

Teachers' And Caregivers' Awareness Of Using Hearing Aids And Auditory Verbal Therapy Strategies For Hard Of Hearing Learners' Speech Enhancement In Machakos School For The Deaf, Machakos County Kenya

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ABSTRACT

Background: Auditory Verbal Therapy (AVT) equips caregivers with the knowledge needed to develop their child's listening and spoken language after being appropriately fitted with listening technology. The hard of hearing learners in Kenya have lacked therapists qualified in supporting and encouraging AVT, and they are mainly inclined to use Kenya Sign Language (KSL). This study established the teachers' and caregivers' awareness of using hearing technology and Auditory Verbal Therapy strategies for hard of hearing learners' speech enhancement in Machakos School for the Deaf, Kenya.

Materials and methods: The study was guided by the Bienenstock, Cooper, and Munro Theory (BCM, 2012). It adopted a mixed research design combining quasi-experimental and descriptive qualitative research designs. The target population was 5 caregivers and 12 teachers. Data was collected using interview schedules. The researcher used descriptive statistics to analyze quantitative data, while qualitative data was analyzed thematically.

Results: Findings from this study established that AVT, when used to compliment hearing aids resulted in improvement of speech perception skills in younger children with a lesser degree of hearing loss. Furthermore, lack of awareness, financial constraints and cultural issues were found to be barriers to effective application of AVT. It is recommended that regular hearing tests be done on the learners, caregivers, policy makers and curriculum developers. All relevant stakeholders be encouraged to embrace training of AV Therapists and use of AVT among children with hearing loss.

Conclusion: Early intervention should be encouraged in developing countries and awareness of AVT among teachers and caregivers of children with hearing loss.

Keywords: Auditory verbal therapy, hearing loss, teachers, caregivers

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I. INTRODUCTION

Childhood hearing loss is a very common yet serious condition (Flexer & Wolfe, 2020). Globally, thirty-four million of the 466 million people with hearing impairments are children (WHO, 2021) with more than thirty million of them born to hearing parents (AG Bell, 2021). Thomas & Zlowan (2019) propose many methods of rehabilitation for children with hearing impairment, such as cued speech, auditory-oral approach, manual communication (sign language), Auditory Verbal Therapy (AVT) and bilingual-cultural method. However, AVT is the most preferred method, as it teaches speech through listening with the exclusion of other cues like lip-reading and signing unless absolutely necessary (Akçakaya & Tavşancıl, 2016).

AVT or Listening and Spoken Language (LSL), is an oral-aural early intervention approach; an auditory rehabilitative therapy for improving the listening and spoken language ability of children who have hearing loss fitted with hearing technology (AVUK, 2020). The AV Therapist coaches caregivers and professionals working with the child to maximize the listening, help the brain make sense of the sound coming through the technology and thus develop the speech, language and social skills of the children. The areas of focus in the AVT are listening (audition), expressive language, receptive language, play skills, literacy skills, numeracy skills, cognition, pragmatics, and speech. It entails using comprehensive early intervention services like amplification, management of these devices, and involvement of the child's parents during the therapy sessions. According to Yoshinaga-Itano and colleagues, it helps children with hearing loss attain both expressive and receptive language as the only intervention approach that obliges the parent to be the client and the primary therapist of his/her child (Yoshinaga-Itano *et al.*, 2020). The emphasis on the parent-child rather than the therapist-child dyad leads to more effective and natural learning of spoken language (Cole & Flexer, 2020). It

operates on ten specific principles proposed by the Alexander Graham Association Deaf and Hard of Hearing (AG Bell) drafted from Doreen Pollack's proposals in 1970, which therapists must adhere to (Eastabrooks, Morrison and MacIver-Lux, 2020).

In the United States of America (USA), Alexander Graham Bell Association for the Deaf and Hard of hearing (AG Bell), a non-profit organization that deals with AVT certification and advocacy (AG Bell, 2021), trains all AV Therapists in the world. It came up with the name 'Auditory Verbal Therapy' in the 1970s despite AVT being in existence from the 1930s in the country. The Washington-based body has been in existence for 130 years and has 41 active chapters in many states in the US and 13 emerging ones both within the country and internationally. It works with children and adults with hearing impairments plus their families, healthcare providers, and educational experts. It equally conducts financial aid like scholarships to learners, education, and advocacy to accord them an opportunity to listen, speak and improve their quality of life. The AG Bell Academy for Listening and Spoken Language (AG Bell Academy), a subordinate organ of this body, began in 2005. Its role is training speech-language pathologists (SLPs), audiologists, and teachers of the deaf for an additional three years to enable them to become either Certified Auditory-Verbal Therapists (LSLS Cert. AVT™) or Certified Auditory-Verbal Educators (LSLS Cert. AVEd™). By 2021, the academy had certified 1000 AVT professionals across 30 countries, 728 of them based in the USA (AG Bell, 2021).

In South Africa, AVUK alongside the members of the South African Cochlear Implant Group (SACIG) formed the LSL-South Africa (LSL-SA) in 2005 (Casoojee, Kanji & Khoza-Shangase, 2021). However, the country has only 3 certified AV Therapists (AG Bell, 2021). The Carel Du Toit Centre, founded in 1978, offers AVT programs to children with hearing loss and coaches their parents at the CHAT center (CDT, 2022). In 2016, it launched the Tygerberg Hospital In-patient New-Born Hearing Screening Program which has screened 20,000 children from its inception. Many children are mainstreamed in various schools for the Deaf across South Africa who prefer AVT for hard of hearing learners (Bell *et al.*, 2021). However, despite its widespread acceptance in the country, challenges such as financial constraints, lack of trained personnel, and inadequate involvement of parents affect it.

In Kenya, however, there is no certified AV Therapists, and the lack of awareness of this technique is alarming. Some Speech-Language therapists apply the AVT strategies especially in clinics like Speech Therapy Totos (Speech Therapy Totos, 2018). There is however, no evidence of parental involvement, a critical tenet of AVT. The Kenyan parents who desire to pursue the Listening and Spoken Language (LSL) pathway after amplification of their children with hearing loss lack support in their journey. Moreover, there is currently no research in Kenya on this area.

In Machakos School for the Deaf, hearing aids have been provided for the hard of hearing learners but AVT has not been used for enhancing speech. As such, they have not been able to experience the enhancement of their listening and spoken language skills. The knowledge of the efficacy of AVT is also unknown due to lack of evidence of widespread practice or a documented study of the same in Kenya. Furthermore, there is paucity of literature explaining how AVT if complemented with caregivers involvement and consistent wearing of technology, can help enhance the speech of the hard of hearing learners in Machakos School for the deaf hence necessitating this particular study. This chapter centered on evaluation of previous works correlated to this current study. Here, the researcher reviewed literature under various sub-headings such as speech perception before using hearing technology and AVT strategies, effects of using hearing technology and AVT strategies on speech perception, role played by selected learner's demographics on the efficacy of AVT as well as teachers' and caregivers' awareness of using hearing technology and AVT strategies.

Speech perception prior to using hearing technology and AVT strategies

Hearing loss has an immense impact on the perception of speech. Children produce what they hear, a concept mostly referred to by professionals as "garbage in, garbage out" (Rotfleish & Martindale, 2023). The errors in speech perception are pointers to issues with auditory access as well as discrimination or identification of speech sounds. The effect increases with late identification and intervention and makes the child lag behind his/her typically hearing peers in ordinary life. Errors in discrimination impacts speech and language development as well as the child's vocabulary, speech perception in noise, and everyday functioning. Moreover, the consonants and vowels, the essential speech sounds/ phonemes are affected, as discussed below.

To begin with, according to Walker and colleagues (Walker *et al.*, 2018), children who are hard of hearing can perceive less vocabulary than their peers who are normal hearing. They conducted a study among 155 children (62 normal hearing (CNH) and 93 hard of hearing (CHH)) in the USA to investigate the breadth of their knowledge (number of words they know) and depth (how well they know the terms). They concluded that while the CHH group showed stable deficits in-depth, the CNH group had outcomes that are more remarkable in the breadth of knowledge. The study used a linear mixed model (LMM) and involved administering standardized tests for vocabulary knowledge administered at 7, 8, and 9 years. The factors for success included age, higher aided audibility, and maternal education. They found the age of hearing aid fitting to be

insignificant. Speech perception in noise is significantly limited among hard of hearing children despite amplification. They are also at a considerable risk for poor speech understanding in noise as well as in conditions with reverberation and noise (McCreery *et al.*, 2019). In a study conducted among 252 children (168 using a hearing aid and 84 using cochlear implants) registered in the Longitudinal Outcomes of Children with Hearing Impairment(LOCHI) study in Australia, Ching and colleagues (Ching *et al.*, 2018) found out that children need better signal-to-noise ratio to hear like their counterparts with normal hearing. For the hearing aid users, language and cognitive abilities influenced the perception. However, for the users of cochlear implant, age at which the CI was activated and language abilities were the most important forecasters of better results. However, this study only focused on very young children (5-year-olds), a gap this study addressed.

Moreover, according to Cupples and colleagues (Cupples *et al.*, 2018), who studied 339 children in the LOCHI program, the speech perception and production as well as everyday functioning of hard of hearing children is more than 1 Standard Deviation below their normal-hearing peers' control group, results also found by Pimperton and Walker(2018). They gave standardized tests such as Diagnostic Evaluation of Articulation Phonology (DEAP), Peabody Picture Vocabulary Test- Fourth Edition (PPVT-4), and Pre-School Language Scale Version 4 (PLS 4) alongside a collection of data on parent's reports on language using Parents' Evaluation of Aural/Oral Performance in Children (PEACH) and Child Development Inventory (CDI). They concluded that both early provision of amplification devices and education level of the mother were critical forecasters of better results.

To add to that, hard of hearing children experience severe delays in both perception and production of speech. Liu and colleagues (Liu *et al.*, 2016) realized that the 2-11-year-old participants they researched performed poorly in Mandarin, a Chinese Language. The children were tested using DREAM (Diagnostic Receptive and Expressive Assessment of Mandarin), a standardized test piloted in China. They noted in both perception and reception they performed at one to two SD below the mean of normal-hearing peers in all language domains.

In a study conducted by Muriithi(2019), an interview of 15 teachers from 3 special units having learners hearing impaired learners in Nairobi County revealed that perception and production of vowels were easier than consonants for hard of hearing learners. 92.3% of them (12 teachers) confirmed this. 84.6%(eleven teachers)said that producing voiced consonants was much easier than voiceless for the learners, while ten confirmed that plosives were easier than fricatives.

Teachers' and caregivers' awareness of using hearing technology and AVT strategies

There are many benefits of AVT, and it is by caregivers and teachers of learners who have graduated from the training. The caregivers find it engaging and able to make them develop self-efficacy. The AVT graduates can be mainstreamed into regular schools and living situations, build confidence, perform better in school, improve social interactions, build identity, and improve economically.

Most parents find AVT engaging even when Tele-therapy is involved (Mc Carthy&Arthur-Kelly, 2020; Houston, 2020). In a study conducted in the UK, it was realized that children who were engaged in tele therapy due to the COVID-19 lockdown measures performed as well as those who had attended in-person therapies in many bars. The parents also felt more involved in Tele-therapy than in the traditional method as their everyday routines were uninterrupted. A study carried out by AVUK (2020), five months into the lockdown, also found out that 78% of the parents investigated preferred Tele-practice to the in-person therapy, with 4 out of 5 desiring Tele-practice entirely or in combination with in-person. A study by the same organization found out that 78 % of the parents felt their children were making good progress courtesy of Tele-therapy with 85% of them expressing preference for the sessions (AVUK, 2022).

AVT also promotes parental self-efficacy (Ambrose *et al.*, 2020; AVUK, 2020), which is in line with the recommendations of the 2020 Alexander Graham Bell Global Symposium (AG Bell, 2020). It does this in many ways, such as demonstrating the valuable strategies for spoken language development, allowing them to practice the techniques in their everyday routines, giving them feedback, and encouraging them, and identifying and changing their negative beliefs on the child's impairment (Clark, Ashton, Kenely, & Hogan, 2021). In a study done in Denmark by Josvassen and colleagues (Josvassen *et al.*,2019), 97% of the parents expressed confidence in their capability to support the development of their children's receptive and expressive language using AVT to integrate the strategies taught in their daily lives.

Teachers also support AVT enables graduates to be mainstreamed into regular learning and living environments (AVUK,2022). In a consumer survey conducted among 153 AVT graduates in Canada and the USA by Flexer and Goldberg in 1993 and later in 2001, most adult graduates admitted to joining regular schools of typical living environments. One hundred fifty-two of the respondents had completed high school, with 70% having graduated as 16-18 years. Over 95% had post-secondary education. 77.6% of them could comfortably make calls, and 56.1% involved in various community activities. Ninety-two of the participants worked in various places as attorneys, engineers, graphic designers, among other careers. A follow up-study to build on

Goldberg and Research by Lim and colleagues (Lim et al., 2018) among 200 participants drawn from the various countries across the world confirmed that AVT was indeed beneficial for mainstreaming into schools and also improving living conditions of the graduates. The limitation of these studies was the use of participants amplified before five years and the lack of involvement of African or Kenyan graduates.

Furthermore, the AVT makes learners who graduate to feel confident, perform better in school subjects such as literature, and outshine their peers (Golbat & Pinto, 2020). In a study conducted in Jerusalem, Israel, it was realized through the telephone surveys of 52 adolescents and young adults subjected to AVT at an early age that they performed better in Hebrew and literature than the control group (non-AVT graduates). Moreover, AVT can improve social interactions among children with hearing impairments to enable them to be at par with their typically hearing counterparts. A study by Monshizadeh and colleagues (Monshizadeh *et al.*, 2018) among 30 children (Persian speakers) in Iran using CIs following a childhood hearing loss and 30 typically hearing children in Iran showed that regardless of sex, AVT helped children with sensory-hearing loss develop everyday social interactions.

Finally, Bell and colleagues (Bell *et al.*, 2021) conducted a study among 31 AVT graduates from the Cape Town-based Carel Du Toit Centre in South Africa. The alumni said the AVT method that helped them have a sense of identity. 45.2% were fully participating in the hearing world with the ability to speak and hear well. Fifty-four percent could comfortably participate in both the hearing and deaf worlds using blended methods to communicate. Their quality of life was also significantly improved. Twenty-two of them worked in various fields such as geology, education, pharmacology, and human resource. Six out of the nine who were not working were still studying, one looking for a job, one self-employed, while one did not answer. However, in this study the lack of diversity was the main limitation, as all the participants were based in Cape Town, a gap this study addressed as the participants hailed from various parts of Kenya.

II. MATERIALS AND METHODS

Research Design

This particular study utilized a mixed research design employing both quasi-experimental and descriptive qualitative studies. Mixed designs are preferred because they combine qualitative and quantitative methods, enabling a comprehensive understanding of the research problem, which one approach cannot achieve with just one approach. (Tracy, 2019). Furthermore, the quasi-experimental design (quantitative) was complemented by the descriptive design (qualitative). As such, the researcher was able to speech train the learners and seek their opinions as well as their teachers and caregivers' on AVT.

Location of the study

This study was done in Machakos School for the Deaf, a public primary school in Machakos County, Kenya. The location is approximately 80 kilometres East of Nairobi City. The school has a population of 242 learners, 17 of whom are hard of hearing. There are 12 teachers employed by the Teachers' Service Commission (TSC), one teacher employed by the Board of Management (BOM) of the school, and 2 teachers employed by the county government of Machakos. It is a mixed boarding primary school with learners hailing from diverse ethnic and cultural backgrounds across Kenya. The researcher has chosen the school as it has a comprehensive early intervention program that includes hearing aids by the government of Kenya, Starkey Foundation and the Lions Club of Germany through For a Better Life (FABL) organization for the hard of hearing learners. It is also in a cosmopolitan town, Machakos, hence, the learners are taught in English. Ten (10) of the hard of hearing learners had previously been introduced to speech training by a qualified SLP from Starkey. Introducing AVT to the learners was easy.

Target Population

This study was carried out in Machakos School for the Deaf. The target population for this study included all learners with hearing impairment, their caregivers and teachers. As such, the target population was 242 learners, 5 caregivers and 12 teachers, a total of 259 participants.

Table 1: Target Population

Categories	Number	Percentage
Learners with Hearing Impairments	242	93.4
Caregivers	5	1.9
Teachers	12	4.6
TOTAL	259	1

Sampling Techniques

This study used a purposive sampling technique hence utilized all the accessible population (Kothari & Garg,2019). Machakos School of the Deaf records shows that only 17 hard of hearing learners are available in the school from Pre-Primary 1 to Class8. In this study, only the learners who are hard of hearing were focused on. A hard of hearing person is one whose hearing loss varies from mild to severe with residual hearing; hence can use spoken language to communicate (WHO 2021).The learners latest audiograms were taken by two certified audiologists, Alex and Nicholas from Machakos Level 5 Hospital and Kenya Society for Deaf Children respectively.All the caregivers (housemothers) and all the teacherswerealso involved to stand in for the parents as required in the AVT practice. As such, the study utilized all learners who are hard of hearing, all their teachers and all their caregivers.

Sample Size

According to Kothari and Garg (2019), for small-sized groups, the whole group should be sampled if the participants have the same characteristics. In this study, the sample size consisted of all 17 hard of hearing learners, 10 teachers and 5 caregivers in Machakos School for the Deaf. The total sample was Thirty-Two (32), as displayed in Table 2 All of the available population was utilized.

Table 2: Sample size

Categories of Sample	Target Population	Sampled Size	Percentage
Learners who are hard of hearing	17	17	100%
Caregivers	5	5	100%
Class teachers	10	10	100%
TOTAL	32	32	100%

Source: Machakos School for the Deaf (2022)

Data Collection Instruments

This study employed adapted McCormick Toy Test (MTT) and Manchester Picture Test (MPT) norm-referenced tests and interview schedule (face-to-face) as the data collection instruments. Creswell and Creswell (2018) assert that these instruments enable the collection of valid data.

Interview Schedule

The researcher used a semi-structured interview schedule for interviewing 5 caregivers and 10 teachers as it is efficient for probing and gives in-depth information (Creswell, 2018). It is also very instrumental in small populations. The schedule had both questions on general information and open-ended ones. It was administered to the respondents within one week. The researcher recorded the responses provided by the conversation with the caregivers using her phone. In instances where the caregivers' reactions were not in English, the researcher provided a translation.

Data Analysis

The quantitative data obtained from the adapted MPT and MTT were analysed using the Statistical Package for Social Science (SPSS Version 22.0) which involved descriptive statistical techniques as well as presentation in percentages and tables. To analyze qualitative data obtained from the interview schedule on opinions of caregivers and teachers a thematic approach was employed by a thorough process involving data familiarization, coding of data, and both the development and revision of critical themes. The phone conversations from the caregivers was transcribed and translated in the when the responses were not given in English. The recorded one from the key-informant was also transcribed. Codes were developed from the transcription according to the objectives.

Logistical and Ethical Considerations

Before the start of the pilot study, consent from specific authorities such as the Kenyatta University Ethical Review Committee and National Commission for Science, Technology and Innovation (NACOSTI). After completing the pilot study successfully, the actual research was done with the approval of relevant authorities at Machakos School for the Deaf and consent from the learners' parents. The caregivers were informed that the phone conversations were being recorded. All participants filled a consent form to show that they are willing to participate in this study. To ensure confidentiality, the participants' personal identity and responses weren't disclosed to other people (Resnik,2018). The responses of the subjects were safely locked in a cabinet and only information relevant to the study collected to ensure privacy. The research poses no risks whatsoever so the subjects are safe. Finally, the researcher engaged the deaf community at Machakos School for

the Deaf through creation of awareness on AVT and publishing the research findings at the end of the study. The researcher showed respect for diversity, equity, co-learning and inclusion of the community members in the study and deviate from any activity that will be contradictory to the community values.

III. RESULTS AND DISCUSSION

Teachers' demographic information

Ten teachers, 9 females and 1 male teacher were involved in this research. The teachers sampled from PP1 to grade 8 classes were in the ages of 37 to 54 years. The youngest serving teacher had 7 years of service, most of the teachers (30.0%) had 20 years of service while one teacher had the highest duration of service (31 years). The teachers were well qualified as 50.0% of them had degree education and similar number had diploma training as shown in Table 4.3. However, despite their training in a tertiary institution, they had never heard of AVT in the course of their training. This result is supported by Akçakaya and Tavşancıl (2016) who propose that the reason teachers are unaware of AVT is because it is not included in the teacher training courses for teachers both in undergraduate and post-graduate programs.

Table 3: Demographic information of teachers

Demography	Category	Frequency (N = 10)	Percentage
Age (Years)	Less than 20	0	0.0
	21 – 30	0	0.0
	31 – 40	2	20.0
	41 – 50	7	70.0
	Above 51 years	1	10.0
Sex	Male	1	10.0
	Female	9	90.0
Academic qualification	Diploma	5	50.0
	Bachelor's degree (Education)	3	30.0
	Bachelor's degree (Special Ed.)	2	20.0
Years of service	Less than 10 years	1	10.0
	11 – 15	2	20.0
	16 – 20	4	40.0
	More than 20 years	3	30.0

Caregivers' demographic information

All the five caregivers were female in the ages of 40 to 50 years. The caregivers had never gone for AVT training hence needed caregiver coaching on the need to be involved in therapy (Estabrooks, Morrison & Maclver-Lux, 2020)

Table 4: Demographic information of caregivers

S/n	Caregiver	Sex	Age	Level of education	Wear time	Mode of communication	AVT training
1.	C/HoH/1/2022	F	50	No schooling	No	Sign Language	No
2.	C/HoH/2/2022	F	45	High School (F4)	No	Sign Language	No
3.	C/HoH/3/2022	F	40	High School(F4)	Yes	Speech Reading	No
4.	C/HoH/4/2022	F	47	Primary School(Class 8)	Yes	Speech Reading	No
5.	C/HoH/5/2022	F	43	Primary School (Class 8)	No	Sign Language	No

Concerning their education qualification, one of the caregivers (20.0%) had no formal education; two of the caregivers had primary level of education (40.0%) while two had high school education (40.0%) as shown in Figure 4.3. However, their level of education did not affect their ability to apply the two AVT strategies, a finding supported by Chen and Liu (2019) who found out that early intervention could effectively remediate the effects of the level of parental education. Caregiver involvement is proposed to be very effective and despite the the level of education, the therapist should be aware of their learning style and implement a strengths-based coaching strategy (Hearing First, 2020).

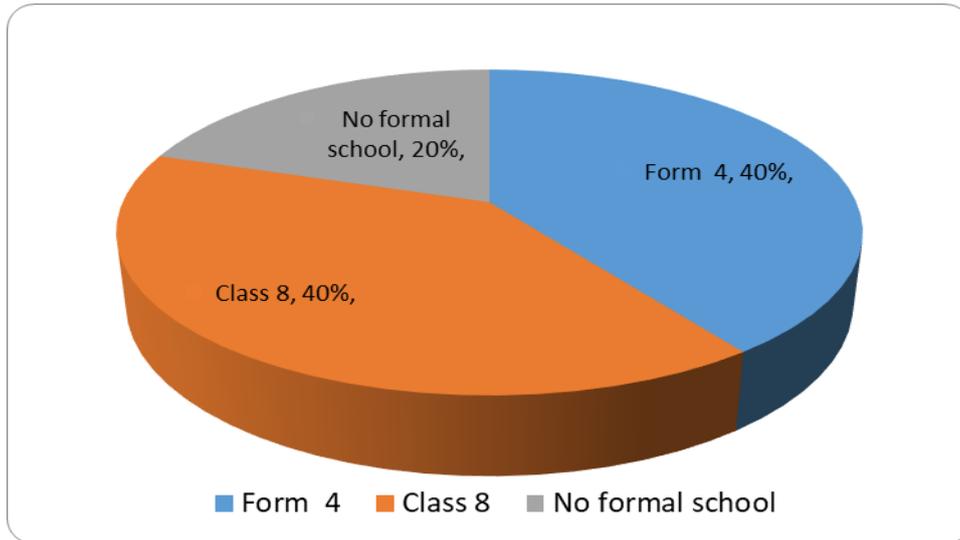


Figure 1: Education level of caregivers

Teachers' Qualifications in Speech Training

The teachers were all qualified and had trained in speech training. However, it was established that not all the teachers would encourage it for children with Hearing Impairment. A big number of teachers (40.0%) would not encourage this for learners who are hard of hearing.

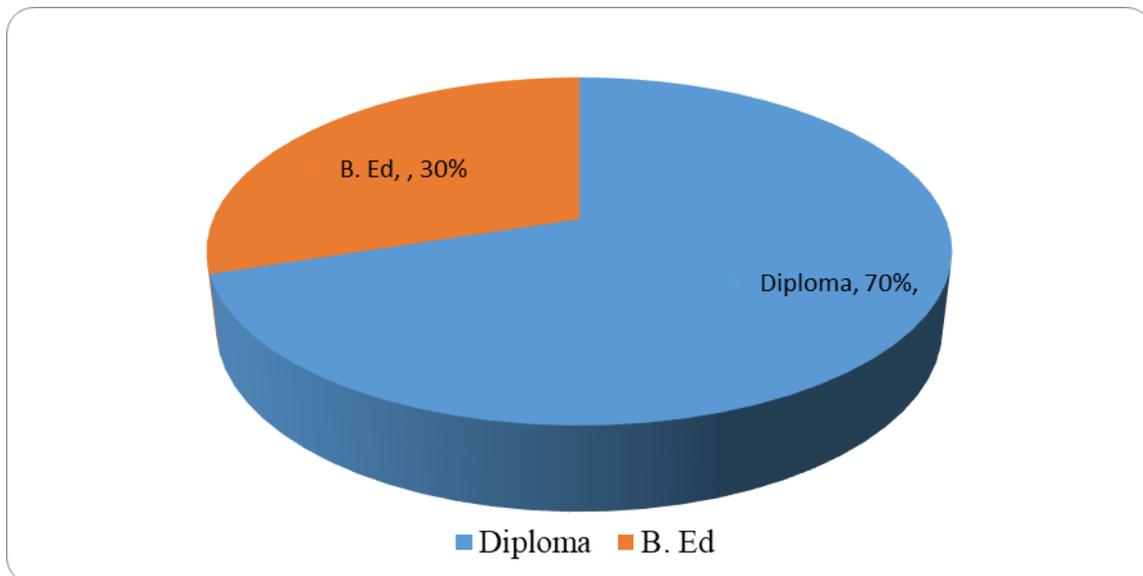


Figure 2: Teacher's qualification

Ten teachers sampled in this study were involved in teaching classes, PP1 to grade 8. Most of the teachers (40.0%) had taught children with HI for 15 – 20 years. Only one teacher (10.0%) had taught for a shorter period of 5 – 10 years as illustrated in Figure

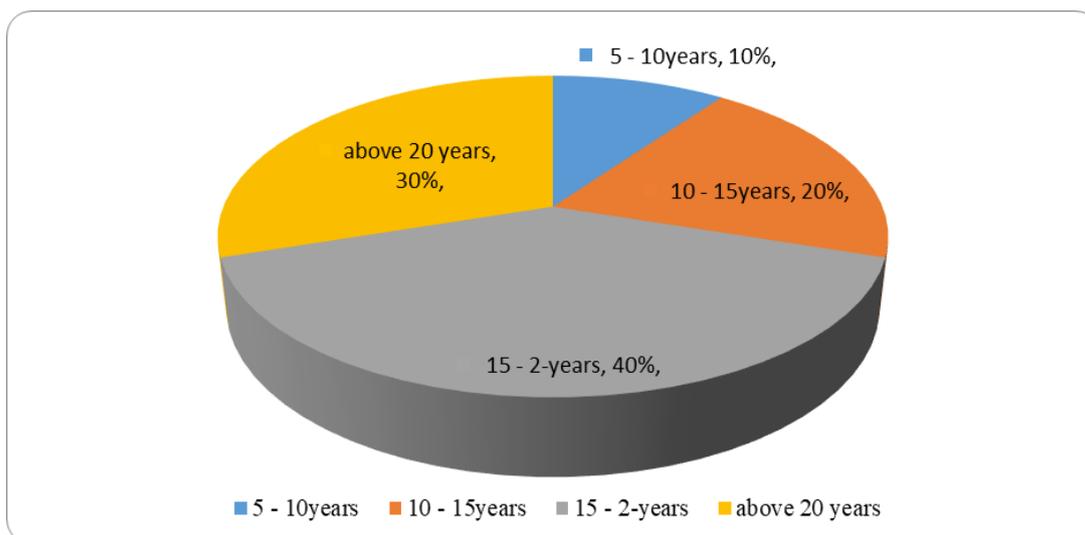


Figure 3: Number of years the teachers had taught children with Hearing Impairment

Teachers' awareness and opinion on encouraging wear time, speech training and use of speech for the hard of hearing learners

The study indicated that all the teachers had basic knowledge of speech training for learners with hearing impairment. A vast majority, 60.0% would encourage the use of speech training for hard of hearing learners.

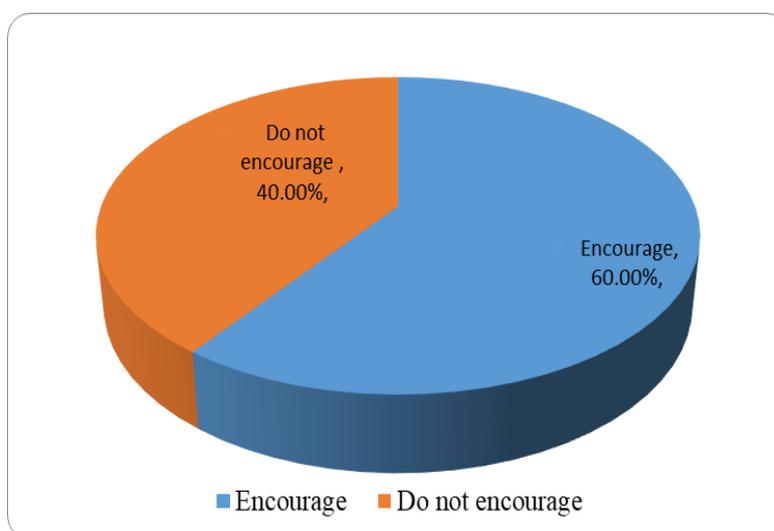


Figure 4: Teachers encouraging speech training of learners

All the teachers noted that consonant is the harder sound for the hard of hearing learners and 50.0% of them would encourage learners who are hard of hearing during their normal lessons to use their residual speech, a finding supported by Muriithi (2019). The remaining half of the teachers would not encourage the learners. The methods of encouraging the learners included encouraging them to voice their answers and make sure they sit near in class to reduce the distance between the teacher and the learner to make communication easier. They also encourage them to voice their answers in class as the teacher use total communication. The teachers also encourage preferential seating, total communication, lip reading and voicing. T/HoH/5/2022 stated; *"I do preferential seating as well as encouraging them to use their voice to answer questions"*

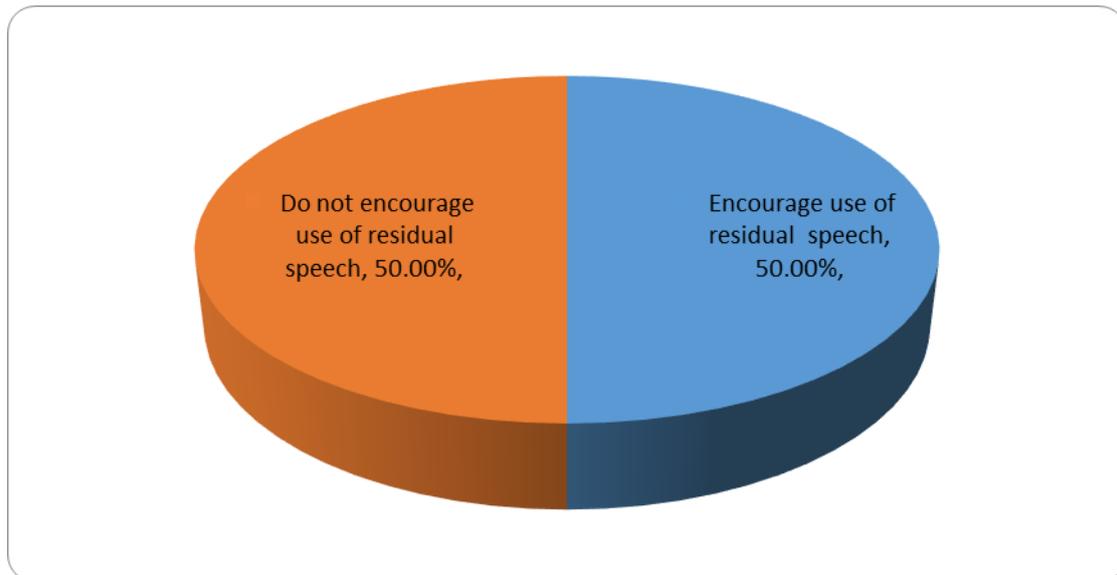


Figure 5: Teachers encouraging learners to use their residual speech during normal lessons

Teacher who do not normally use residual speech during normal lessons feel their speech is not clear so using speech for them is unnecessary. They believe that sign language is sufficient for the deaf and don't think there's any positive impact of speech training to children who are deaf. One of the teachers (T/HoH/2/2022) stated;

"I encourage all learners to use sign language"

During class hours, 40% of the learners do not wear hearing aids. In one instance, the child complained of headache and pain when wearing the hearing aids. The teacher felt it and encouraged the learner to avoid using his hearing aid. This is mostly associated to listening-related fatigue which is common among many hard of hearing people using hearing aids (Bess *et al.*, 2020; Davis *et al.*, 2021). However, most of the learners (60.0%) wear them. Those who wear hearing aids keep them on (3-4 hours) and some are not consistent. Some of the learners wear them as long as they are in class while some wear them 4 – 5 hours in a day. However, a few cases of broken and stolen hearing aids as well as hearing aids lacking batteries, have been noted by the teachers. T/HoH/8/2022 stated;

"I ensure they wear hearing aids during the class hours (around 4-5 hours)"

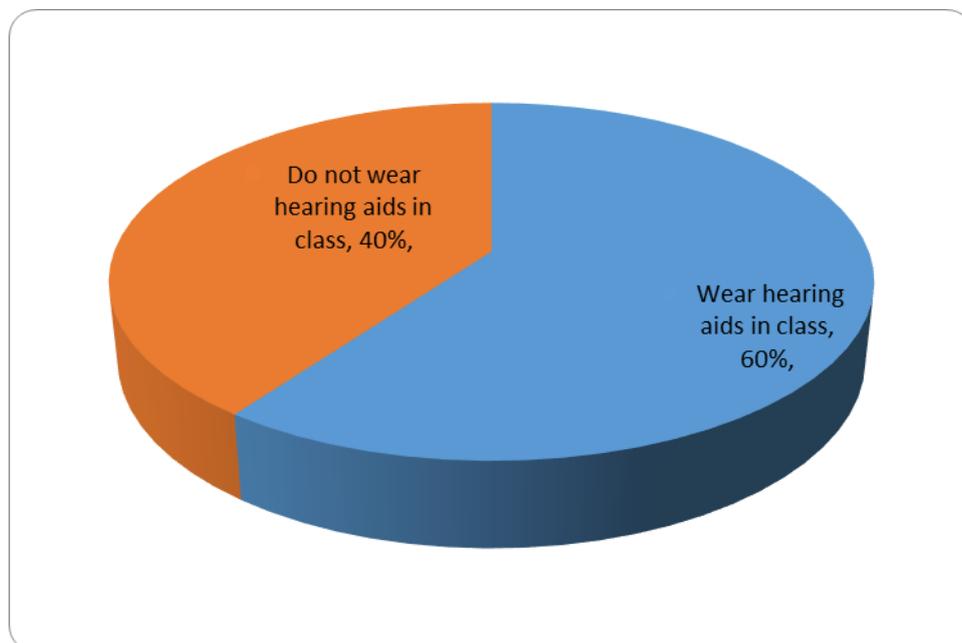


Figure 6: Learners wearing hearing aids in class

Most learners who do not wear hearing aids prefer using sign language and not speech. This result is supported by the findings of Picou and colleagues (Picou *et al.*, 2020), the longer the wear time, the better the speech outcomes. Learners who wore their hearing aids for a longer time were mostly those supported by teachers and they had better speech perception outcomes.

Teacher's awareness of the application of AVT strategies

Prior to this study, only two teachers (20%) had heard of AVT having attended a training in Nairobi facilitated by a qualified Auditory Verbal Therapist. A vast majority, 80%, had never heard of it before. However, all the teacher said that despite amplification and speech training, most of the learner who are hard of hearing prefer using sign over spoken language for communication. After the study, most teachers agreed that they find it easier to implement Acoustic highlighting, an AVT strategy, and not waiting.

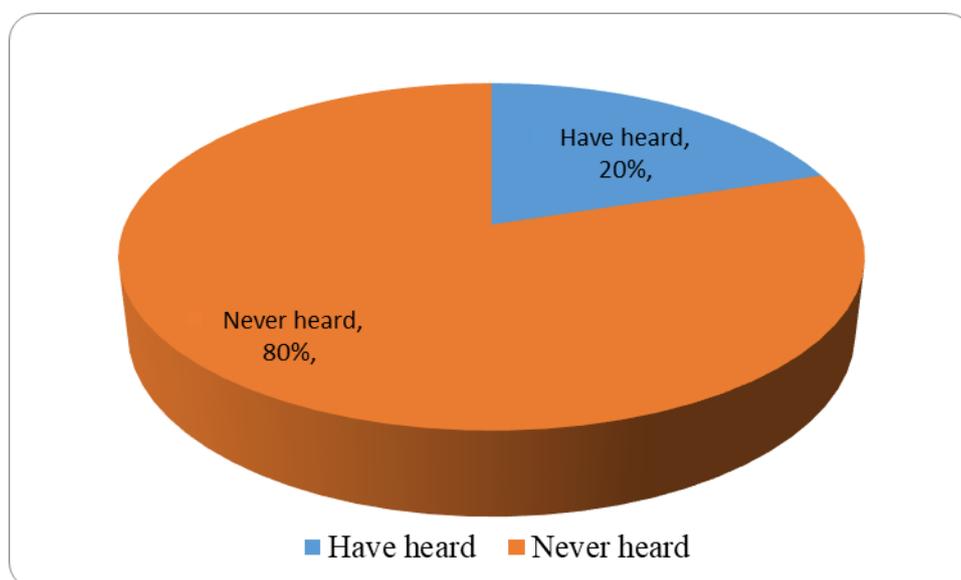


Figure 7: Teachers awareness of AVT prior to this study

Caregivers' awareness and opinion on using hearing technology

Caregivers' awareness of learners' usage of hearing technology was also established. Out of the five caregivers in this study, 2 (40.0%) encouraged the learners to use hearing aids. The caregivers do encourage the children to keep it on for at least 30 minutes during supper.

Most of the caregivers do not encourage the children to use hearing aids because they fear the children will lose the hearings aids due to theft or breakage. C/HoH/1/2022 said;

"Lack of time to follow up because I'm always busy with the other children"

The caregivers were more concerned that the hearing aid can get lost yet it is a very expensive device. They further noted that other children always play with it and break it.

In the dormitory, most of the caregivers (60.0%) use sign language with the learners as the main mode of communication. Others use speech reading. This can be attributed to the poor speech perception in most of the learners in the study. Children whose caregivers mostly use spoken language experience expansion in the auditory neural networks in their brain hence have better speech perception and production outcomes according to Ching and colleagues (Ching *et al.*, 2018). The lack of a rich spoken language environment likely affected the outcomes of the children. This as shown in Figure 8.

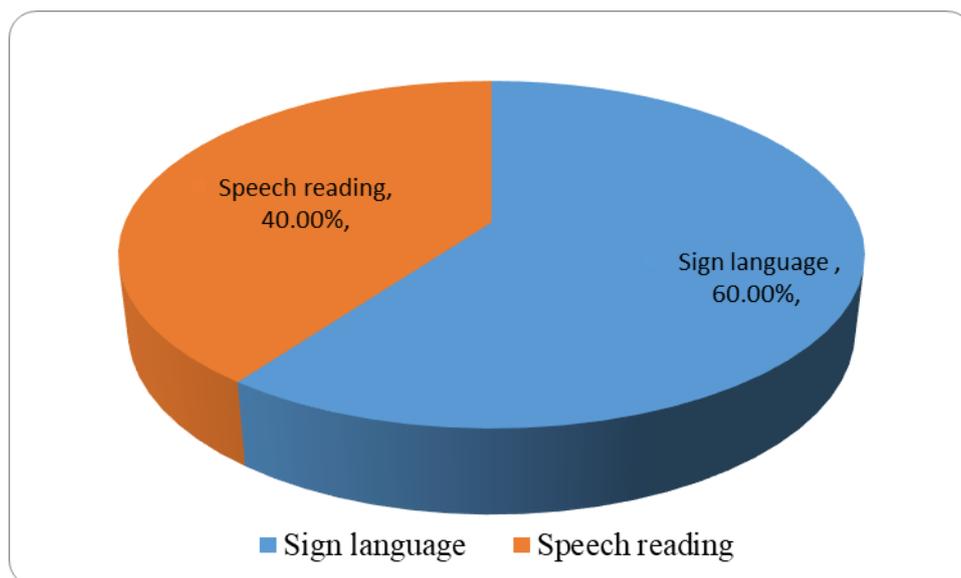


Figure 8: Mode of communication used by caregivers with learners who are hard of hearing

All the caregivers have never heard of AVT or attended a session prior to this study. In their opinion, barriers likely to affect application of AVT to the child are; financial Constraints, lack of AVT professionals and culture. According to Hearing First (2020), caregivers are the primary therapists for their children. The lack of caregiver awareness of AVT was noted as very detrimental to the learner's speech development.

Caregivers' opinion on training a child to listen and speak using AVT

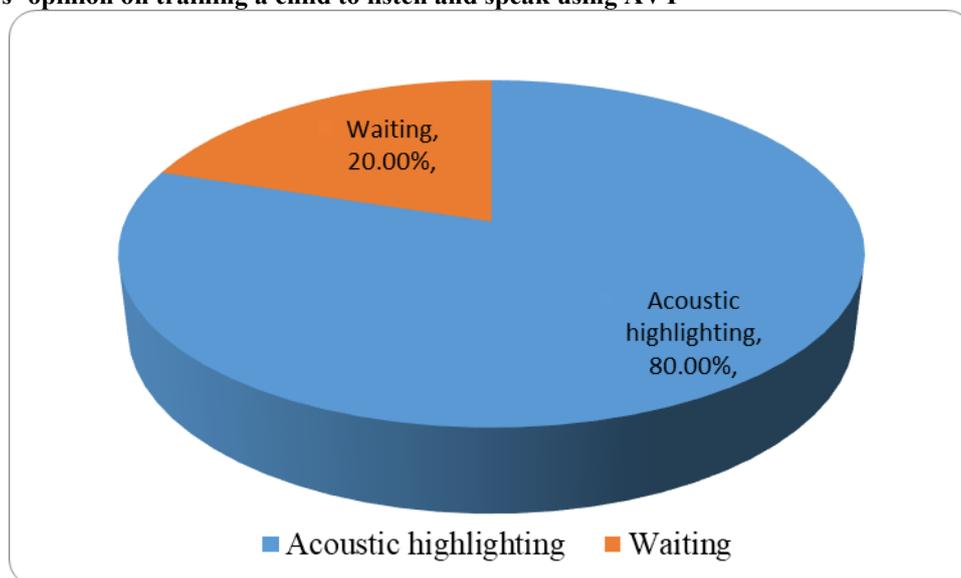


Figure 9: AVT strategies easier to use by the caregivers

In the opinion of all of the caregivers, it is good if a child has some hearing ability. It helps him/ her to talk and listen to others. Training helps a child to learn how to speak. This is in line with the findings of Ferjan Ramirez, Lytle and Kuhl (2020), who said that coaching caregivers gives them confidence to apply AVT strategies hence improve the speech of their children. One of the C/HoH/5/2022 stated;

"It is good for children who have some hearing as it helps them speak better. When they are outside school, they can talk as well as sign which is good for them"

The caregivers found it easy to use the strategy of Acoustic highlighting (80.0%) and waiting (20.0%) easier to use. By training them on the use of the same, the researcher increased their self-efficacy and helped them develop self-confidence as proposed by Joulaie and colleagues (Joulaie *et al.*, 2019).

IV. Conclusion and recommendation

Based on objective one, speech perception in noise is greatly impaired in children who have some degree of hearing loss (Lim, 2017). As such, considerations must be made to ensure reduction of the signal to noise ratio after amplification and ensure the children can listen to speech better.

Concerning objective two, the use of hearing technology and AVT helps the brains of the learners who are hard of hearing to be trained to listen and speak (Flexer, 2018). Deaf children following the AVT pathway outshine those following both the total communication and oral approach in social, speech, language and literacy skills (AVUK 2023; Eriks-Brophy, Ganek, & DuBois, 2020).

Based on objective three, the greatest predictor of better speech outcomes is age at amplification and less degree of hearing loss (Yoshinaga-Itano *et al*, 2020). If intervention is done early, and the correct amplification provided to mitigate the effects of severe hearing loss, the child will get better speech outcomes. The gender of the child does not have any effect on their performance.

Based on objective four, teachers, caregivers as well as other professionals like audiologists experience challenges with increasing wear time of hearing aids as well as use of spoken language in schools for the deaf because of lack of awareness. According to Bavin and colleagues (Bavin, *et al.*, 2021), involvement and coaching of parents (caregivers) positively influences the outcomes of the child. A multi-disciplinary approach should be employed to ensure success. In this study, caregivers, audiologists, teachers and a speech therapy student (the researcher) were involved to ensure better outcomes for the children. When professionals provide resources, support and knowledge, the child experiences a robust growth in their speech and language outcomes (Crowe & Guiberson, 2021).

Recommendations

After the conclusion of the research on the efficacy of AVT in hard of hearing learners' speech enhancement in Machakos School for the Deaf, the following are recommended:

Based on the findings on objective one, it was recommended that regular hearing tests should be done on the learners to know their degree of hearing loss. This will help them ascertain the speech sounds they can perceive before amplification and ensure they are amplified correctly.

Following the findings on objective two, the study recommended that caregivers, policy makers, curriculum developers as well as all relevant stakeholders should be encouraged to embrace training of AVTs and use of AVT as well as hearing technology among children with hearing loss.

Based on the findings on objective three, it was recommended that early intervention should be encouraged in developing countries. Newborn hearing screening should be introduced in at least one public hospital per county. Assessment, amplification and therapy produces better results in younger children (younger than three years) because the brains are malleable

Concerning the findings on objective four, the study recommended that awareness of AVT and hearing technology needs to be created among teachers and caregivers of children with hearing loss. Community talks as well as outreach programs should be carried out by the audiologists, speech language therapists as well as other stakeholders involved in the provision of early intervention services for children with hearing loss.

References

- [1] Akçakaya, H. & Tavşancıl, E. (2016). Teacher Opinions About Auditory Verbal Therapy. *Journal Of Qualitative Research In Education*, 4(2), 7-28. [Online]: <http://www.enadonline.com> <http://dx.doi.org/10.14689/issn.2148-2624.1.4c2s1m>
- [2] The Alexander Graham Bell Academy (2020). *The AG Bell Academy For Listening And Spoken Language Certification Handbook 2020*. Retrieved From; <https://agbellacademy.org/Wp-Content/uploads/2018/10/Certification-Handbook-1.Pdf>
- [3] Alexander Graham Association For The Deaf And Hard Of Hearing (AG Bell, 2021). *Homepage*. Retrieved From: <https://www.agbell.org/>
- [4] Alexander Graham Association For The Deaf And Hard Of Hearing (AG Bell, 2020). *Annual Report*. Retrieved From: <https://www.agbell.org/>
- [5] Alexander Graham Association For The Deaf And Hard Of Hearing (AG Bell, 2020). *Global LSL Virtual Symposium*. Retrieved From: <https://www.agbell.org/>
- [6] Ambrose, S. E., Appenzeller, M.C., Mai, A. & Desjardin J.L. (2020). Beliefs And Self-Efficacy Of Parents Of Young Children With Hearing Loss. *The Journal Of Early Hearing Detection And Intervention* 5(1), 73-85
- [7] Auditory Verbal ^{UK} (AVUK, 2023). *Auditory Verbal Therapy Position Paper*. Retrieved From; <https://www.avuk.org/policies-and-publications>
- [8] Auditory Verbal ^{UK} (AVUK, 2022). *Our Impact*. Retrieved From; <https://www.avuk.org/policies-and-publications>
- [9] Auditory Verbal ^{UK} (AVUK, 2020). *A Sound Future: Raising Expectations For Children With Deafness Position Paper*. Retrieved From: <https://www.avuk.org/policies-and-publications>
- [10] Auditory Verbal ^{UK} (AVUK, 2019). *A Sound Future: Raising Expectations For Children With Hearing Loss Position Paper 2019*. Retrieved From; <https://www.avuk.org/policies-and-publications>
- [11] Bavin, E. L., Sarant, J., Prendergast, L., Busby, P., Leigh, G., & Peterson, C. (2021). Positive Parenting Behaviors: Impact On The Early Vocabulary Of Infants/Toddlers With Cochlear Implants. *Journal Of Speech, Language, And Hearing Research*, 64(4), 1210-1221.