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AUDITORY-VERBAL THERAPY AS AN INTERVENTION
APPROACH FOR CHILDREN WHO ARE
DEAF: A REVIEW OF THE EVIDENCE

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Structured Abstract

Clinical Question: Would young deaf children who participate in Auditory-Verbal Therapy (AVT) provided by a Listening and Spoken Language Specialist (LSLS) certified in AVT demonstrate gains in receptive and expressive language skills similar to their typical hearing peers?

Method: Systematic Review

Study Sources: EBSCOhost databases: Academic Search Complete, CINAHL Complete, Education Resources Information Center (ERIC), Health Source: Nursing/Academic Edition, and PsycINFO; ASHAWire; Communication Source with Communication Abstracts; and ProQuest

Search Terms: Auditory-Verbal Therapy OR auditory-verbal intervention

Number of Included Studies: 6

Primary Results: Deaf children who participated in AVT demonstrated improvements in receptive and expressive language as measured by standardized language assessments. Most studies utilized a quasi-experimental, pre-/post-intervention design.

Conclusions: There is a small body of evidence that suggests young children who participate in AVT can achieve receptive and expressive language skills comparable to their peers with typical hearing. There is a need to continue examining the efficacy of AVT services provided by an LSLS cert. AVT.

Auditory-Verbal Therapy as an Intervention Approach for Children Who Are Deaf: A Review of the Evidence

Clinical Scenario

Luanne is a mother of three children ages six, four, and five months. Her youngest child, Olivia, failed her newborn hearing screening and was later diagnosed with a bilateral sensorineural hearing loss. At a follow-up appointment with her audiologist, Olivia was fit with hearing aids and her parents were given information regarding her candidacy for a cochlear implant, different communication modalities, and various intervention approaches. Olivia's family feels very overwhelmed with the amount of information they received regarding early intervention (EI) options; however, they are confident that they want to pursue spoken language. Luanne received a recommendation from a parent while attending a local support group to contact a Listening and Spoken Language Specialist (LSLS) certified to provide Auditory-Verbal Therapy (AVT) (LSLS cert. AVT™). The LSLS cert. AVT is a speech-language pathologist who works at a clinic 45 minutes from Luanne's home. While Luanne is willing to drive to the clinic to receive specialized services for her daughter, she would like to know what evidence is available that Olivia is likely to demonstrate language gains from participating in this particular therapy approach.

Background Information

According to the Centers for Disease Control and Prevention (CDC, 2014), hearing loss is the most prevalent newborn congenital disorder, affecting approximately 3 of 1,000 children born with some degree of hearing loss. Due to the national implementation of newborn hearing screenings, it is estimated that 97% of all infants in the United States are screened for hearing loss at birth. Identification of a hearing loss provides professionals the opportunity to fit young children with appropriate amplification, as well as start teaching children to be effective communicators through early intervention (Yoshinaga-Itano, Sedey, Coulter, & Mehl, 1998; Moeller, 2000). There is a need to critically evaluate methods of

intervention identified as appropriate for children who are deaf or hard of hearing (d/hh) using the principles of evidence-based practice (EBP).

EBP requires the integration of clinical expertise, best current evidence, and client values (American Speech-Language-Hearing Association [ASHA], 2005). Research has documented that over 85% of families with a child with a cochlear implant choose to pursue a spoken language communication option (Hyde & Punch, 2011). Unlike other spoken language communication options that vary in definition and execution, AVT has 10 defining principles that practitioners adhere to when applying the intervention. Additionally, there is a standardized certification process to practice AVT. Due to the standardized definition of AVT and requirements of AVT certification, this review focuses on research outcomes of therapy conducted by an LSLS cert. AVT.

Clinical Question

Olivia's family would like more information regarding the language gains of children who receive services from an LSLS cert. AVT. A systematic review of the literature was conducted to attempt to answer the clinical question: Would young deaf children (P) who participate in AVT services provided by an LSLS cert. AVT (I) demonstrate gains in language skills (O) similar to their typical hearing peers (C)?

Population. The search included deaf children with an average age of four years or younger at the start of therapy who participated in AVT services provided by an LSLS.

Intervention. While therapists have been using listening skills as a primary way to teach spoken language to deaf children for decades, the 10 specific principles practiced by an LSLS cert. AVTs (Estabrooks, MacIver-Lux, & Rhoades, 2016) were adapted from Pollack (1970, 1993) and formally adopted by the Alexander Graham (AG) Bell Academy for Listening and Spoken Language in 2007. Table 1 includes the core components, 10 principles, and practical application examples of AVT.

The certification process to become an LSLS cert. AVT is rigorous; individuals must complete requirements in the areas of academics, professional experience, and execution of AVT practices. Currently, the AG Bell Academy for Listening and Spoken Language is responsible for upholding the standards for certification worldwide (Alexander Graham Bell Academy for Listening and Spoken Language, 2007). A master's degree and licensure, typically in audiology, speech-language pathology, or education of children with hearing loss, is required. Applicants must write a one-page description outlining their professional experience in auditory-verbal practice as well as a commitment to conduct the 10 principles of AVT. Additionally, candidates must complete a minimum of 80 hours of postgraduate study in Listening and Spoken Language Development and 900 clock hours of professional experience in AVT. A certified LSLS professional must supervise and provide feedback for at least 20 AVT sessions over the course of a 3- to 5-year time frame. Three letters of recommendation from families describing AVT sessions must also be included.

Comparison. The ultimate goal of AVT is for d/hh children to engage in meaningful spoken language communications and participate in regular education classrooms with speech and language abilities similar to their peers (Eriks-Brophy, 2004; Estabrooks et al., 2016); therefore, peers with typical hearing were included as the comparison group.

Outcomes. This review focused on the receptive and expressive language skills typically measured by a language assessment battery.

Search for the Evidence

A systematic review of the literature was conducted. Exclusion and inclusion criteria were defined prior to the search for relevant literature (Meline, 2006), limiting the study population, nature of intervention, outcome variables, and linguistic range. Inclusion criteria were limited to studies that focused on children with an average age of four years or younger at the start of services that documented language outcomes of children participating in therapy provided by an LSLS cert. AVT. Full text, peer-reviewed journal articles published in English between the years 2000 through 2016 were included in the search. There is a long history of auditory-based strategies in the therapeutic environment (Pollack, 1970); however, this search was

limited to those articles published in the last 15 years. This focused the search on children using amplification technologies closely aligned to what is currently available, as well as therapy principles that aligned with contemporary AVT practices.

The following EBSCOhost research databases were searched: Academic Search Complete, CINAHL Complete, Education Resources Information Center (ERIC), Health Source: Nursing/Academic Edition, and PsycINFO. In addition, ProQuest, ASHAWire, and the Communication Source with Communication Abstracts database were also included in the search. The following key words were searched: Auditory-Verbal Therapy OR auditory-verbal intervention.

From the EBSCOhost search, 113 articles were identified. No additional articles relevant to the inclusion criteria were identified using the ProQuest search engine, the Communication Source with Communication Abstracts database, or ASHAWire. Articles that included unrelated research questions (e.g., older population) exclusionary criteria (e.g., did not document that an LSLS provided therapy) and methodology (e.g., no language assessment measures) as well as article duplicates were omitted. Several studies found in the systematic review that reported using Auditory-Verbal Therapy were not included if it was unclear if the guiding principles of AVT were utilized in therapy by an LSLS cert. AVT (e.g., Dornan, Hickson, Murdoch, & Houston, 2007; Jackson & Schatschneider, 2014).

Evaluating the Evidence

After consideration of the exclusionary and inclusionary criteria, a total of six articles were deemed appropriate to include in this review (see Table 2 for article summaries).

Hogan, Stokes, White, Tyszkiewicz, and Woolgar (2008) investigated the language development of 37 children (mean age = 23 months, range 5 to 56 months) participating in AVT programs in the United Kingdom. Children were required to regularly use amplification and attend sessions conducted by an LSLS cert. AVT twice per month for at least 12 months. Researchers calculated a child's rate of language development (RLD) using the child's chronological age and age-equivalent language score in combination with total time spent in the AVT program to measure predicted and actual rates of language development. Pre-intervention RLD scores were 0.49 (range 0 to 1.14) while post-intervention scores increased to 1.36 (range .54

to 3.12). Results also demonstrated that 70% of participants achieved or exceeded the average expected RLD as compared to children with typical hearing (i.e., RLD ≥ 1).

Rhoades and Chisolm (2000) examined the receptive and expressive language abilities of a heterogeneous group of children (mean age = 44 months) who received AVT from an LSLS cert. AVT. All children were given a battery of standardized language assessments. Forty children were tested after one year of AVT, 32 children after two years, 14 children after three years, and six children after four years of program participation. Significant increases in language equivalency scores were reported after the first and second years of AVT. Additionally, mean receptive and expressive language growth occurred throughout participation in AVT. Post hoc analysis conducted by Kaipa and Danser (2016) calculated the participants' RLD. Pre-intervention RLD scores averaged 0.53, while post-intervention RLD scores averaged 1.21.

A longitudinal study conducted by Dornan, Hickson, Murdoch, and Houston (2009) aimed to compare the speech and language development of deaf children receiving AVT to children with typical hearing. Participants included 25 children ages 2 through 6 from English-speaking homes who attended a program following the 10 guiding principles of AVT. A control group of 25 children with typical hearing was recruited and matched for language outcomes ± 3 months of the treatment group as measured by a language assessment battery. All tests were given at pre-intervention and then again 22 months post-intervention. Results showed children in the AVT group demonstrated significant gains in total language development during the 21-month intervention period and made progress similar to their peers with typical hearing. Post hoc analysis of RLD found a pre-intervention average score of 0.91, while post-intervention RLD scores averaged 1.13.

Further study of the language development of these participants was conducted in 2010 by Dornan, Hickson, Murdoch, Houston, and Constantinescu. Nineteen children were available to participate in the continuation of this study. Language outcomes from the treatment group were compared to a matched group of children with typical hearing. Over a period of 50 months, children in the AVT group continued to make gains on language outcome measures at a rate of progress similar to their hearing peers. Post hoc analysis revealed a pre-intervention RLD average score of 0.91 and post-intervention RLD average score of 1.02.

Several researchers studied the efficacy of AVT services with underserved populations. One study investigated the use of AVT practices with children from low-income homes (i.e., less than 30,000 euros income per year, per family). Results demonstrated no difference in the success of AVT therapy when implemented with children from low-income homes who qualified for free services as compared to children receiving services who did not qualify for reduced rates based on income (Hogan, Stokes, & Weller, 2010). Another study examined the effectiveness of using telepractice AVT (eAVT) for children in rural areas with no access to an LSLS. Researchers found no difference in the language outcomes of children receiving traditional in-person AVT and the eAVT program (Constantinescu et al., 2014). While these studies used traditional models of AVT like the control group, it was reported that children in the traditional AVT groups demonstrated language outcomes comparable to their peers with typical hearing.

The six articles deemed relevant to the inclusion criteria were rated for methodological and evidence quality. The American Speech-Language-Hearing Association (ASHA) adopted a rank system that considers the level of quality and credibility of evidence (ASHA, 2004). The six levels of evidence are Ia, well-designed meta-analyses; Ib, well-designed randomized controlled studies; IIa, well-designed controlled studies without randomization; IIb, well-designed quasi-experimental studies; III, well-designed nonexperimental studies (e.g., correlational and case studies); and IV, expert committee report, consensus conference, and clinical expertise. Three studies utilized a quasi-experimental, nonequivalent group design (children with hearing loss and children with typical hearing), and one quasi-experimental study used an equivalent, matched group design, demonstrating level IIa evidence ratings (see Table 2). Two studies used a within-subjects experimental pretest/posttest design with no control group yielding level IIb evidence ratings.

The Evidence-Based Decision

An evidence-based decision must take into consideration client values, clinical expertise, and best current evidence. In our clinical scenario, Luanne expressed an interest in pursuing a spoken language communication approach for her daughter, Oliva. Auditory-Verbal Therapy provided by an LSLS cert. AVT was recommended to Luanne as a possible option. The purpose of this review was

to evaluate current evidence to answer the clinical question: Would young deaf children (P) who participate in AVT services provided by an LSLS cert. AVT (I) demonstrate gains in language skills (O) similar to their typical hearing peers (C)? Of the six studies identified by a search of the literature, all demonstrated some level of evidence that children who participate in AVT make gains in receptive and expressive language.

All study designs used some variation of a pre-/post-intervention comparison and demonstrated IIa or IIb level of evidence (ASHA, 2004), where I demonstrates the strongest level and IV the weakest level of evidence. Future experimental studies should be designed to limit confounding factors (e.g., maturation, selection bias); however, implementing a randomized controlled trial (RCT) in this case would require withholding treatment from children with hearing loss. Given the limitations of executing RCTs, researchers should aim to design longitudinal controlled studies without randomization to examine the effects of AVT.

There were several limitations regarding population to consider. The age when participants first received AVT therapy was controlled for to some extent with the inclusionary criteria, but was highly variable (range = 4 to 100 months at the start of AVT). Control groups matched for language were used in the longitudinal set of studies (Dornan et al., 2009; Dornan et al., 2010), but this precluded children from being matched for age (i.e., AVT group's language matched language scores of younger children). It was also noted that in an attempt to match groups, children with other presenting diagnoses and/or difficulties were excluded; thus, the attempt to gather a homogenous group for matching purposes limited the eligible participants. Generalizing findings to Olivia's individual needs and circumstances may be limited due to the variability of participants included in this review.

Once Olivia's family decided to pursue a listening and spoken language approach, there were still several options to consider, including auditory-oral, auditory-based, and auditory-verbal therapies. Navigating the difference of these specific terms can be confusing for parents. An important distinction of AVT is that the use of visual cues is limited during therapy sessions. In contrast, other auditory-oral approaches often include visual cues such as lip reading, facial expressions, and natural gestures used during daily activities, as well as therapy sessions (Yanbay, Hickson, Scarinci, Constantinescu, & Dettman, 2014). It is important for Olivia's parents to be able to understand these

distinctions when making decisions regarding what is best for her individual communication needs.

It is equally as important for families to realize that execution of different therapeutic approaches may not result in differing degrees of effectiveness. Recent research has shown that auditory-oral approaches (i.e., using visual cues) have outcomes similar to those of AVT (Yanbay et al., 2014). Specific to manual communication, there is literature to both support (Davidson, Lillo-Martin, & Chen Pichler, 2014) and refute (Kirk et al., 2002) the benefit of using gestures and/or signs in conjunction with spoken language. What is clear is that we do not fully understand the effects of combining spoken (i.e., auditory) and gestural/sign (i.e., visual) information when aiming for successful spoken language as the primary mode of communication. Olivia's family should be made aware of this information when choosing a unisensory approach to promote listening and spoken language.

While training may differ, there are many professionals who proficiently and successfully provide services to d/hh children learning to communicate via spoken language. Speech-language pathologists, audiologists, and educators of the deaf all have sufficient professional credentials to serve deaf children. However, the LSLS certification may have additional value to families because of the operational definition of AVT, guiding principles, and stringent certification process. For Olivia, traveling 45 minutes to receive specialized services may be warranted based on the LSLS cert. AVT's extensive specialized training in the areas of listening and spoken language. It may also be beneficial to explore the potential of Olivia participating in eAVT, as research has shown no difference between telepractice and in-person services.

Ultimately, the goal of professionals who work with d/hh children and their families is for all children with hearing loss to communicate effectively and succeed in an academic environment. Based on the available evidence, it is appropriate to recommend AVT as a viable option for developing language using listening and spoken communication. Further research is needed to identify the components successful for the acquisition of spoken language (e.g., using visual cues, incorporating gestural communication as a bridge to oral communication). Given the evidence available, it is possible for children receiving services from an LSLS cert. AVT to make gains in receptive and expressive language similar to their peers with typical hearing. More research is warranted to strengthen the evidence base for AVT.

Author Note

Lisa Bowers is an assistant professor at the University of Arkansas in Communication Disorders. Her research focuses on the language and literacy abilities of special populations, including children who are deaf/hard of hearing. She is a certified speech-language pathologist and has experience in aural rehabilitation, early intervention, and school-based settings working with children from culturally and linguistically diverse backgrounds.

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Table 1. Core Components, Principles, and Practical Application Examples of Auditory-Verbal Therapy (AVT)

Core components	Principles of AVT*	Practical application examples
Early identification and diagnosis of hearing loss and immediate use of amplification.	1. Promote early diagnosis of hearing loss in newborns, infants, toddlers, and young children, followed by immediate audiologic management and Auditory-Verbal Therapy.	Newborn hearing screenings. Yearly auditory evaluations.
	2. Recommend immediate assessment and use of appropriate, state-of-the-art hearing technology to obtain maximum benefits of auditory stimulation.	Follow up with audiologist after failed hearing screening. Be fitted for hearing aids as soon as possible. Participate in cochlear implant consultation, as appropriate.
Guide, coach, and support parents as they become the primary agents of change in the process of training a child with hearing loss to use hearing as the primary sensory modality.	3. Guide and coach parents to help their child use hearing as the primary sensory modality in developing listening and spoken language.	Have parents document hearing technology use to achieve maximal amplification during all waking hours.
	4. Guide and coach parents to become the primary facilitators of their child's listening and spoken language development through active consistent participation in individualized Auditory-Verbal Therapy.	Provide parents with weekly objectives to facilitate listening, speech, and language in the home environment.
	5. Guide and coach parents to create environments that support listening for the acquisition of spoken language throughout the child's daily activities.	Limit background noise. Talk through activities such as folding laundry, picking up toys, etc.
	6. Guide and coach parents to help their child integrate listening and spoken language into all aspects of the child's life.	Facilitate diverse language experiences.
	7. Guide and coach parents to use natural developmental patterns of audition, speech, language, cognition, and communication.	Facilitate understanding of developmental milestones of children with typical hearing. Scaffold learning opportunities.
	8. Guide and coach parents to help their child self-monitor spoken language through listening.	Child learns to self-correct speech when necessary. Child identifies need to repair communication breakdowns using their auditory feedback loop.
AVT practitioner's specific role in assessment, progress monitoring, treatment efficacy, and professional collaboration.	9. Administer ongoing formal and informal diagnostic assessments to develop individualized auditory-verbal treatment plans, to monitor progress, and to evaluate the effectiveness of the plans for the child and family.	Complete auditory skills checklists. Document speech productions and progress. Analyze speech and language samples.
	10. Promote education in regular schools with peers who have typical hearing and with appropriate services from early childhood onwards.	Meet with professionals within the child's school environment. Tailor the school environment for optimal listening and spoken language.

* As directly listed in Estabrooks, W., MacIver-Lux, K., & Rhoades, E. A. (2016). *Auditory-verbal therapy: For young children with hearing loss and their families, and the practitioners who guide them*. San Diego, CA: Plural Publishing, Inc. and <http://www.agbell.org/principles-of-LSLS/>

Table 2. Articles Selected for Review

Study	Design/level of evidence	Participants/treatment group	Comparison	Intensity/duration	Language outcome findings
Hogan, Stokes, White, Tyszkiewicz, & Woolgar (2008)	Within-subjects experimental design with no control group/Level IIb	37 children, mean age = 23 months (range 5–56 months) at start of AVT.	Compared predicted and actual rates of language development (RLD).	Pre-intervention RLD (predicted) and post-intervention (actual) RLD were calculated. Post-intervention data was collected after 12+ months of AVT.	Pre-intervention RLD = .49 (range 0–1.14), post-intervention RLD = 1.36 (range .54–3.12). Over 70% children after 12+ months of AVT had achieved or exceeded the average expected RLD for typical hearing children.
Rhoades & Chisolm (2000)	Within-subjects experimental design with no control group/Level IIb	40 children, mean age = 44 months (range 4–100 months) at start of AVT.	Compared pre-intervention scores to annual assessment data.	Children assessed yearly after one ($n = 40$), two ($n = 32$), three ($n = 14$) and four ($n = 6$) years of AVT.	Significant increase in language equivalency scores after the first and second years of AVT. Mean receptive and expressive language growth occurred throughout AVT (1–4 years).
Dornan, Hickson, Murdoch, & Houston (2009)	Longitudinal, quasi-experimental, nonequivalent, matched group design/Level IIa	25 children, mean age = 45 months (standard deviation = 15 months) at pre-intervention test session.	Compared AVT group's language scores to typical hearing (TH) group matched for language (+/- 3 months) at pre-intervention testing.	Post-intervention assessment occurred 21 months after pretesting.	AVT group made language gains at a rate similar to TH group. Majority of AVT group had total language scores in age-appropriate range ($n = 21$) post-intervention.
Dornan, Hickson, Murdoch, Houston, & Constantinescu (2010)	Longitudinal, quasi-experimental, nonequivalent, matched group design/Level IIa	19 children from Dornan et al. (2009), mean age = 45 months (standard deviation = 15 months) at pre-intervention test session.	Compared AVT group's language scores to a typical hearing (TH) group matched for language at pretest.	Post-intervention assessment occurred 21 months after pretesting.	AVT group continued to make gains on language outcome measures at a rate of progress similar to their hearing peers over 50 months.
Hogan, Stokes, & Weller (2010)	Quasi-experimental, nonequivalent, matched group design/Level IIa	12 children, mean age = 28 months (range 5–42 months), family income less than 30,000 euros.	Compared rate of language development (RLD) to pretest and also to previous study in 2008 with group who paid for own therapy.	One-hour therapy sessions weekly and an initial 90-minute session, pre- and posttest, saw up to four certified AVTs.	Mean RLDs showed increase with children. In comparison to previous study, few notable differences (except for mean age). Income did not affect AVT success, parents as primary agents is a large factor.
Constantinescu et al. (2014)	Quasi-experimental, equivalent, matched group design/Level IIa	14 children, mean age = 6 months (range 3–10 months), 7 children in the eAVT group and 7 in the in-person group.	eAVT program was conducted in the same manner as in person, except therapy was conducted via video conferencing.	Posttesting occurred two years after amplification.	Mean scores for children in both the eAVT and in-person groups were within the normal range as compared to hearing peers. There were no significant differences in language pre-amplification or post-amplification between the two groups.