaz de hablar con precisión sobre el tipo, grado, y la configuración de la pérdida auditiva a la familia en la lengua minoritaria y también transmitir las preocupaciones de los padres acerca de la pérdida auditiva del niño (Johnson, 2012, p. 68). Los intérpretes deben entender que su traducción / interpretación tiene que ser lo más cercano a la expresión comunicativa original del terapeuta (Katz y de Melo, 2012, p. 47). Otro componente importante en seleccionar a un intérprete es su formación y experiencia en ciencias de la salud y la traducción médica (Johnson, 2012, p. 68).

En segundo lugar, los terapeutas auditivo-verbales, audiólogos, logopedas, y todos los demás profesionales de la salud auditiva deben reunir con el intérprete anticipadamente para



discutir el caso específico de cada niño (Johnson, 2012, pp. 68-69; Katz y de Melo, 2012, p. 47; Rhoades et al., 2004, p 293). Los miembros del equipo de terapia del niño deben examinar las metas y los objetivos del cliente con el intérprete mientras recordarle traducir exactamente lo que se dice y no dedicarse a otro diálogo (Johnson, 2012, p. 69). Los intérpretes también deben ser conscientes que durante las pruebas diagnósticas, debe limitarse cualquier tipo de señales verbales, visuales o táctiles para obtener una respuesta por parte del niño y que todo lo que ocurre durante la sesión o evaluación es estrictamente confidencial (Johnson, 2012, p. 70). Generalmente, si los intérpretes están de acuerdo respecto a la importancia de no proporcionar señales para el niño durante el examen diagnóstico, están mucho más propensos a seguir los protocolos de administración de la prueba (Johnson, 2012, p. 70).

El último paso importante en el uso exitoso de un intérprete durante una sesión terapéutica con un niño es la frecuencia con y consistencia en que trabaja con el equipo (Katz y de Melo, 2012, p. 47). Si los médicos y el intérprete ya tienen una buena relación laboral establecida es preferible que el niño tenga el mismo intérprete durante cada sesión (Katz y de Melo, 2012, p. 47). Como consecuencia, el intérprete y el niño y su familia se familiarizarán con los demás y también el formato de la sesión de terapia (Katz y de Melo, 2012, p. 47). Si las relaciones entre, por ejemplo, los terapeutas, el intérprete, y la familia del niño están bien establecidos y dispuestos a fomentar del crecimiento lingüístico del niño en ambos idiomas, los resultados para el crecimiento del niño en su adquisición lingüística debe ser positivo. Consulte el Apéndice B para más detalles acerca de las sugerencias para el uso de un intérprete en un entorno diagnóstico o terapéutico.

## **Mitos de bilingüismo**

Históricamente, los expertos y educadores en el desarrollo del lenguaje han sido escépticos en cuanto al aprendizaje de una segunda lengua en los niños jóvenes (Waltzman, McConkey Robbins, Green, & Cohen, 2003, p. 757). Una razón común por la que los médicos pensaban que los niños no deben crecer "bilingües" era que a veces los niños aprendieron las estructuras lingüísticas en la segunda lengua más tarde que en la primera y como resultado, el niño se consideraba que tenía un impedimento de comunicación (Waltzman et al., 2003, p. 757). En general, este breve "retraso" no suele tener ningún efecto significativo sobre la capacidad del niño bilingüe para desarrollar los dos idiomas más adelante en la vida (Genesee, 2008, p 18;. Gutiérrez-Clellen et al., 2012, p. 64). Se ha observado que si un niño está expuesto a una lengua más que la otra, su preferencia natural para el idioma más utilizado proporciona que el niño desarrolle fluidez en ese idioma más rápido (Waltzman et al., 2003, p. 757). Sin embargo, no existe ninguna evidencia que indica que criar a hijos bilingües perjudica su crecimiento lingüístico a nivel general (Genesee, 2008, p. 18). Además, la falta de apoyo de la lengua materna podría afectar negativamente la capacidad de los padres para comunicarse con su hijo. Esto puede causar problemas psicológicos negativos en los padres, lo cual afecta aún más al niño con su posible pérdida auditiva (Bunta & Douglas, 2013, p. 288) .

## **Deficiencia auditiva y el bilingüismo**

Para aquellos con problemas de audición, la comunicación mediante la escucha y el lenguaje que se habla en un solo idioma sigue siendo una tarea difícil a pesar del uso de la tecnología auditiva, tales como audífonos e implantes cocleares (McConkey Robbins, Green, & Waltzman, 2004, p. 644) . Muchos niños que son sordos o con dificultades auditivas no tienen acceso a la gama completa de los aspectos fonéticos y prosódicos del lenguaje debido a su

discapacidad auditiva (McConkey Robbins, 2007, p. 1). Aún más impactante, la sordera restringe la capacidad de los niños para escuchar las conversaciones y limita su exposición a la lengua ambiental lo cual es una de las formas más importantes para que los niños adquieran la fluidez en un idioma (Genesee, 2008, p 21;.. McConkey Robbins et al., 2004, p . 644). La neuroplasticidad del cerebro durante los primeros años de la infancia es lo que permite, sea en hogares bilingües o multilingües, aprender todos los idiomas a los que uno está expuesta. (McConkey Robbins, 2007, pp. 1-2, McConkey Robbins et al., 2004, p. 644).

Los terapeutas pueden tener dificultades en recomendar el aprendizaje bilingüe para un niño con una discapacidad auditiva, incluso si el niño tiene un implante coclear (McConkey Robbins et al., 2004, p. 644). Aunque los implantes cocleares normalmente proporcionan un arco más completo de las características fonéticas del lenguaje comparado con los audífonos, todavía suministran al cerebro una parte de la información acústica (McConkey Robbins et al., 2004, p. 644;. Moreno-Torres, 2014, p. 575). Con el movimiento de tener implantes cocleares en las edades cada vez más jóvenes, hay que fijarse en el hecho de que niños sean más propensos a desarrollar habilidades lingüísticas esenciales a través del aprendizaje incidental y durante su período crítico de aprendizaje de idiomas (Genesee, 2008, p. 21; McConkey Robbins et al., 2004, p. 644;. McConkey Robbins, 2007, p. 2).

### **Resultados de pacientes bilingües con implantes cocleares**

Se han realizado varios estudios para ver si los niños que reciben los implantes cocleares pueden desarrollar fluidez en dos idiomas de manera conmensurable con sus compañeros con audición normal. Uno de los primeros estudios que probó la viabilidad de los niños con implantes cocleares se realizó mediante un análisis retrospectivo (Waltzman et al., 2003, pp. 757-758). La mayoría de los niños demostró habilidades del lenguaje receptivo y expresivo

apropiadas para su edad en su lengua primaria igual que los niños con audición normal (Waltzman et al., 2003, p. 761). En general, el aprendizaje de otro idioma no pareció causar un efecto negativo en la adquisición del lenguaje del niño, y en todo caso, el contacto con otras lenguas resultó en más apoyo en el idioma, lo cual ayudó al niño (Bunta y Douglas, 2013, p. 282; Waltzman et al, 2003, p. 761).

Otro estudio concluyó que los médicos no deben alentar a los padres con niños jóvenes a hablar exclusivamente con sus hijos en inglés, especialmente si la competencia lingüística de los padres en inglés no brinda las cualidades necesarias para adquirir un inglés de nivel nativo (McConkey Robbins et al., 2004, p. 647). Otro estudio añade que los niños que fueron criados en ambientes bilingües cuya lengua materna era inglés demuestra resultados parecidos a sus colegas monolingües en inglés en las pruebas de competencia lingüística teniendo en cuenta factores como la misma edad en el momento de la implantación, su anatomía coclear, el entorno educativo, y el tipo de aparato auditivo (Thomas, El-Kashlan, y Zwolan, 2008, p. 233). Otro estudio concluyó resultados similares, cuando los padres y los médicos apoyan los dos idiomas, los dos idiomas se pueden adquirir al mismo nivel de competencia (Bunta & Douglas, 2013, p. 287.).

En contraste con los estudios anteriormente citados, un análisis retrospectivo no apoyó el uso de una adquisición bilingüe del lenguaje para niños con implantes cocleares en un contexto inglés y alemán (Teschendorf, Janeschik, Bagus, Lang, y Arweiler-Harbeck, 2011, pp. 234-235). Los autores señalaron, “Some children who live in bilingual homes could develop proficiency in a second language, but that was the exception rather than the rule” (p. 235)<sup>17</sup>. Los autores afirman que los resultados de su estudio podrían haber diferidos tan dramáticamente de los

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<sup>17</sup> ...“Algunos niños que viven en hogares bilingües podrían desarrollar dominio de un segundo idioma, pero eso era la excepción y no la regla” (p. 235).

estudios anteriores debido a las discrepancias en las metodologías que se utilizaron. Los autores no controlan el nivel socioeconómico (SES), formación escolar de los padres, nivel educativo del niño, la motivación de los padres para el éxito del niño, y el cumplimiento de los padres con el tratamiento (p. 235). En conclusión, en general, los estudios previamente citados ayudan a disipar el mito de que el bilingüismo provoca retrasos en el lenguaje en los niños; y aún más notable el mito que puede ser una falta de habla y/o el lenguaje suficiente en ambas lenguas que causa a los niños bilingües tener un "retraso" de lenguaje (Bunta & Douglas, 2013, p. 283).

### **Conclusión**

Si hay un mensaje central que el autor de este estudio pretende señalar es lo siguiente: los niños que provienen de diversos orígenes culturales y lingüísticos han sido “olvidados” durante demasiado tiempo. El habla, el lenguaje, y los médicos de la audición deben ahora reconocer la cantidad de conocimiento que todavía tienen que adquirir para que ayude adecuadamente a los niños. Este repaso de la literatura fue diseñado para ayudar a los médicos y los padres de niños con pérdida auditiva a entender mejor lo que aún queda por hacer. Aunque ha habido un importante campo de estudio dedicado a los temas de la adquisición de dos idiomas en los niños en la terapia después de la cirugía de los implantes cocleares no se puede decir lo mismo en cuanto a la poca investigación dirigida al proceso de pacientes (en particular los niños) referidos a los especialistas y cómo las prácticas terapéuticas afectan a los niños que hablan más que el inglés. En el siguiente capítulo se describen las principales conclusiones encontradas en este estudio, las implicaciones, limitaciones, recomendaciones para futuras investigaciones y reflexiones finales pertenecientes a esta investigación.

## CAPÍTULO III

### CONCLUSIONES Y RECOMENDACIONES

Este estudio ha examinado las políticas y las prácticas clínicas de los audiólogos y terapeutas auditivo-verbales con respecto a la candidatura para los implantes cocleares y el tratamiento auditivo de los receptores hispanos pediátricos que son monolingüe español, Inglés como Segundo Idioma (ISL), y bilingüe en Inglés-Español en centros de implantes cocleares en todos los Estados Unidos. Encuestas electrónicas fueron distribuidas a los participantes por correo electrónico. Este capítulo contiene las conclusiones principales encontradas en este estudio, las implicaciones, limitaciones, recomendaciones para futuras investigaciones y reflexiones finales pertenecientes a esta investigación.

#### **Principales conclusiones**

La primera conclusión importante de este estudio fue que la implantación coclear pediátrica juntada con la terapia auditiva-verbal debería de considerarse el estándar de práctica para los pacientes pediátricos que recibieron los implantes cocleares discutido en este estudio. La gran mayoría de los audiólogos y terapeutas auditivo-verbales encuestados en este estudio indicó que la mayoría de sus pacientes pediátricos que tienen implantes cocleares reciben terapia auditiva-verbal. Según este estudio, los pacientes pediátricos que tienen implantes cocleares fueron remitidos constantemente a la terapia auditiva-verbal en la cuál el lenguaje hablado y escuchado fue el modo de comunicación o comunicación “oportunidad” elegido para la terapia. Aunque el hallazgo ya mencionado apoya la tendencia en la literatura que la terapia auditiva-verbal debe ser asociada con los que reciben implantes cocleares, este estudio no tiene la intención de negar los beneficios proporcionados por otras modalidades de comunicación o en ciertos casos, otros modos de comunicación que pueden ser más apropiados.

La segunda conclusión importante de este estudio fue que existe una cohorte grande de pacientes hispanos pediátricos que tienen implantes cocleares, aunque muchos profesionales no se sienten entrenados suficientemente para ayudar lingüísticamente a los pacientes de orígenes diversos. Aunque la literatura escolar anterior discute el gran aumento y la población de los hispanos en los Estados Unidos, no había muchos estudios que notan la prevalencia de los niños hispanos con pérdidas de la audición, al menos que, los niños hispanos que recibieran los implantes cocleares. Los resultados de este estudio confirman que los audiólogos y terapeutas auditivo-verbales sirvieron una gran población de pacientes hispanos pediátricos en sus centros de implantes cocleares. Aunque los profesionales que participaron en este estudio denotaron que muchos de estos pacientes hablan inglés en algún nivel, los resultados sugirieron que estos audiólogos y terapeutas no se sienten capacitados por ayudar a los pacientes de orígenes lingüísticamente diversos. Los resultados de la investigación mostró, sin embargo, que los clínicos entienden cuestiones interculturales relacionados con el bilingüismo sin importar el hecho de que no se sentían adecuadamente entrenados para servir a estos pacientes.

Una tercera conclusión importante de este estudio fue que el bilingüismo no es perjudicial para los pacientes pediátricos que tienen implantes cocleares, sino que puede ofrecer una variedad de beneficios a los niños que son de entornos lingüísticamente diversos. Sin embargo, hay que señalar que esta recomendación sólo es aplicable a los pacientes pediátricos que tienen implantes cocleares que no demuestran otras comorbilidades y que tienen padres o familias que están comprometidos a ayudar a su niño al convertirse en bilingüe. Según los resultados de este estudio, la mayoría de los profesionales admitió que los padres deberían de decidir el idioma que el niño utilizará durante la terapia. Muchos de los terapeutas auditivo-verbales observaron que la terapia no tiene que llevarse a cabo exclusivamente en inglés y que

las técnicas de la terapia en inglés y en español son las mismas. Los clínicos notaron que la mayoría de sus clínicas usaron los intérpretes medicinales durante las pruebas auditivas y la terapia auditiva-verbal, pero acordaron que los terapeutas auditivo-verbales bilingües idealmente serían la mejor opción, aunque no hay muchos centros de implantes cocleares que tienen ellos.

La cuarta conclusión importante de este estudio fue que hubo dos diferencias significativas entre los audiólogos y terapeutas auditivo-verbales en sus opiniones relacionadas con la candidatura para los implantes cocleares, problemas y el bilingüismo. Los terapeutas auditivo-verbales difirieron significativamente con los audiólogos en respecto a si los hispanos deben hablar español para mantener su identidad cultural y si es necesario para los niños con implantes cocleares a recibir terapia auditiva-verbal en la lengua materna del paciente. Los audiólogos, contrastantemente, difirieron con los terapeutas auditivo-verbales sobre si los padres españoles monolingües comprenden de los criterios de candidatura y los resultados esperados asociados a su niño que recibe un implante coclear. Los resultados marcados tendieron hacia la significación estadística, pero no dieron una diferencia significativa. Estos resultados sugirieron que los audiólogos y los terapeutas auditivo-verbales no son siempre de acuerdo cuando se trata de cuestiones relacionadas con la candidatura y el bilingüismo para los pacientes que son de entornos lingüísticamente diversos.

La gran conclusión final de este estudio fue que ninguna clínica de implante coclear tiene una política escrita o formal con respecto a cómo llevar a cabo terapia auditiva-verbal con los pacientes hispanos pediátricos que usan los implantes cocleares. Aunque este hallazgo confirmó las expectativas del investigador, también implicó un tema mucho más evidente. Dado que la inmensa mayoría de los profesionales indica que no fueron formalmente entrenados para ayudar a los pacientes de orígenes lingüísticamente diversos, centros de implantes cocleares



desprovistos de las guías clínicas de cómo mejor servir a esta cohorte de pacientes pediátricos que tienen implantes cocleares continuará a luchar por proporcionar el mejor tratamiento posible para una población que crece rápidamente cada día.

### **Implicaciones de los resultados de la investigación**

Los resultados de este estudio tienen tres implicaciones principales que son relevantes para audiólogos y terapeutas que atienden a pacientes de implante coclear pediátrico de orígenes lingüísticamente diversos así como la sociedad en general. La primera consecuencia de este estudio fue que los audiólogos y terapeutas auditivo-verbales deberían de ser mejor educados y entrenados en cuanto a cómo evaluar correctamente y ayudar a los pacientes de lingüísticamente diversas procedencias para que ellos puedan brindarles la mejor atención posible. Esto beneficiaría a los médicos directamente porque se tendría una mejor comprensión de las necesidades de sus pacientes aprovechando también los propios pacientes dándoles la intervención más clínicamente efectiva.

La segunda implicación de este estudio fue que para asegurar que la terapia auditiva-verbal es la más eficaz para los pacientes pediátricos que usan implantes cocleares que son de orígenes lingüísticamente diversos, los campos de audiología y logopedia necesitan más terapeutas auditivo-verbales bilingües o multilingües. Para proporcionar el mejor servicio a los pacientes de orígenes lingüísticamente diversos, ambos campos deben contratar a más profesionales que también vienen de un fondo lingüísticamente diverso o diseñar programas específicos para enseñar a los audiólogos y terapeutas cómo podrían ayudar a esta cohorte de pacientes pediátricos que tienen implantes cocleares.

La implicación final de este estudio fue que los centros de implantes cocleares necesitan crear una política estandarizada con respecto a la candidatura y cómo proporcionar más

eficazmente el tratamiento auditivo a pacientes de orígenes lingüísticamente diversos. Hasta que se establezca una política escrita sobre cómo servir a estos pacientes en una manera mejor, los profesionales seguirán luchando con las decisiones clínicas acerca de las necesidades específicas de pacientes pediátricos de implante coclear de lingüísticamente diversos orígenes.

### **Limitaciones de los resultados de la investigación**

Había varias limitaciones de este estudio. La primera limitación de este estudio fue la manera en que los participantes fueron contactados para participar en el estudio. La mayoría de correos electrónicos de los participantes fueron encontrados usando las barras de búsqueda en la sección “Encontrar una clínica” en los respectivos sitios web de Cochlear Americas, Advanced Bionics, and MED-EL. Muchos de los enlaces asociados con los sitios web de los centros de implantes cocleares fueron llenados con información demográfica, pero a menudo faltaban los correos electrónicos de los profesionales que trabajan en las clínicas específicas. La otra información de contacto fue identificada usando la barra de búsqueda “Find American Cochlear Implant Alliance (ACIA) Organizations” en la página web de ACIA, que sólo cedió una pequeña cantidad de correos electrónicos de audiólogos específicos. Breves descripciones sobre el estudio, sin embargo, fueron publicadas en el sitio web de American Speech-Language-Hearing Association (ASHA) en su página de grupo de interés especial 9 (SIG-9), Audición y Trastornos Auditivos en Infancia, y a través de un e-blast para 12.000 contactos en el sitio web de The Alexander Graham Bell for the Deaf and Hard of Hearing para obtener más respuestas. No obstante, sólo 59 participantes respondieron a la encuesta.

Una segunda limitación de este estudio es que los audiólogos y otros profesionales fueron animados a enviar la encuesta a otros profesionales/colegas en su equipo, específicamente los terapeutas auditivo-verbales que también sirven a esta cohorte de pacientes pediátricos que

tienen implantes cocleares. Esto también podría haber contribuido a la tasa baja de las respuestas de los terapeutas auditivo-verbales. Esta solicitud en nombre del investigador también presupone que los audiólogos y los terapeutas auditivo-verbales trabajan de una manera interdisciplinaria, en la que los profesionales colaboraban y comunican a menudo en nombre del paciente, y que los procesos de referencia entre los dos grupos tuvieron éxito.

La tercera limitación fue que la población de la muestra refleja sólo un pequeño porcentaje de los audiólogos y terapeutas auditivo-verbales que trabajan con pacientes hispanos pediátricos que usan implantes cocleares de entornos lingüísticamente diversos de los Estados Unidos. Esto obviamente limita la generalización de los resultados, particularmente puesto que la prevalencia de la pérdida auditiva entre la población hispana es la más grande entre cualquier grupo minoritario en los Estados Unidos (Mehra, Eavey, & Keamy, 2009, p. 464; Ramkissoo & Khan, 2003, párr. 2). Aunque la población de la muestra no podría ser considerado un tamaño grande, cabe señalar que estas políticas y prácticas clínicas de los audiólogos y terapeutas auditivo-verbales provenían de profesionales en los principales centros de implantes cocleares en 16 diferentes estados dentro los Estados Unidos y varios países diferentes. También debe ser indicado que más del 40% (n=22) de los 51 participantes, se observó que tenían 11 años o más experiencia trabajando con niños que usan implantes cocleares.

Una cuarta limitación de este estudio es que se realizó mediante una investigación de encuestas anónimas online. Las investigaciones dirigidas online plantean varias limitaciones relacionadas con la cuestiones de muestreo (Babbie, 2014, p. 294). Aunque la encuesta indicó claramente que el estudio fue diseñado para audiólogos y terapeutas auditivo-verbales que sirven pacientes hispanos pediátricos con implantes cocleares, el investigador no podría realmente controlar quien completaron la encuesta (Babbie, 2014, p. 301). Las tasas de terminación

también son indicativas de una encuesta online porque los participantes fácilmente podrían optar por iniciar o completar la encuesta en su totalidad. Una última cuestión común relacionada con la investigación de encuestas online es varios de los correos electrónicos de los participantes que fueron descubiertos online causaron que el investigador recibió algunos correos de vuelta del proveedor de los correos electrónicos teniendo en cuenta que ciertas direcciones de correo electrónico no existían (Babbie, 2014, p. 299).

Una limitación final de este estudio fue que con el fin de crear dos grupos de opiniones entre los audiólogos y terapeutas auditivo-verbales, aquellos habían elegido la opción “Other” con respecto a la función principal del participante en su equipo de implante coclear fueron encaminados para responder preguntas relacionadas con la matriz de preguntas audiológicas. Esto permitió a los participantes responder a las declaraciones relacionadas con las prácticas audiológicas, pero algunos de estos participantes potencialmente no estaban calificados para responder a estas preguntas planteadas. Esta limitación, así como las ya mencionadas, sin embargo, no deberían de impedir la contribución de este estudio a la literatura referente a las políticas y las prácticas clínicas de los audiólogos y terapeutas auditivo-verbales sobre la candidatura y el tratamiento auditivo de pacientes hispanos pediátricos con implantes cocleares de orígenes lingüísticamente diversos.

### **Recomendaciones para futuras investigaciones**

Hay varias recomendaciones que pueden sugerirse para futuras investigaciones con respecto a las políticas y las prácticas clínicas para los audiólogos y terapeutas auditivo-verbales relacionadas con esta cohorte de pacientes pediátricos con implantes cocleares. En referencia a las limitaciones, la primera recomendación es aumentar el tamaño de la muestra y mejorar la manera en que los audiólogos y terapeutas auditivo-verbales son contactados para participar en

futuros estudios. Esto permitiría una muestra más representativa de las prácticas clínicas que los profesionales están siguiendo, que permitiría que los resultados fueran más generalizables y potencialmente más significativos.

Una segunda recomendación para futuras investigaciones es entrevistar los audiólogos y terapeutas auditivo-verbales así como la administración de una encuesta. Aunque la investigación de encuesta es un método eficaz para obtener una gran cantidad de datos, también pueden sesgar los resultados debido a los participantes que no responden honestamente. Aunque la introducción de un método adicional como entrevistar a profesionales serían mucho más lento, ellas potencialmente cualitativamente pudieron corroborar la validez de los datos cuantitativos de las encuestas.

Una tercera recomendación para futuras investigaciones sería estudiar las políticas y prácticas clínicas de la candidatura y el tratamiento auditivo de los pacientes pediátricos con implantes cocleares que hablan otros idiomas aparte del español. Aunque este estudio no pretende ser completa ni generalizable a todas las demás lenguas de las minorías que existen en los Estados Unidos, el investigador espera que los resultados sean similares para otros pacientes pediátricos con implantes cocleares que quieren ser bilingüe en dos lenguas habladas y escuchadas. Teniendo en cuenta que la población hispana está creciendo rápidamente y pronto se convertirá en la más grande minoría en general, uno puede asumir que si los audiólogos y terapeutas auditivo-verbales no tienen políticas en lugar para trabajar con esta población, que también carecen las políticas para atender las necesidades de los pacientes pediátricos con implantes cocleares para todos los que quieren se bilingües.

Una recomendación final para la investigación futura es comparar las políticas y prácticas de la terapia auditiva-verbal implementadas en España a las que se utilizan en los Estados

Unidos. España es un país donde el bilingüismo no es sólo valeroso, sino alentado por la Constitución Española. El castellano se habla además de muchas otras lenguas que son específicas de las comunidades autónomas de España (por ejemplo: el aranés, el catalán, el gallego, el vasco, y el valenciano). Según Guiberson (2014), más de un cuarto de la población española habla uno de estos idiomas de la comunidad autónoma como su lengua materna (p. 88). Por otra parte, 53% de los adultos españoles son bilingües o multilingües, hablando tanto el español castellano y una lengua de la comunidad autónoma española o otra lengua extranjera (Instituto Nacional de Estadística, 2012). Teniendo en cuenta la amplia gama de idiomas de las comunidades autónomas, el alto porcentaje de los bilingües con la opinión positiva del bilingüismo, observando y comparando las políticas y las prácticas clínicas empleadas en España y los Estados Unidos podrían proporcionar a los investigadores una mejor comprensión de cómo llevar a cabo la terapia con pacientes quien habla español y que son bilingües en general.

### **Reflexiones finales**

Este estudio no sólo fue el primer que examinó las políticas y las prácticas clínicas con respecto a la candidatura y el tratamiento auditivo para los pacientes hispanos pediátricos con implantes cocleares, pero también fue el primer estudio que examinó el proceso de referencia entre los audiólogos y terapeutas auditivo-verbales en los pacientes con implantes cocleares. Los resultados obtenidos en este estudio sugirieron que pacientes pediátricos con implantes cocleares reciban la terapia auditiva-verbal más que otros medios de comunicación; los profesionales no se sienten capacitados para ayudar a los pacientes de orígenes lingüísticamente diversos; se recomienda el bilingüismo para los pacientes pediátricos con implantes cocleares; los audiólogos y terapeutas auditivo-verbales difieren en ciertos temas relacionados con la candidatura de los implantes cocleares y el bilingüismo; y ninguna clínica de implantes cocleares tiene una política

escrita sobre cómo llevar a cabo la terapia auditiva-verbal con pacientes hispanos pediátricos con los implantes cocleares. Por lo tanto, el investigador espera que este estudio se convierta en un catalizador para otros estudios de investigación para investigar la relación entre el tratamiento auditivo de los pacientes pediátricos con implantes cocleares que hablan otros idiomas otros idiomas. La tasa proyectada de crecimiento de las lenguas minorías en los Estados Unidos está aumentando precipitadamente, y debido a lazos personales con el lenguaje, el investigador espera que las investigaciones futuras continúen a sugerir que hay que hacer más esfuerzos para ayudar a pacientes que no calzan en el molde *típico* de candidata para recibir un implante coclear.