5-2020

Development of the Caregiver-Child Auditory Skills Tracking (CAST) scale: A Pilot Study on Caregiver Implementation via International Telepractice

Elizabeth Ocampo-Roman
University of Arkansas, Fayetteville

Development of the Caregiver-Child Auditory Skills Tracking (CAST) scale: A Pilot Study on Caregiver Implementation via International Telepractice

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science in Communication Disorders

by

Elizabeth Ocampo-Roman
University of Arkansas
Bachelor of Science in Communication Disorders, 2017
University of Arkansas
Bachelor of Arts in Psychology, 2017
University of Arkansas

May 2020
University of Arkansas

This thesis is approved for recommendation to the Graduate Council.

Rachel Glade, Ph.D.
Thesis Director

Tracy Pate, M.S.
Committee Member

Christine Holyfield, Ph.D.
Committee Member

Elizabeth Rosenzweig, M.S.
Ex-officio Member

Abstract

Parent engagement is a key component during early language development for all children, but particularly for a child with hearing loss. Through the application of technology-based models of service delivery such as telehealth, researchers have found an increase in parent-child engagement during auditory-verbal therapy (AVT) sessions due to the physical absence of the provider and parents becoming the primary language facilitators. However, current measures of parent-child interactions do not have a coding system to monitor facilitation of auditory skills. This present study will discuss the development of the Caregiver-Child Auditory Skills Tracking (CAST) Scale to track progress of caregiver implementation of the auditory skill hierarchy. Initial development included using the CAST scale for a pilot case study of parent interaction during 2 sessions (6 months) of auditory-based sessions via international telehealth. The participants were Spanish-speaking parents of a 2-year-old child with bilateral cochlear implants who reside in Mexico and received intervention from an Arkansas-based clinician. Parent interactions were qualitatively coded by graduate student clinicians using the CAST scale to rate implementation of auditory skill hierarchy stages. Data was coded twice (approximately 4 weeks apart) for both sessions on the auditory skills strategies data sheet developed by the researchers. The statistical analysis performed on the data collection was a repeated measures ANOVA. The results of the analysis found that there is a significant effect of time on both session conditions (rating one and rating two). Specifically, the rater's auditory skills training had a statistically significant effect on auditory skills strategies data. Additionally, telehealth was observed to increase parent engagement in both sessions. These findings provide a guideline towards continued progression of the CAST scale and adds to research that supports telehealth as a viable option of speech-language pathology service delivery.

Acknowledgements

Things happen for a reason. This is one of the most important lessons I have learned so far in my graduate school journey. Although the road to get to where I am has not been easy, none of it would be possible without the support of the inspiring people in my life. I want to thank my family who have always encouraged me to believe in myself and been proud of all my accomplishments no matter how small. In the moments that I doubted my ability to achieve my dreams, my sisters were there to reassure me that I was capable doing that and so much more. To my beautiful nieces and nephews, thank you for always putting a smile on my face. To Mario and Eliza, you inspire me to make the world a better place. Good friends are necessary to help every step of the way on this journey. Jennifer Araujo, my best friend for 12 years, thank you for everything. From answering all my grad school questions to being my SLP supervisor this past summer, you are relentless and it shows with how much your clients appreciate everything you do for them. To my cohort especially to the 5 of us who message each other words of support when things seem impossible, thank you. I want to thank Erika Rodriguez for being such an amazing work partner. Without her, I would not have been able to get this far on my thesis or have published my first international blog post on hearing loss. To my committee members, Tracy, Elizabeth, and Dr. Holyfield, thank you for your guidance and motivation. You are all essential to this amazing field and your endless, remarkable contributions are proof of that. Last but not least, I want to thank my mentor, Dr. Rachel Glade. I will forever be thankful for your guidance and expertise throughout this process. I could not have done this without you. You trusted and believed in me to accomplish this goal before I did. You motivate me to be the best person and SLP that I can be. To the rest of my extended family, friends, and colleagues, I appreciate all your words of encouragement and support.

Dedication

To my parents. Everything I have done is for you. You both left your families and all that you knew to come to this country with hopes and dreams of a better life. I am so proud to be your daughter and it will take me more than a lifetime to thank you for everything you have done for me. Gracias.

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CHAPTER I

INTRODUCTION

The role of a parent is critical during early language development more so in a child with hearing loss. Auditory-verbal therapy (AVT) is a rehabilitative approach for children with hearing impairments comprised of early intervention with a focus on audition, technological management and involvement of the child's caregivers in therapy sessions (Brennan-Jones, White, Rush, & Law, 2014). A key aspect of AVT is training parents to be the primary language facilitators for their children. In order for the parent to assume the role of a "teacher" (Radaszewski Byrne, 2000), the therapist's role in the partnership must not be to provide direct delivery of services to the child, "but rather as guide and coach to the parents, assisting them in incorporating techniques that facilitate speech, language, and listening skill growth in the context the family's daily routines" (Rosenzweig, 2017).

Research by Blaiser, Behl, Callow-Heusser & White (2013) found that TI (tele-intervention) resulted in increased parent-child engagement due to the providers interacting more with caregivers and facilitating parent-child interactions by improving the caregiver's ability to encourage their child's development. However, currently there is not a coding system to monitor the facilitation of auditory skills for parent-child interactions. The development of a scale to measure parental engagement is important to research because it can have implications on our field to better our services in parent training in particular working with children with hearing loss and their families.

Cole and Flexer (2011) describe hearing loss as an "invisible acoustic filter that distorts, smears, or eliminates incoming sounds…". (p. 12). In utero, babies have access to sound by the third trimester (approximately 20 weeks) after the cochlea begins to function (Harrison &

Gordon, 2005). If present from birth, hearing loss disrupts communication and overall development that can have later implications in academic environments and for the child's family (Watkin, McCann, Law, Mullee, Petrou, Stevenson, Worsfold, Yuen & Kennedy, 2007). Although research findings from Yoshinaga-Itano et al. (1998) suggest early identification and early language intervention by 6 mo to obtain better rates of development in language skills, Rhoades and Chisolm (2000) study reported AVT to be significant language intervention option to attain age-appropriate language skills for participants who initiated intervention beyond the suggested ages for early language development.

"Parents and caregivers are encouraged to integrate listening opportunities and strategies into everyday activities and to engage in frequent communicative interactions with their child" (Jackson & Schatschneider, 2014, p. 4). Radaszewski Byrne's (2000) language intervention study demonstrated that 2 conditions: joint teaching (between the parent and professional) and a parent who received language training, resulted in greater effective outcomes for a child, who is hard of hearing, spontaneous language development. This is important to this research because the overall goal for children enrolled in auditory-verbal services is not only to attain age-appropriate speech and language but also to generalize these skills outside of the therapy setting.

Through the application of telehealth technology, children with hearing loss and their families have increased direct access to providers who are not available in their local community (Houston & Stredler-Brown, 2012). Moreover, telehealth sessions can be used to observe the carry-over of listening and spoken language skills in the child's natural environment while still providing coaching for caregivers. However, few studies have measured the impact of telehealth on parental engagement with families who are deaf or hard of hearing (Blaiser et al., 2013; Stredler-Brown, 2017). Family involvement is an important component for the success of

auditory-verbal services. Hence, there is a significant need to continue research for parent-child interactions using a specific scale developed for this specific population's needs and skills.

CHAPTER II

LITERATURE REVIEW

Hearing Loss: Impact on Early Language Development

Cole and Flexer (2011) describe hearing loss as an "invisible acoustic filter that distorts, smears, or eliminates incoming sounds…". (p. 13). In utero, babies have access to sound by the third trimester (approximately 20 weeks) after the cochlea begins to function (Harrison & Gordon, 2005). A child with normal hearing hears sound and spoken language for months prior to the development of speech and language. In comparison, children with hearing loss have a gap of missing acoustic information that may lead to a developmental delay. The World Health Organization (2019) estimated that in 2018 that approximately 466 million of the world's population have hearing loss and approximately 34 million of this population are children (WHO, 2019).

According to Shekari, Nakhshab, Valinejad, Modarres, & Hosseinpour (2017), children with hearing loss have language development deficits due to lack of stimulation of the auditory system during a critical language learning period in brain plasticity. If present from birth, hearing loss disrupts communication and overall development that can have later implications in academic environments and for the child and his/her family (Watkin, McCann, Law, Mullee, Petrou, Stevenson, Worsfold, Yuen & Kennedy, 2007). Neuroplasticity decreases after 3.5 years of age, thus negatively impacting the ability to develop spoken language (Kaipa and Danser, 2016). Research studies have found that early intervention (EI) has been effective in helping to close developmental gaps for children with hearing loss (Calderon, 2000; Nicholas

& Geers, 2007a; May-Mederake & Shehata-Dieler, 2013; Meinzer-Derr, Wiley, & Choo, 2011; Moeller, 2000; Shekari et al., 2017; Watkin et al., 2007; Yoshinaga-Itano, Sedey, Coulter, & Mehl, 1998). The overall goal of EI services is to decrease the negative outcomes of conditions such as hearing loss and support overall development (Meinzer-Derr et al., 2011). Furthermore, the researchers stressed the importance of enrolling a child in EI during as early as possible. EI includes incorporating the child's "listening age" to grow auditory neural pathways through the use of hearing technology and providing auditory language enrichment via family and therapists (Cole & Flexer, 2015). Listening age or hearing age refers to the period since the child has received their hearing device (Rosenzweig, 2008). The later the child receives appropriate amplification, the greater the impact on their developmental age. Their developmental age refers to the stage of development at which they function physically and mentally. Typical hearing infants are born with approximately five months of hearing experience given that their ears in utero receive auditory stimuli such as the sounds of their mother's voice in the womb 18 weeks after conception (Rosenzweig, 2008). For example, if a 6-year-old child was identified with hearing loss and did not receive a hearing device until they were 3 ½ years old, he/she have a listening age of 2 ½. They have an auditory experience and a language age equivalent of 2 ½ years compared to their same chronological age peers.

Yoshinaga-Itano et al. (1998) findings suggested that it is critical for children to be identified early by 6 months of age accompanied by EI in order to enrich language development. Moeller (2000) found that the language development in early enrolled children versus children who were enrolled at later ages was considerably higher in vocabulary and verbal-reasoning skills. Further evidence suggests that early cochlear implantation prolongs the "window of opportunity" (from birth to 7 years of age) for acquiring language in children with

hearing loss by giving greater access to auditory stimuli through spoken language which promotes a growth in auditory skills, speech understanding, and oral linguistic development (May-Menderake & Shehata-Dieler, 2013, p.2). Researchers have found further evidence to support the benefits of early cochlear implantation and early enrollment language intervention on school readiness for acquirement of age-appropriate spoken language skills (Geers, Moog, Biedenstein, Brenner, & Hayes, 2009b). Similarly, Geers and Nicholas (2013c) found that children, who received their cochlear implants before or just after the age of three with listening and spoken language intervention, maintained a lexical and language advantage in their mid-elementary school years. These findings suggest that early implantation with early language intervention create advantages during a critical phase in the development of age-appropriate language and auditory skills that can carry over throughout a child's later school years.

Auditory-Verbal Therapy (AVT)

Auditory-verbal therapy (AVT) is a rehabilitative approach for children with hearing impairments comprised of early intervention with a focus on audition, technological management and involvement of the child's caregivers in therapy sessions (Brennan-Jones, White, Rush & Law, 2014). The auditory-verbal approach is one of the most sought after approaches for children with hearing loss that uses residual hearing without additional cues for spoken language learning (Kaipa & Danser, 2016). The primary aim of AVT is for children with hearing loss is to acquire age-appropriate speech and language skills as their same age hearing peers (Eriks-Brophy, 2004; Lim & Simser, 2005). To assist with the acquisition, AVT requires caregivers to be actively involved in the sessions and use learned techniques at home. In this case, the therapist becomes a "coach" and trains parents by involving them in the therapy

sessions. The therapist may give the parent opportunities to lead objective activities and provide feedback during trials to ensure auditory skills are targeted and facilitated. The success of AVT is dependent on the teamwork between a therapist, the care team, and the child's caregivers.

Benefits of AVT for the development of language

AVT emphasizes on developing auditory discrimination skills through audition only and removing visual cues (Brennan-Jones et al., 2014). AVT is based on the concept that most children with various degrees of hearing loss can acquire the skills to communicate through spoken language if provided with "appropriate amplification, abundant language stimulation, and adequate opportunities to develop their residual hearing" (Eriks-Brophy, 2004, p.22). To have exceptional access to the speech frequency spectrum, AVT relies on the proper fitting of hearing equipment which can lead to children learning "to listen to their own voices, the voices of others, and the sounds of their environment in order to understand spoken communication and develop meaningful conversations" (Hitchins & Hogan, 2018, p.126). AVT has been found to be an effective intervention option for children with hearing loss to attain similar language and speech found in children with typical hearing (Dornan, Hickson, Murdoch, Houston, & Constantinescu, 2010). Kaipa & Danser's (2016) systematic review of the literature on the efficacy of AVT on language development revealed the following:

> (1) children in an AVT program can achieve age appropriate speech and language skills comparable to their hearing peers, (2) AVT can even help older children with HI (beyond three years of age) to develop age appropriate speech and language skills, (3) children receiving AVT can learn to recognize words accurately even in the presence of background noise… (5) AVT graduates can be successfully mainstreamed (p.132-133).

An exploratory study by Fairgray, Purdy, & Smart (2010), found that twenty sessions of speech therapy services highlighting AVT techniques enhances phonological development, receptive language, articulation and speech perception in noise for children with hearing loss. In particular, their research revealed enriched auditory discrimination skills among their

participants, which further supports the emphasis of AVT to "listen" to speech to improve speech recognition. Although research findings from Yoshinaga-Itano et al. (1998) suggest early identification and early language intervention by 6 months to obtain better rates of development in language skills, Rhoades and Chisolm (2000) study reported AVT to be significant language intervention option to attain age-appropriate language skills for participants who initiated intervention beyond the suggested ages for early language development. The results from these studies provide encouraging evidence for AVT as a beneficial intervention program for young children with hearing loss that benefits the development of linguistic and auditory skills critical for communication.

Parent participation

The Alexander Graham (A.G.) Bell Academy for Listening and Spoken Language has 10 principles that certified auditory-verbal therapists must maintain throughout their profession; six of these principles are specific in guiding and coaching parents help their child acquire spoken language and listening skills (Principles of Certified LSL Specialists). The role of a parent is critical during early language development more so in a child with hearing loss. Gradually, Auditory Verbal Therapists implement families with knowledge and skills to further expand their child's spoken language skills through listening (Hogan et al., 2008). By monitoring the progress of spoken language acquisition, auditory-verbal therapists have the opportunity to detect a child's probable impediment during this process and to consult a child's needs with their parents (Hogan, Stokes, White, Tyszkiewicz, & Woolgar, 2008). The overall goal for children enrolled in auditory-verbal services is not only to attain age-appropriate speech and language but also to generalize these skills outside of the therapy setting. Hence, for early intervention, the first setting to generalize skills would be a child's home environment. "Parents and caregivers

are encouraged to integrate listening opportunities and strategies into everyday activities and to engage in frequent communicative interactions with their child" (Jackson & Schatschneider, 2014, p. 4). Although, professionals share their knowledge and expertise with families about effective interventions, families also hold a great deal of information to offer early intervention professionals about their particular situation, their child's skills and the kind of activities that they participate in to learn (Bruder, 2000). To encourage participation during AVT sessions and at home, a partnership must be developed between the auditory-verbal therapists and the parent. Byrne (2000) assigned the role of the parent in this partnership as a "teacher" which entails greater probable direct effects of the intervention program. This language intervention study demonstrated that 2 conditions: joint teaching (between the parent and professional) and a parent who received language training, resulted in greater effective outcomes for a child's, who has hearing loss, spontaneous language development.

Coaching strategies

A key aspect of AVT is training parents to be the primary language facilitators for their children. In order for the parent to assume the role of a "teacher" (Byrne, 2000), the therapist's role in the partnership must not be to provide direct delivery of services to the child, "but rather as guide and coach to the parents, assisting them in incorporating techniques that facilitate speech, language, and listening skill growth in the context the family's daily routines" (Rosenzweig, 2017). Rosenzweig (2017) provides a detailed overview of the Principles of AVT (AG Bell Academy of Listening and Spoken Language) with an emphasis on guiding and coaching parents to help their child use audition with their hearing technology as their "primary sensory modality", become the primary language facilitators through active consistent participation in AVT, create environments that support listening throughout the child's daily

routines, integrate listening and spoken language in the entire scope of the child's communicative behaviors, target skills (audition, speech, language, cognition, and communication) developmentally, and use the auditory feedback loop to help their child self-monitor spoken language through listening.

Parental engagement

As early as infancy, a child and a parent are communicating through multiple behaviors such as gestures and vocalizations. These early interactions between a parent and a child is critical during all areas of development. They provide communication opportunities that help a child obtain optimal acquisition of speech and language. Delaney & Kaiser (2001) described parent-child interactions as "transactional rather than unidirectional" meaning parents must be responsive to their children to create language-rich environments and manage their behavior. Qualities of the interactions that can facilitate social communication and behavior development include contingent receptiveness during communication, joint attention, relating language to experience, and differential response to the child's behavior (Delaney & Kaiser, 2001). For a parent of a child with hearing loss, the interactions are expected to be much more involved. The Outcomes of Children with Hearing Loss (OCHL) project (Moeller & Tomblin, 2015) was a 6-year longitudinal study that followed children with normal hearing and children with hearing loss with a chronological age span between 6 months and 7 years of age (Tomblin, Walker, McCreery, Arenas, Harrison & Moeller, 2015). One of the key conclusions derived from this longitudinal study is that caregiver's seek to influence their child's linguistic outcomes by optimizing the quality of their communication exchanges. Ambrose, Walker, Unflat-Berry, Oleson, & Moeller (2015) found that improved quantity and quality parental linguistic input influenced developmental outcomes for children with hearing loss at 18 months and 3 years of

age. However, the following differences in caregivers' input were noted when compared to children with normal hearing: the quality and quantity decreased at later ages and increased use of directive utterances. Over 90% of children who are have hearing loss are born to parents who have typical hearing (National Association of the Deaf). As the child grows older, the interactions become more complex and verbal language is encouraged to be used more frequently by the parent. Parents become the primary language facilitators and create environments that provide daily listening opportunities (AG Bell Academy for Listening and Spoken Language).

Monolingual, Spanish-speaking families

According to the 2017 U.S. Census Bureau (2018), the Hispanic population is the largest racial minority in the United States with 58.9 million people. The Gallaudet Research Institute (2013) survey found that 19.4% of the U.S population who are deaf or hard of hearing (DHH) live in homes where Spanish is the primary language. This data includes children who use spoken (monolingual or bilingual) and/or sign language. Currently, there is limited research on parental involvement in pediatric hearing loss for Spanish-speaking families. A literature review conducted by Caballero, Munoz, Schultz, Graham, and Meibos (2018) emphasized the need to understand Hispanic parent perspectives in order to promote parental engagement in the diagnosis and treatment process of their child. The following key elements were shared among the five studies of their review: "deafness causality, cultural attitudes, and cultural values" (p. 33). Negative feelings of the diagnosis, community stigmatization, role of extended family, close relationship with providers (healthcare, educators etc.), the value placed on fatalism, and their respect towards authority figures may go against their own personal choices and/or beliefs may impact parents' inclination to seek out further resources to better support their child's

overall development. Kohnert, Yim, Nett, Kan, & Duran (2005) addressed a series of clinical questions in a literature review to guide therapists in clinical decision making when working with linguistically diverse preschool children with language impairment. One of the questions involves parent involvement and the effectiveness of parent training with families whose primary language is not English. The researchers suggest that parent training is an option to generalize techniques in the home language by performing tasks such as reading, singing etc. that focus on a single language and maintaining the same amount of exposure to each language spoken at home. In addition, a shared primary language is necessary for communication in parent-child relationships to facilitate the family's cultural social, emotional, and cognitive development. Bunta and Douglas (2013) hypothesize that the success of English language skills in bilingual children with hearing loss in their study could be contributed to dual-language support via parental involvement in therapy by encouraging parents to use their native language to deliver their child language opportunities. Previous research has assigned parents the role of "teacher" during parent-child interactions for children with hearing loss (Byrne, 2000). However, according to the American Speech-Language Hearing Association (ASHA), it is essential for practitioners to consider cultural dimensions such as the roles each family member and the family's approach to instilling language that may be influenced by their individual cultural values ("Cultural Competence", n.d.).

Parent engagement scales

The quality and quantity of parent-child exchanges have a significant impact on optimizing a child's developmental outcomes (Ambrose et al., 2015). According to Bontinck, Warreyn, Meirsschaut, & Roeyers (2018), existing measures of social interaction use one of two coding methods: "moment by moment frequency coding and global rating scales" (p.3).

However, due to scarce research evidence, there is not an accord on how to assess and measure parent-child interactions reliably and effectively.

Ingersoll and Lalonde (2010) developed an observer rating scale, RIT fidelity of implementation form, to ensure proper implementation of Reciprocal Imitation Training (RIT) on 4 children with autism spectrum disorder (ASD). Through coaching and feedback, clinicians were trained to maintain "90% correct implementation" of RIT components with the participants over three sessions (p. 1043). Trained therapists rated each session on a scale from one (low fidelity) to five (high fidelity) on the following components: Contingent Imitation, Linguistic Mapping, Model, Pacing, Prompt and Praise. Component definitions and descriptions of strategies for each component were provided relative to each rating score. By using the RIT fidelity form, the researchers found correlations between the therapist's rate of use of individual RIT components with the rate of language use in their participants. Additionally, lead therapists were able to determine if additional training was needed if the treating therapist's average rating fell below a 4 during a session. Recent research by Wainer and Ingersoll (2015), used an adapted RIT fidelity form in their study to rate parent use of additional components during a telehealth RIT training program.

The Dyadic Parent-Child Interactive Coding System, fourth edition (DPICS-IV) is a standardized behavioral observation coding system designed to evaluate the quality and frequency of parent-child interactions (Eyberg, Nelson, Ginn, Bhuiyan & Boggs, 2013). The DPICS-IV is used alongside Parent Child Interaction Therapy (PCIT) to code parent and child verbalizations to track the progress of parenting skills and child compliance (Eyberg et al., 2013). Throughout PCIT, the clinician trains, observes, and codes the interactions with DPICS during parent-child structured play activities. Data collected from the determines whether PCIT

is a suitable treatment by identifying specific issues in parent-child interactions. If PCIT is implemented, the DPICS is used by the clinician to track progress and establish treatment goals. Additionally, it assists clinicians to establish whether a family is ready for phase continuation and the completion of PCIT. The DPICS codes the category, Parent Behaviors, as Praise, Description, Question, Criticism, Direct Command, Indirect Command, Reflective Statement, and Neutral Talk. Child behaviors are coded in a separate category, Child Responses to Commands, with Compliance, Non-compliance, and No Opportunity. A description of parent behaviors and Child Responses accompanies each code. Three standard parent-child interaction conditions are observed using the DPICS: Child-Led Play, Parent-Led Play, and Clean-Up. Both parent and child verbalizations, vocalizations, and physical behaviors are coded. Although the coding system was designed specifically for PCIT, its core features such as focusing on direct observation of parent-child dyadic interactions, allow the DPICS to be adaptable with the situations and categories it is used for as well as the manner behavior frequencies are documented.

Measuring parental engagement can be an intricate process. Particularly, when observing parent-child interactions in home environments. One observational measure that may be used to assess the quality of family engagement is the Home Visit Rating Scales-Third Edition (HOVRS-3) (Roggmann et al., 2019). Compared to previous versions of the HOVRS, this edition provides revisions to better guide observers using the measure. Changes made to the measure consisted of further clarification of scale terms, more consistent wording throughout each indicator, and reordering the scales to emphasize the caregiver-home visitor relationship. The HOVRS-3 consists of scales that rates the home visitor's ability to increase caregiver-child interactions, parent participation, and the child's interactions with the caregiver. The study's

results found high reliability and validity for the HOVRS-3. The researchers found that if home visits were highly rated, positive outcomes were increased for both child and the parent. Furthermore, significant findings of the use of the total score to assess the overall home-visit quality provide strong support of parenting as an important method to improve child development.

Parent engagement scales can be used as guides for service providers to improve the quality of their practice as well as to help keep track of the caregiver's mastery of skills and techniques to further support the overall developmental outcomes of their child at home. Although the current literature provides a variety of coding systems to measure and analyze distinct aspects of parent-child interactions, there is not a coding system to monitor the facilitation of auditory skills. The development of this scale to measure parental engagement is significant to research due to the implications on for the speech-language pathology field to better provider services in parent training, particularly when working with children with hearing loss and their families.

Telehealth

As technology becomes more innovative and accessible, internet access is expected to rise. Hence, services in multiple fields have begun to adapt their models of service delivery to technology-based such as speech-language pathology and telehealth. ASHA defines telehealth or telepractice as "the application of telecommunications technology to the delivery of speech language pathology and audiology professional services at a distance by linking clinician to client or clinician to clinician for assessment, intervention, and/or consultation." ("Telepractice", n.d.). The concept of videoconferencing intervention is to provide similar in-person intervention where providers can communicate with caregivers, observe caregiver-child interactions, and

bestow feedback across distances in real time (Hall & Bierman, 2015). Doarn. Yellowlees, Jeffries, Lordan, Davis, Hammack, McClosky-Armstrong, & Kvedar (2008) address relevant societal factors such as the increase in retirement age for baby boomers, growth in chronic diseases, rising cost of transportation, lack of skilled medical professionals, disproportion of number of health care professionals to patients as drivers for medical providers to adopt the use of telehealth and other emerging technologies to address these issues among their patients.

Impact for service mode for speech-language pathology

Molini-Avejonas, Rondon-Melo, Higuera Amato, & Samelli (2015) conducted a systematic review on the provision of speech-language pathology services via telehealth. Their results indicated that telehealth has seen an increase in use in the last 5 years with the United States being one of the countries with the largest number of published studies. According to a recent ASHA SLP Health Care Survey, approximately 80% of SLPs employed in the United States work in either cities or suburbs while less than 20% work in rural areas ("Survey Methodology, Respondent Demographics, and Glossary", 2017). In addition, Workforce SLP Health Care Survey found that 35% reported that job openings surpassed job seekers (ASHA, 2017). Therefore, considering telehealth as a model of service delivery may increase access in underserved regions where there is limited provider availability (Houston & Stredler-Brown, 2012). Results from an extensive literature review by Mashima & Doarn (2008) found that telehealth also offered the opportunity for "professional growth and skill development" for medical specialists through interaction with colleagues from university medical centers. In addition, telehealth can benefit cost-effectiveness in settings that have critical personnel shortages such as home health and traveling school services by "minimizing travel expenses and reducing staff time". Other studies have reported the same and additional advantages to the use

of telehealth such as delivering an approach of coaching and observation to caregivers; and early outcomes proposing equal results when paralleled with typical in-person intervention (Baharav & Reiser, 2010; Boisvert, Hall, Andrianopoulos, & Chaclas, 2012; Boisvert, Lang, Andrianopoulos, & Boscardin, 2010; Edwards, Stredler-Brown, & Houston, 2012; Grogan-Johnson, 2012; McCarthy, Duncan, & Leigh, 2012; Theodoros, 2011).

Language development

Previous research has provided evidence for significant language development outcomes regarding the delivery of speech and language intervention via telehealth. Scheidman-Miller, Clark, Smeltzer, Cloud, Carpenter, Hodge, & Prouty (2002) developed a pre-pilot study to assess whether telemedicine would be an effective language and articulation approach for students with articulation deficits in a rural Oklahoma school. After five weeks of telemedicine intervention, significant improvements in social interaction, problem solving, and memory were reported. Due to the favorable results from the pre-pilot study, a thirty-week pilot study was created which yielded similar clinical outcomes with higher improvements in expression and problem solving. Seven studies of a systematic review focused on speech and language intervention for primary school-age children further show positive findings when comparing in-person delivery to telehealth-delivered speech and language services (Wales, Skinner, & Hayman, 2017). For example, Grogan-Johnson et. al, (2010) conducted a pilot study that compared the efficacy of telemedicine with traditional face-to-face intervention for two groups of school-age children with articulation, language and/or fluency disorders. One group of children received intervention via telemedicine for four months and afterwards face-to-face intervention for four months. The other group received face-to-face intervention for four months and subsequently telemedicine treatment for four months. The study's outcomes reported no differences between the two

groups and all students made similar progress when assessed with the Goldman-Fristoe Test of Articulation – Second Edition. Additionally, satisfaction surveys indicated that parents, students, and SLPs were supportive and satisfied with the telemedicine intervention model. Recent studies provide further support on the equivalent treatment effects of telehealth in comparison to traditional in-person services for school-age children (Coufal, Parham, Jakubowitz, Howell & Reyes, 2018; Grogan-Johnson, Gabel, Talyor, Rowan, Alvares, Schenker, 2011)

Parent engagement

Mashima & Doarn (2008) found that parents and therapists were generally satisfied with the telehealth services provided despite not having the physical presence of the therapist. The Virtual Home Visit (VHV) Project monitored 36 families of children enrolled in the Up to 3 Early Intervention Program in face to face (F2F) and videoconferencing sessions (Olsen, Fiechtl, Rule, 2012). To measure interactions (e.g. provider-parent, provider-child, and parent-child), the authors developed a coding system based on the HVOF (McBride & Peterson, 1997). Although parent-child interactions were observed more frequently during F2F visits, coaching including the therapist providing feedback while observing the parent implement strategies with their child was statistically significant during VHV. Stredler-Brown's (2017) study on the use of telehealth for family-centered intervention (FCEI) for children with hearing loss state describe the role of parents during sessions. The results demonstrated that caregivers become more active participants and acquire more direct-contact responsibility during the session. The review of the literature found that the most frequently used FCEI provider behavior was observation where the provider observes the caregiver interact with the child (Campbell & Sawyer, 2007; Campbell & Sawyer, 2009; Colyvas, Sawyer, & Campbell, 2010; McBride & Peterson, 1997; Peterson, Luze, Eshbaugh, Jeon, & Kantz, 2007). The University of Akron's School of Speech-Language

Pathology and Audiology established a telehealth delivery model for intervention for families of children with hearing loss (Houston, 2012). The practitioners provide materials and demonstrate the session activities prior to asking caregivers to engage with the child. During parental engagement, practitioners observe and become coaches. Positive reinforcement and constructive feedback is provided throughout the intervention process. The teleintervention (TI) model has proven to be successful in increasing parental confidence in their role as primary language facilitators for their children. Research by Blaiser, Behl, Callow-Heusser & White (2013) showed similar results for parent-child engagement via TI. Compared to home visits, the TI group rated higher on the following indicators on the Home Visit Rating Scales-Adapted and Extended to Excellence (HOVRS-A+): parent-child interaction and parental engagement. There was a statistically significant difference particularly with parent-child engagement that could be due to the increase of provider-parent interaction during the TI sessions. The nature of telehealth requires active participation of the parent due to the therapist being physically unavailable to modify the session or elicit the desired behavior from the child (Hamren & Quigley, 2012).

International Telehealth

Regardless of geographical location, telepractice is an option for families who live in distant settings to access competent and expert practitioners to meet their needs (McCarthy et al., 2012). In 2017, the World Bank Group estimated that approximately 45% of the world-wide population use the internet ("Individuals Who Use The Internet"). A recent report by the Pew Research Center has found that 19 emerging and developing countries have increased their use of the internet by more than 12% in the last five years compared to advanced countries such as the United States where internet use has remained fixed (Pushter, Bishop & Chwe, 2018). Over the years, the internet has become a channel of communication that facilitates pursues of knowledge

for instance advice or an opinion on health information. Yet, using a monitoring framework for universal health care coverage (UHC), the WHO and World Bank Organization found that at least 400 million people worldwide do not have access to basic healthcare (2015). Due to the lack of ease of access to healthcare providers in developing and remote areas in the world, consultations via technology-based modalities is ideal for international outreach. Speech-language pathology is a specialized medical field that is not readily available or non-existent in all nations due to deficiency of funds, practitioners or inaccessible location (Shprintzen & Golding-Kushner, 2012). It is inferred telepractice would be suitable for SLPs scope of practice as they rely more on auditory assessment of their client's speech production and adaptions of standardized protocols can be easily achieved to use through telehealth. An international telehealth model was used by the researchers to diagnose and treat patients with velo-cardio-facial syndrome (VCFS) from their center in New York to Europe, Asia, Africa, and South America. The success of their distance care program was that the practitioners were not entirely reliant on physical contact with their clients but more on the comprehensive review of client information prior to their sessions. Likewise, researchers found that examination of speech production issues, could be precise "based on information obtained from a distance by combining a store-and-forward approach with real-time (synchronous) videoconferencing" (p.19). McCarthy et al. (2012) discussed the application of international telepractice in Australia to create a conduit of service for children with hearing loss in Samoa. Initially, the children had 3-month stay post-cochlear implantation at the Royal Institute for Deaf and Blind Children (RIDBC) where they received AVT sessions and attended the auditory-oral preschool. The children and at least one parent attended weekly AVT telepractice sessions after returning to Samoa. RIDBC practitioners coached parents and trained staff at the children's local education

center to use auditory-verbal techniques to generalize at home and school. The use of telepractice to assist in overcoming the limited accessibility of auditory trained professionals for children with hearing loss in Samoa provides an example of creating opportunities beyond international borders.

International considerations.

Prior to engaging in telepractice, professionals must consider factors that can affect service-delivery particularly to multicultural populations. Practitioners must bear in mind comprehensive language and cultural matters when creating goals and activities (McCarthy et al., 2012). Per ASHA, it is important to assert requirements for international speech-language pathology associations and seek "additional resources on providing services with cultural and linguistic sensitivity" (Telepractice: Key Issues). Edwards-Gaither (2018) discussed elements to emphasize the crucial need of having culturally competent practitioners in the field to better service their diverse clientele via telepractice. These elements highlight the importance of choosing assessments and treatment options that are culturally and ethically appropriate. Cohn (2012) provides a summary of the ethical service-delivery of telepractice or tele-ethics for communication disorders practitioners. Using the ASHA Code of Ethics, associated ASHA telepractice guidelines, and other resources, the author attempts to answer relevant ethical questions to guide new and current telepractitioners. Notably, the introduction of the "Telepractice Bill of Rights" provides an important overview of the client's expectations from their clinician when receiving services via telepractice such as being knowledgeable of the client's cultural background and providing if not the same but better-quality service-delivery in comparison to traditional in-person delivery (p. 13-14). In addition to cultural competence, SLPs may also encounter a language barrier. Using an interpreter can help clinicians overcome this

obstacle particularly if the interpreter has experience with communication disorders (Shprintzen & Golding-Kushner, 2012). According to Mashima & Doarn (2008), client candidacy for this model of service-delivery is generally determined on "case by case basis" by a number of factors including "cultural/linguistic considerations such as the availability of an interpreter if needed" (p. 1102). The "Collaborating with Interpreters" practice portal (ASHA, n.d.) provides key issues related to using interpreters, translators, and transliterators in a SLPs specific work setting including telehealth. These trained communication professionals may embody the roles of "cultural broker" or "linguistic broker" (Torres, Lee, & Tran, 2015; Orellana, Martinez, & Martinez, 2014). In other words, they inform and provide judgements for clinicians on areas of language and patterns of social interactions that are appropriate for that client's community. Multiple resources on ASHA provide further guidance for practicing clinicians who may or are currently using telepractice as a means of service-delivery when working with a diverse population. This includes the ASHA "Cultural Competence" practice portal (n.d.), "Cultural Competence Self Awareness Tool" (n.d.), and "Issues in Ethics: Cultural and Linguistic Competence" (2017). Through establishing cultural competency and adhering to the SLP's professional code of ethics, clinicians can serve clients internationally through online platforms and continue to "cross geographical and cultural boundaries from their homes and offices" (Edwards-Gaither, 2018).

AVT.

According to the A.G. Bell Academy for Listening and Spoken Language, 75% of more than 800 worldwide certified Listen and Spoken Language reside in the U.S. (About the LSL Specialist Certification). Compared to number of SLPs currently working in the U.S., there is a larger medical personnel shortage that are specialized in knowledge and skills for the population

of children with hearing loss (Houston, Munoz, & Bradham, 2011; Houston & Perigoe, 2010; Houston & Stredler-Brown, 2012; Moeller, White, & Shisler, 2006; Shulman, Besculides, Saltzman, Irys, & White, 2010). Telehealth may contribute to solving this issue by increasing the range of settings and scope of practice to speech-language professionals (Edwards-Gaither, 2018). Similar to the University of Akron's delivery approach model (Houston, 2012), other providers have employed telepractice to obtain greater access to the hearing loss population to address their developmental, communicative, and rehabilitative needs (Behl, Houston, Guthrie, & Guthrie, 2010; Hamren & Quigley, 2012; McCarthy, Munoz, & White, 2010). In the western Washington region, Listen and Talk is an early intervention and AVT program that employs "distance technology" to deliver services across the region to improve outreach for services (Hamren & Quigley, 2012, p.404). Providers who work for this program reported that their experiences with telepractice reflected the following benefits for families compared to traditional models of delivery: more consistent attendance to sessions, improved parental engagement during the sessions by means of provider coaching strategies, and better collaborative opportunities with the families' other service providers. As stated before, a key component of AVT is to increase parental involvement in their child's language development. The DePaul School for Hearing and Speech in Pittsburgh collected data to monitor skills for both parents and children receiving services from a LSL professional (Parfitt, Ramachandar & Auld, 2016). Due to the long daily commute to the facility, the professionals initiated "reverse telepractice" where the parent observed the session between the LSL and their child at the location (p.30). After the session, the professional and parent would discuss generalization strategies to implement at home. Early findings indicated a growth in important skills: growth in parent's self-confidence to providing plenty of language opportunities in multiple settings, tracking and encouraging

auditory skill development, and practicing auditory skills at home. Further advantages of telepractice for parent coaching include the feeling of comfort of being at home, decrease reliance on physical presence of therapist, and economical access to hearing loss professionals Drawbacks have been noted such as quality issues when using distance technology. Constantinescu (2012) reported that therapists who participated in the Outreach AVT telemedicine program found it difficult to assess the child's speech production (e.g., /s/ and /sh/ in final word positions) when compared to in-person intervention. Despite the audio quality issue, it was not considered a barrier and therapists instead used the parents to clarify their child's sound production. As the AVT program relies on training parents to improve their teaching skills, this disadvantage was seen as a potential to increase parental involvement to generalize listening and language strategies at home. By implementing distance technology, AVT providers can connect with patients and their families with necessary services that may otherwise not be available.

Impact on language outcomes.

Due to the shortage of face to face AVT provision, "children in rural and remote areas at risk of further isolation in their community as they struggle to achieve their full potential in education, vocation, and society" (Constantinescu, Waite, Dornan, Rushbrooke, Brown, McGovern, Ryan, Hill, 2014, p. 135). Currently, few studies have studied the effects of the use of telepractice to deliver AVT services to children with hearing loss. Blaiser et. al, (2013) randomly assigned 27 infants and toddlers to TI or in-person treatment groups for a six-month period. Each child received the SKI-HI Language Development Scale (LDS) as a pre-and post-test measure. The TI group obtained higher mean scores on expressive and receptive language skills compared to the comparison group. A pilot study in Australia found that seven children

who received tele-AVT services (eAVT) achieved similar language outcomes as the seven children who received in-person AVT at two-years post-amplification (Constantinescu et al., 2014). Additionally, the eAVT group performed within the normal range when compared to their hearing peers on the PLS-4. Researchers in Taiwan investigated the efficiency of eAVT for five Mandarin-speaking children with hearing loss (Chen & Liu, 2017). The eAVT preschoolers were matched to preschoolers who participated in conventional AVT based on 4 characteristics such as extent of hearing loss and age of amplification. All participants' language abilities were measured using the Revised Preschooler Language Assessment (RPLA) in person two years after enrollment in the AVT program. Results in language performances were not significantly different between the eAVT and traditional AVT groups. Lee, Hall, and Sancibrian (2017) examined phonological awareness in twenty children (preschool to second grade) with hearing loss in West Texas. Even though it was not reported if the children did or did not receive AVT services, findings provide added support for the use of telepractice for treating children with hearing loss due to the larger number of participants compared to the studies previously discussed. Ten children were matched in two groups and were assigned to either the telepractice or face to face group. Both groups received additional phonological awareness intervention with speech-language services. According to the ELLA phonological awareness test, after 12-weeks of intervention, the standard scores for the preschool and school-age telepractice groups increased from below average in pre-test to within average in post-test. When compared to the in-person group, there were no significant differences in post-test scores. The children who participated in the Depaul's telepractice project showed a growth in specific auditory skills, increase of utterance intricacy, capacity to follow multistep directions, and improvement in phonological processes (Parfitt et al., 2016). The findings of these current studies suggest that

telepractice is a feasible AVT service delivery model for children with hearing loss that is just as effective as in-person traditional AVT.

Previous research has indicated that several aspects influence speech and language development in children with hearing loss. These include the importance of early intervention, AVT, caregiver involvement and training; and the efficacy of telehealth as a provision of services. Although new evidence continues to support these factors, there are few studies have measured the impact of telehealth on parental engagement with families who are deaf or hard of hearing (Blaiser et al., 2013; Stredler-Brown, 2017). Specifically, documenting parental application of a central component of AVT, the auditory skills hierarchy (Erber, 1982). Based on this gap in the literature, researchers for the present study have developed a scale to document and measure caregiver implementation of the auditory skills hierarchy during AVT telepractice sessions. The specific aims were as follows: 1) a coding schema will be developed that will be a reliable means of measuring a caregiver's engagement and implementation of the auditory skills hierarchy and 2) to administer AVT services to families via international telehealth in order to increase caregiver involvement. The results will add further support for the significant need to continue research for parent implementation, effectiveness of coaching, and the use of telepractice for this specific population’s needs and skills.

CHAPTER III

METHODS

Research design

The research design of this initial pilot study was an IRB-approved retrospective, single case study.

Participants

A 2-year-old female child with bilateral cochlear implants, who was noted to be a bilingual language learner with a language delay, and her parents participated in auditory-verbal therapy sessions with a speech-language pathologist. Sessions were primarily provided in Spanish with a translator, the language the family was most comfortable speaking. The family had previously participated in auditory-based intervention with the same clinician at Arkansas Children's Hospital (ACH) in Little Rock, AR but continued services after relocating to Mexico via international telepractice.

A total of 2 raters participated in this study. Both raters were second-year, bilingual (proficient in English and Spanish) graduate students from the Communication Disorders (CDIS) program at the University of Arkansas. They had experience in diagnostic and clinical practicum (at least 12 months). They completed a graduate level course in auditory-rehabilitation and auditory habilitation. Additionally, they had experience in providing intervention for children with hearing loss. The principal rater was a researcher who helped develop the coding schema and was familiar with the rating procedures. The second rater required training with revision of the video sessions and coding measures.

Settings and materials

Video recordings of two 60 minute auditory-verbal therapy sessions were collected over the course of 6 months with services being provided via international telepractice. The clinician provided auditory-based intervention with a Spanish translator from ACH. The family completed the sessions using their own tablet and internet connections. All sessions took place in the home and were conducted over ACH's internet-based, password-protected video-conferencing program. All sessions were recorded using the clinician's screen-recording software. The family's and clinician's own toys and materials were used during all data collection sessions.

As is recommended by the World Health Organization, Wilson and Junger's (1968) work on the early disease detection and screening development was used as a foundation for the development of this screening instrument, the Caregiver-Child Auditory Skills Tracking (CAST) scale (see Appendix 1). It was determined that hearing loss is an important health problem and that auditory-verbal therapy is an accepted treatment for children with hearing loss via the literature review.

Crocker and Algina's (2006) text served as a reference for initial steps in scale construction. This scale is adapted from Ingersoll and Lalonde's (2010) RIT fidelity of implementation rating form. The scale is composed of several components. The first component is identifiable information regarding the client, parents, observer, and session. Scoring instructions are provided for the observer/rater. The domains on the scale are composed of Erber's (1982) auditory skills hierarchy (awareness, discrimination, identification, and comprehension) including descriptions of each skill. Fidelity scores (1= *low fidelity;* 5= *high fidelity*) are allocated across each domain. Caregiver behavior definitions accompany each

fidelity score. Fidelity scores are calculated to create a *Total Score* for session one and session two. The primary purpose for scale scores was identified as tracking caregiver progress in the ability to facilitate auditory skill development through the auditory skills hierarchy. Implementation strategies to identify each measured construct were identified as were specific items across each domain (awareness, discrimination, identification, and comprehension). The initial pool of scale items was developed by this researcher and three experts in the field with a combined over 40 years' experience in working with children with hearing loss and their families. A data sheet of implementation strategies of auditory skills was provided.

Procedures and scoring

Parent-led interactions were qualitatively coded by two trained, bilingual graduate student-raters using the CAST scale in session one and session two. Both raters conducted the review and coding of the sessions independently. Video recordings were coded by more than one rater to account of inter-rater reliability and were coded twice (approximately 4 weeks apart) to account for intra-rater reliability. Implementation strategies of auditory skills were identified using tally marks on the data sheet. The overall score of all the scale items was compared to the previous overall score of the sessions. The fidelity scores of the scale domains (auditory awareness, discrimination, identification, and comprehension) were compared to the previous fidelity scores of the AVT sessions. Total scores were documented for each session for comparison of parent implementation progress.

CHAPTER IV

RESULTS

In order to determine the validity and reliability of the CAST scale, a repeated measures ANOVA analysis was conducted to compare the effect of the rater (IV) on the auditory skills strategies data (DV) in the session one and session two conditions (As shown in Table 1). The following effects were reported: there is a significant effect of time for both sessions on auditory skills strategies data. The rater's auditory skills training had a statistically significant effect on auditory skills strategies data. There is no interaction of a session by auditory skills strategies data. However, there is an interaction effect of session and rater which may reflect the differences in training and familiarity with auditory skills strategies between the raters. Thus, these results suggest that the CAST scale has the ability to track a caregiver's implementation of auditory skills strategies over time.

Table 1: CAST Scale, Comparison of Raters, and Intervention.

	Degrees of Freedom	Sum of Squares	Mean Squared	F Value	Pr (>F)
Session	1	141.3	141.3	14.97	0.000131***
Rater	1	158.9	158.9	16.84	5.13e-05***
Stage	1	175.4	175.4	18.58	2.15e-05***
Session: Rater	1	60.2	60.21	6.378	0.012015*
Session: Stage	1	0.7	0.71	0.075	0.78418
Rater: Stage	1	0.2	0.17	0.018	0.893886
Session: Rater: Stage	1	11.9	11.88	1.258	0.262721
Residuals	334	3153.1	9.44		

CHAPTER V

DISCUSSION

A family's home is the first setting to generalize auditory-verbal skills by encouraging parents and caregivers to assimilate learned strategies into daily routines along in conjunction with frequent parent-child interactions (Jackson & Schatschneider, 2014). Therefore, the current study's goal was to determine the reliability of a developed coding schema to measure caregiver's implementation of the auditory skills hierarchy during an AVT session. Observers reviewed and coded video recordings of telepractice AVT sessions of a Spanish-speaking family who resided in a different country. The results of this pilot investigation have indicated the ability of the researchers to use the CAST scale to track a caregiver's progress of engagement and implementation of auditory skills. This was indicated by the comparison of post- and pre-data collection on the auditory skills data sheet. These findings are encouraging as it provides a baseline for the continued development and improvement of the pilot scale.

The use of telehealth as a mode of service delivery provided the child's parents multiple opportunities to lead the session. Due to the lack of physical presence of the clinician, the parents were required to initiate tasks and elicit responses from their child. The clinician continued to provide coaching via the translator such as giving suggestions on techniques to redirect their child to the task or how to improve an elicitation skill. The growth of responsibility for the parents to create a home environment that supported and integrated listening corresponded to the Principles of AVT (Rosenzweig, 2017). It is important to note that the family in this study already had an established relationship with the clinician including an understanding of AVT. Thus, future research may consider observing families from initial encounters with treatment to better track progress of implementation of auditory skills.

The ultimate goal of parent engagement is to support their child's skills development. During review of video recordings, it was observed that the child demonstrated language growth. In session one, the child's communication consisted of babble and imitation of sounds after modeling. Conversely, in session two, moderate increase of spontaneous imitation of single words and sounds was noted during play. This was concurrent with the increasing trend in parent participation. Comparatively, session two showed an accrual of data in both identification and comprehension auditory skills. The clinician's level of support decreased as well. That is, feedback during session tasks was reduced and praise was given instead to encourage the parents to continue performing as is. Evidently, the roles of the collaboration between the parent and the clinician had begun to establish as "teacher" for the caregiver (Byrne, 2000) and "guide and coach to the parents" for the therapist (Rosenzweig, 2017).

Limitations and future directions

The primary limitations to this study include insufficient rater clinical experience, further clarification of implementation strategies, and a small sample. Both raters who collected data for this current study were graduate students with less than 2 years' experience with AVT. The raters reported having to pause the video continuously to consult the auditory skills strategies sheet to ensure that their scoring was valid. Results indicated a disparity in data collection within and between each rater for post- and pre- sessions. This may reflect the difference in training between each rater with the auditory-verbal method. Future extensions of this study can benefit from prospective raters with increased exposure, knowledge and training of AVT. Moreover, increasing the number of raters analyzing a session may provide more consistent results in data collection. With the help from more experienced clinicians, the definitions of auditory skills strategies may be improved to help raters with their confidence of assigning

fidelity scores on the CAST scale. With regard to international telehealth, including raters and clinicians who are culturally competent and familiar with that particular client's culture is equally as important for the validity and reliability of the developed scale. The use of large randomized clinical trials, with diverse samples, is necessary to establish the effectiveness of telepractice as a conduit of service delivery. Due to the research design, the findings of the current study do not allow for generalization to the intended population nor to other populations. In addition, further research is needed to investigate caregiver implementation of auditory skills both in traditional face to face therapy and other service delivery models. This can contribute to the emerging body of literature suggesting that there is an equivalent effect on speech and language outcomes when comparing in-person services and telehealth in the pediatric population (Coufal, Parham, Jakubowitz, Howell & Reyes, 2018; Grogan-Johnson, Gabel, Talyor, Rowan, Alvares, Schenker, 2011).

CONCLUSIONS

The current study provides initial evidence of a pilot scale of caregiver implementation of auditory skills via international telepractice to families of children with hearing loss. The CAST scale may serve as reference for future research on the carryover of skills in AVT with emphasis on parent engagement. Likewise, the present research on telehealth continues to explore this branch of service delivery as an option for families residing beyond the borders of the clinician's practice settings. Certainly, questions of acceptability, effectiveness, and cultural outreach must be explored to determine how telepractice can fit within the scope of practice of speech-language pathologists.

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APPENDIX A

Caregiver-Child Auditory Skills Tracking (CAST) Scale

Parent:_____Child:_____Session:_____Observer:_____Date Observed:_____

Scoring: Review auditory strategies on pages XX – XX. Mark a tally for each strategy used in the designated boxes on page XX – XX. Assign fidelity score as summary of session based on caregiver's use of strategies identified.

Auditory Skill Hierarchy	**Low Fidelity 1**	**2**	**3**	**4**	**High Fidelity 5**
Detection: awareness of speech or sound	Parent does not use any auditory strategy or parent does not provide any acoustic information. [1]	Parent uses auditory strategies around the child's attentional focus less than 50% throughout session but misses the majority of opportunities. [2]	Parent uses auditory strategies around the child's attentional focus up to 50% throughout the session but misses many opportunities. [3]	Parent uses auditory strategies around the child's attentional focus for more than 50% of the session but misses opportunities. [4]	Parent uses auditory strategies for all of the session around the child's attentional focus. [5]
Discrimination: ability to differentiate sounds, including the introduction of new sounds to the environment	Parent does not use any auditory strategy or parent does not provide any acoustic information. [1]	Parent uses auditory strategies around the child's attentional focus less than 50% throughout session but misses the majority of opportunities. [2]	Parent uses auditory strategies around the child's attentional focus up to 50% throughout the session but misses many opportunities. [3]	Parent uses auditory strategies around the child's attentional focus for more than 50% of the session but misses opportunities. [4]	Parent uses auditory strategies for all of the session around the child's attentional focus. [5]
Identification: Ability to look at, point to, or label sound/item/object/word/picture described or labeled	Parent does not use any auditory strategy or parent does not provide any acoustic information. [1]	Parent uses auditory strategies around the child's attentional focus less than 50% throughout session but misses the majority of opportunities. [2]	Parent uses auditory strategies around the child's attentional focus up to 50% throughout the session but misses many opportunities. [3]	Parent uses auditory strategies around the child's attentional focus for more than 50% of the session but misses opportunities. [4]	Parent uses auditory strategies for all of the session around the child's attentional focus. [5]
Comprehension: Ability to logically respond to words/phrases/ sentences to demonstrate understanding of communicative intent	Parent does not use any auditory strategy or parent does not provide any acoustic information. [1]	Parent uses auditory strategies around the child's attentional focus less than 50% throughout session but misses the majority of opportunities. [2]	Parent uses auditory strategies around the child's attentional focus up to 50% throughout the session but misses many opportunities. [3]	Parent uses auditory strategies around the child's attentional focus for more than 50% of the session but misses opportunities. [4]	Parent uses auditory strategies for all of the session around the child's attentional focus. [5]

Session 1 Total Score

_____

Session 2 Total Score

_____

UNIVERSITY OF ARKANSAS

To:	Rachel Glade BELL 4188
From:	Douglas James Adams, Chair IRB Committee
Date:	04/27/2018
Action:	**Expedited Approval**
Action Date:	04/27/2018
Protocol #:	1804115841
Study Title:	Parent coaching and hearing loss: A case for international telehealth
Expiration Date:	04/19/2019
Last Approval Date:	

The above-referenced protocol has been approved following expedited review by the IRB Committee that oversees research with human subjects.

If the research involves collaboration with another institution then the research cannot commence until the Committee receives written notification of approval from the collaborating institution's IRB.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date.

Protocols are approved for a maximum period of one year. You may not continue any research activity beyond the expiration date without Committee approval. Please submit continuation requests early enough to allow sufficient time for review. Failure to receive approval for continuation before the expiration date will result in the automatic suspension of the approval of this protocol. Information collected following suspension is unapproved research and cannot be reported or published as research data. If you do not wish continued approval, please notify the Committee of the study closure.

Adverse Events: Any serious or unexpected adverse event must be reported to the IRB Committee within 48 hours. All other adverse events should be reported within 10 working days.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, study personnel, or number of participants, please submit an amendment to the IRB. All changes must be approved by the IRB Committee before they can be initiated.

You must maintain a research file for at least 3 years after completion of the study. This file should include all correspondence with the IRB Committee, original signed consent forms, and study data.