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Infants and Toddlers with Hearing Loss from Bilingual Homes

Bebês e crianças pequenas com perda auditiva oriundos de lares bilíngues

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ABSTRACT

This article provides information about intervention strategies for children who are deaf or hard of hearing in non-English speaking homes with research data on children in Spanish-speaking homes living in the United States. A description of the language learning environment of these families are compared to children with typical development in Spanish-speaking homes, children who are deaf or hard of hearing in English-speaking homes and children with typical development in English-speaking homes. The language learning environment includes the average number of adult words, of conversational turns, and child vocalizations in an average

RESUMO

Este artigo fornece informações sobre dados de pesquisa relativos a estratégias de intervenção para crianças surdas ou hipoacúsicas provenientes de lares de não falantes de inglês, se comparados com crianças ouvintes não falantes de inglês, todas residentes nos Estados Unidos. Se compara ainda o ambiente de aprendizado de língua dessas crianças surdas de lares onde se fala espanhol com o de crianças com desenvolvimento típico provenientes de lares onde se fala o espanhol, com crianças surdas ou hipoacúsicas em lares onde se fala inglês e de crianças com desenvolvimento típico de lares onde se fala inglês. Estudo do ambiente linguístico in-

day, as well as the percent of the day in silence, in noise, with TV/radio, with distant language and meaningful language.

clui um número médio de palavras emitidas por adultos, de turnos conversacionais e de vocalizações médias emitidas diariamente por uma criança, assim como o percentual diário de manutenção em silêncio, em barulho, com TV/rádio ligados, com linguagem distante e com línguas com significado.

KEY WORDS:
Bilingual; Deaf or Hard of Hearing; Language Development; Parent Language Input

PALAVRAS-CHAVE:
Bilinguismo; Surdos ou Hipoacúsicos; Desenvolvimento de linguagem; Input linguístico parental

As the world becomes increasingly more global, the percentage of children with hearing loss living in families for whom the native language of the country is not the language of the home, has increased dramatically. For example, depending upon where the child with hearing loss lives in the United States, the proportion of children speaking a language other than English can be as high as 30 to 50% of the children receiving services in early intervention. Because almost all newborns in the United States are being screened for hearing in the first month of life, over 5000 infants each year are identified with hearing loss by 3 months of age and at least 50% of these children are enrolled in early intervention services by 6 months of age, the number of children in either monolingual non-English speaking homes or bilingual homes is a significant number. At the time of identification, these children are in monolingual speaking homes, but they are being raised in US society in which the native language of the country is not the same as the language in the home, which means that the language of instruction in educational programs for families and children who are deaf or hard of hearing, is spoken English. Further complicating the situation, families in the United States are frequently provided with a choice of spoken language and/or visual communication and sign language. The family's opportunity for communication could expand to 3 unique languages across multiple modes, auditory, visual and auditory-visual.

The following discussion will describe components of the Colorado Home Intervention Program services for families who do not speak English as their native or home language. Their "heart language" is different from the language of the country in which they reside. Currently, about 15% of the approximately 350 families with infants who are deaf or hard of hearing, be-

tween birth and 36 months of age, served each year do not speak English in the home.

Bilingualism

Bilingualism can exist in a variety of diverse options. Options can include: 1) children who do not speak the native language of the country as the dominant language in the home or 2) children who are exposed to more than one language in the home because their parents are bilingual or multilingual or 3) the parents have two different native languages or 4) because the primary day care provider speaks another language than the language of the home. Any of these potential scenarios can provide significant challenges to early intervention programs for children who are deaf or hard of hearing.

Cultural and Linguistic Diversity

Other complicating variables are that families escaping war or poverty in their native countries may have had less access to education than families in the new country that is now home. Families may also be members of indigenous minority groups within the native country who have maintained a language other than the country's majority language. Additionally, families may come from countries from every corner of the globe. The cultural beliefs and values of the families regarding disability, health and educational services, religious beliefs, family structure, hierarchy of decision-making, and parenting styles, to name a few, may have significant impact on decisions that a family makes about how to communicate and educate their child. These cultural difference may influence the family accepts the cultural values of the country in which they now reside, pertaining to their family and child.

Cultural and Linguistic Brokers

Colorado early intervention providers are trained in cultural and linguistic information that could impact families' trust relationships with early intervention services through in-service training. A number of websites are available to early intervention providers with information about immigrants/refugees in the United States, their native cultures and languages. A useful website can be found at http://cirrie.buffalo.edu/culture/monographs/.

Education Levels of the Parents

Additionally, early intervention providers and other professionals may have a low level of familiarity of the country of origin of the family, their cultural beliefs and values, or the characteristics of the family's native language, such as vocabulary, syntax, phonology or pragmatics. The family expectations about educational services and attitudes about disability may be very different than what is offered in the country in which they now reside. This article will outline some of the actions that early intervention programs can take to provide a higher quality of service and begin to assure equity in the services being offered.

Socio-economic variables

Families may also be dealing with income, housing, and food challenges, basic needs, domestic violence with respect to spousal or child abuse, single parent household demands, child care issues, unemployment or employment in numerous jobs, and/or poor compromised health/medical care. Socio-economic issues in addition to cultural and linguistic differences could influence not only how the family is able to meet the expectations of the educational and health agencies but also access issues.

Language of Instruction

To the degree possible, the family's home language should be respected and services should be provided to the family in native language. If possible, a provider who is fluent in the family's language, as well as trained as with early childhood deafness specific strategies is the goal for the Colorado Home Intervention Program. In the state of Colorado in the United States, the primary second language of the home is Spanish. Significant effort over decades has been made to educate early intervention providers with native or fluent Spanish language skills. Eighty percent of the early intervention services for Spanish-speaking families in the Colorado Home Intervention Program is provided by early intervention providers with either native/fluent or conversational Spanish-speaking skills. The other 20% of the families are provided interpreters through a specific interpreting company, whose interpreters have been trained on the home intervention parent training manual. The same interpreter stays with the family for the duration of the time that they are receiving early intervention services. While interpreting services are

not optimal and direct services in the language of the family are optimal, there are many situations for many languages that make direct services impossible. It has been particularly challenging to find interpreters when families communicate in a sign language that is not American Sign Language. An attempt is made not to use family members as the primary interpreters for families. While this may work well for some families, it may cause significant issues for others.

Parent-to-parent support

Parent leaders from Spanish-speaking communities, as well as other cultural and linguistic groups, have been trained by the organization Hands and Voices to provide parent-to-parent support in Colorado and across the United States. These parent leaders can serve as both cultural and linguistic brokers for Spanish speaking families and other non-English speaking families. A national committee of these Spanish-speaking leaders meets regularly and every state seeks to identify and train parent-to-parent support advocates for the growing number of Spanish-speaking families. In geographic areas where there are large numbers of families speaking other languages, such as Mandarin, Arabic or any other language, efforts could be made locally to train families.

Parent leaders provide social opportunities for Spanish-speaking families to eat together, share stories, hopes, dreams, fears and challenges. They can communicate with one another in their native language and these events are regularly scheduled. There is also a sign language class for Spanish-speaking parents for parents able to obtain transportation to these classes. In the birth through 3 year age period, native/fluent sign language instructors can also provide instruction in the family's home, in addition to other early intervention services. This sign language instruction uses children's literature at its core and will be discussed later in the article.

Educational materials

To the extent possible, families are provided with educational materials in their native language. Information in Spanish and in a number of other languages frequently occurring in parent-infant programs for children who are deaf or hard of hearing are provided to families in addition to English materials, if they prefer both languages. If the family is unable to read written Spanish or English and does not have a family member who can assist them,

early intervention providers can provide the information orally and are encouraged to audio or videotape their explanations so that the family can replay the tapes as often as they wish. DVDs and other materials have been made by programs across the United States and in other countries and can often be obtained if needed.

Because the world has become a smaller place for deaf children since universal newborn hearing screening, the global network in family-centered early intervention has grown. International contacts allow us, through email and the internet to contact professionals in the family's native country and obtain any educational materials that are available. We have found that even when the family is quite fluent in English, they really appreciate having some materials in their native language, if the materials are available.

Children's literature in Spanish

Families are provided with a number of book-bags with an average of 10 children's books in each book bag in Spanish. The first books are "predictable books", books that can be easily memorized so that even if a family does not have sufficient literacy skills, they can read the books to their children. DVDs of the books being read with sign language, either ASL or manually coded English, can also be provided.

Deaf Mentors/Role Models who are Spanish-speaking

Parents also have the opportunity to interact with deaf mentors/role models who are fluent in both English, Spanish and sign language. Many families from developing countries have never known or interacted with professionals who are deaf or hard of hearing themselves and who speak Spanish or are themselves bilingual or multi-lingual. Interacting with individuals who have advanced graduate degrees, are highly trained professionals and are deaf or hard of hearing provides families with hope and with an example of what could be achieved by deaf and hard of hearing children.

Additionally, as more and more children who are deaf or hard of hearing from non-native English speaking families have success in spoken, signed, and written language, the children themselves become ambassadors for other families who provide support to one another. It is no longer un-

common for our children who are deaf or hard of hearing to learn to speak more than one spoken language or more than one sign language.

The provision of family-centered early intervention services to Spanish-speaking and other non-English speaking families living in the United States through the Colorado Home Intervention Program is complex and assurance of eqbual access to the same quality and quantity of information for all families is critically important. The next part of this article will describe the language learning environment of children in CHIP.

LANGUAGE ENVIRONMENT ANALYSIS STUDY OF SPANISH- AND ENGLIS-SPEAKING HOMES

Introduction

Hart & Risley (1995) studied the relationship between maternal levels of education, the amount and quality of parent talk and vocabulary development, verbal intelligence and literacy. Mothers of children who are deaf or hard of hearing in Spanish-speaking families in Colorado and across the United States generally have lower levels of education that mothers of children who are deaf or hard of hearing in English-speaking families in Colorado, which is representative across the United States. There have been few studies of the relationship between parent/mother's talk and conversational turn-taking or child vocalizations in these families. Parent-infant programs are designed to support families in learning strategies that enhance their language and communication strategies with their children to assure that their children have access to language and knowledge in the world around them throughout their daily life from the time of their diagnosis. It is critically important to be able to examine whether or not early intervention programs are successful in helping parents provide rich language environments for their children who are deaf or hard of hearing.

A descriptive research study of the language environments of Colorado children who are deaf and hard of hearing and children with normal hearing in both English- and Spanish-speaking homes was conducted. All of the children who were deaf or hard of hearing were enrolled in the Colorado Home Intervention Program.

The language environments of children from four groups were compared in this study using the LENA (Language Environment Analysis) technology: 1) children who were deaf or hard of hearing in Spanish-speaking homes and 2) typically developing in Spanish-speaking homes, 3) children who were deaf or hard of hearing in English-speaking homes and typically developing in English-speaking homes. LENA technology has been successfully used with both children with hearing loss and children with typical de-

velopment (Ambrose, Van Dam & Moeller, 2014, Van Dam et al., 2015). The two groups of children who were deaf or hard of hearing were compared with their typically developing peers to describe the characteristics of their spoken language learning environments. Early intervention services were provided through the Colorado Home Intervention Program for the children who were deaf or hard of hearing. The study investigated how the characteristics of the daily spoken language environment differed from children with typical development.

Method

LENA technology

Technological advances and the development of LENA (Language ENvironment Analysis) digital language processor (DLPs) recorders and software capable of analyzing 10-16 hours of the child's spoken language environment have provided the Colorado Home Intervention program with a tool that can be used across many different language environments, including English (Xu, Richards & Gilkerson, 2014; Ramírez-Esparza, García-Sierra & Kuhl, 2014), Spanish (Weisleder & Fernald, 2013), French (Canault et al., 2015), Mandarin (Gilkerson et al., 2015; Zhang et al., 2015), Arabic with research being conducted in German, Swedish, Cantonese and an increasing number of other languages.

LENA can provide automated processing to estimate the number of words spoken to the child, the number of conversational turns, and the number of child vocalizations in an average day. The information can be obtained both in daily totals, by the hour, and in each 5 minute interval. In addition, the software provides information about the average percent of the day or hour in silence, with TV or other electronic sounds, in noise, with distant language or with meaningful language.

Participants: The sample size for children who were deaf or hard of hearing was larger than the sample reported by Aragon and Yoshinaga-Itano (2012). Thirteen DHH infants/toddlers from Spanish-speaking homes, 21 typically developing infants/toddlers from Spanish-speaking homes, 329 typically developing infants/toddlers from English-speaking homes and 46 DHH infants/toddlers from English speaking homes were included in this analysis.

As seen in Figure 1, 15% of the DHH Spanish-speaking mothers had more than a high school diploma. Thirty-three percent of the Spanish-speaking mothers with children who were deaf or hard of hearing and 53% of the English-speaking mothers with typically developing infants/toddlers had

educational levels greater than a high school diploma. Sixty-three percent of the English-speaking mothers with children who were deaf or hard of hearing had greater than a high school diploma. Mothers of Spanish-speaking children who were deaf or hard of hearing had the least amount of education of all participants.

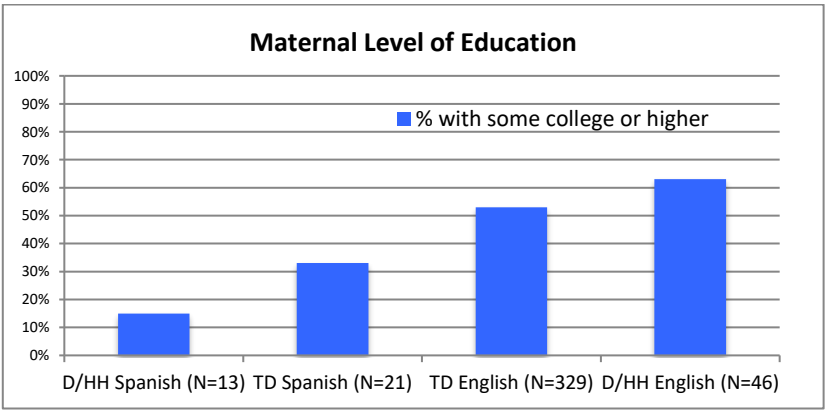

Figure 1. Percent of mothers with some college or higher across 4 groups: 1) DHH (Deaf/Hard of Hearing) Spanish-speaking, 2) Typically Developing (TD) Spanish Speaking, 3) TD English Speaking, and 4) DHH English speaking.

Procedures: Families were provided with instructions on the LENA DLPs and recording in their native language, either Spanish or English. They were instructed to record a 10-16 hour typical day. The families were provided with instructions, LENA clothing and the DLP. After recording for a day, the families with deaf or hard of hearing children returned their recorders to the University of Colorado for download and analysis. Families with typically developing English- and Spanish-speaking children returned the DLPs and clothing to the LENA Foundation for analysis. Families with deaf or hard of hearing children receive reports of the LENA results after recording and analysis.

Statistical Analysis. Means and Ranges of the automatic analysis for Adult Word Count, Conversational Turns, and Child Vocalizations are provided for each group.

Results

Adult Word Count

As shown in Figure 2, the means of the families who had deaf or hard of hearing children in Spanish-speaking homes were the highest of the 4 groups, indicating that Spanish-speaking mothers in the CHIP services who completed the LENA recordings spoke frequently to their children, about 14, 474 words per day. There were significant similarities between the mothers of Spanish-speaking deaf/hard of hearing, English-speaking typically developing (13,051 words per day) and English-speaking deaf/hard of hearing children (14,209 words per day). The lowest amount of adult words was found for the group of Spanish-speaking mothers with typically developing children. The range was the greatest for mothers of deaf/hard of hearing children in English-speaking homes, from 4,987 words per day to 42,536 words a day.

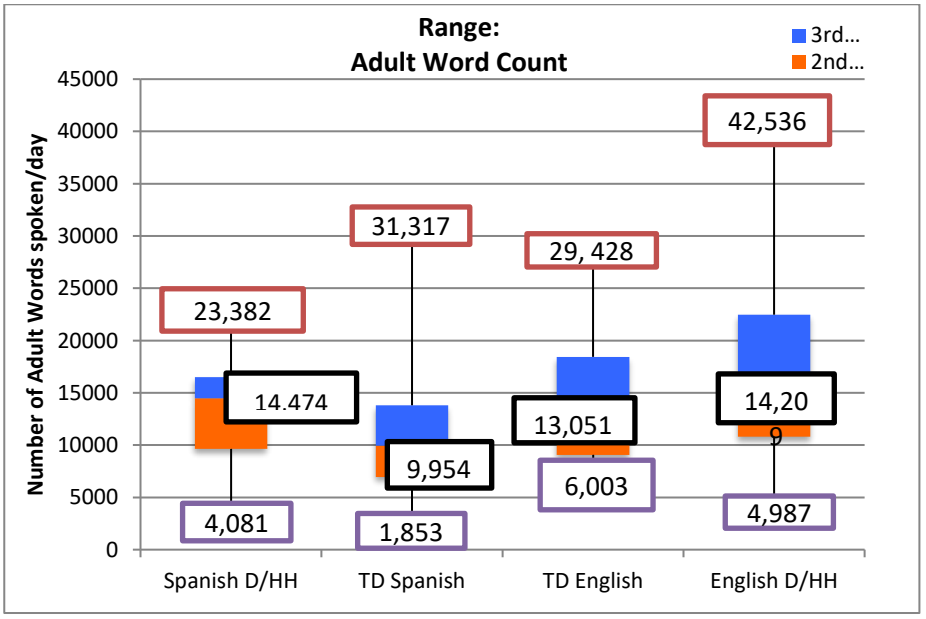

Figure 2. Adult Word count per day across 4 groups: 1) Spanish DHH, 2) Spanish TD, 3) English TD, English DHH

Conversational Turns

As seen in Figure 3, children who are deaf/hard of hearing and adults in English-speaking homes had the greatest mean number of conversational turns (512), as compared to typically developing children in English-speaking homes (462), and children who were deaf/hard of hearing in Spanish-

speaking homes (430). The lowest mean number of conversational turns was 266 for typically-developing children and adults in Spanish-speaking homes. Families with deaf/hard of hearing children in Spanish-speaking homes had almost as many conversational turns per day as those of typically-developing children in both English- and Spanish-speaking homes. Because these children who were deaf/hard of hearing in the CHIP early intervention services had considerably higher number of turns than their peer group, who had only 266 turns per day, it would appear, that for these Spanish-speaking families, the CHIP early intervention support and information about communication strategies resulted in language learning environments more like the English-speaking cohorts.

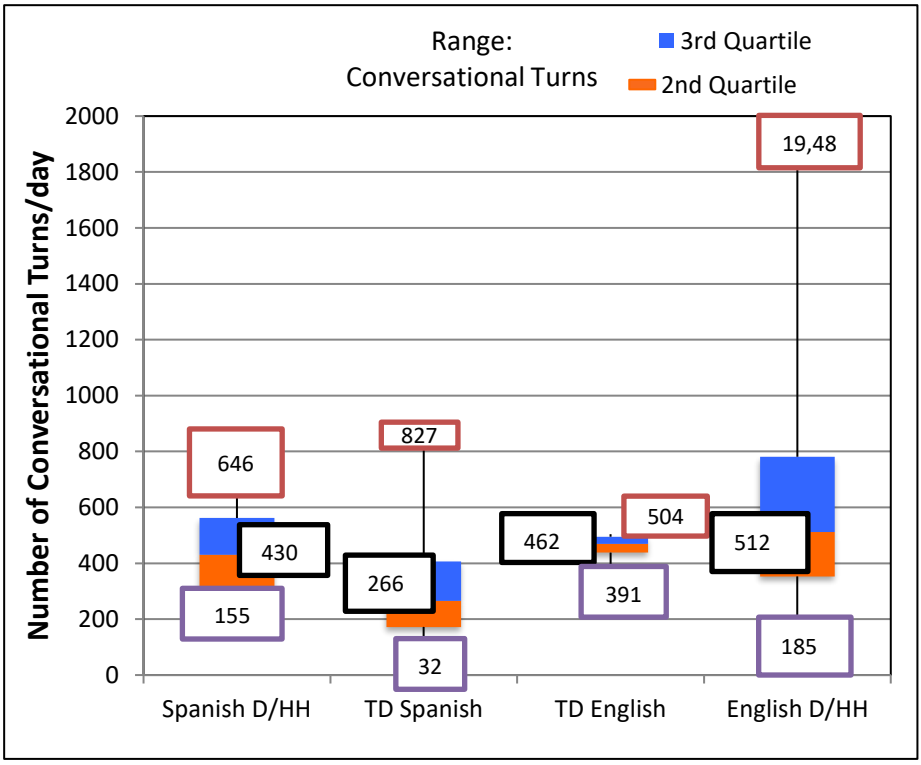

Figure 3. Conversational Turns across 4 groups: Spanish DHH, Spanish TD, English TD, English DHH

Child Vocalizations

As seen in Figure 4, the number of child vocalizations was lowest for the typically developing children in Spanish-speaking homes while the mean

number of child vocalizations was highest for the typically-developing children in English-speaking homes followed closely by children who are deaf/hard of hearing in English-speaking homes. The vocal production of the children who are deaf/hard of hearing in Spanish-speaking homes was, on average, 300 words more per day than their Spanish-speaking typically developing peers and 200 words less than their English-speaking deaf/hard of hearing peers.

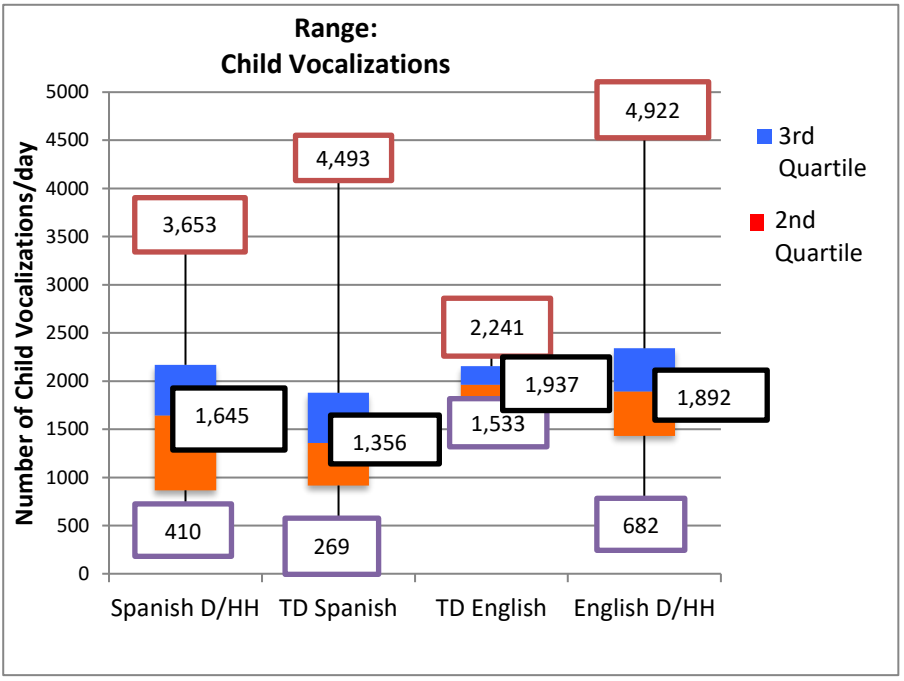

Figure 4. Child Vocalizations per day across 4 groups: 1) Spanish DHH, 2) Spanish TD, 3) English TD, 4) English DHH

Discussion

Similarly to the Aragon & Yoshinaga-Itano (2012) results, children who are deaf or hard of hearing in Spanish-speaking homes who are receiving services from the Colorado Home Intervention Program had more adult words, conversational turns and child vocalizations than their typically developing peers in Spanish-speaking homes. They approach the levels of the English-speaking cohort of children who are deaf/hard of hearing, despite the fact that this group had the mothers with the highest levels of education. More data is needed to determine if these 13 Spanish-speaking children are

representative of the cohort of children in CHIP from Spanish-speaking homes. However, at least for these families and children, the families are demonstrating conversational communication within their children's daily life that is descriptively much greater in frequency than that of their typically developing peers. These results demonstrate that for these families, lower maternal levels of education can be overcome through early intervention services that provide families with culturally and linguistically competent programs.

The information provided by LENA can be used to support parents in early intervention services provided. Parents are provided with totals and percentile ranks. They are able to chart their progress over time and can try different communication strategies, such as reading books often each day, and see how it impacts their child's conversational turn-taking and frequency of vocalizations.

Differential Diagnosis

An Automatic Vocalization Analysis (AVA) score is provided. This analysis matches the child's vocalizations to phones, consonant vowel and vowel-consonant productions of an English-speaking adult, providing information including standard scores and percentile ranks, flagging children's productions that are below the 5th percentile. Although there are some differences in the phonemes and phoneme combinations when comparing Spanish and English, there is significant overlap of the sounds. When the frequencies within the child's vocalizations are not consistent with those in intelligible adult productions, and are flagged by the AVA software, the early interventionist and families should consider whether there are any additional issues that could be negatively impacting the child's vocal development. These negative issues could involve lack of hearing aid use, use of a pacifier when vocalizing, or additional disabilities. Information on adult word count, conversational turns, child vocalizations and AVA provide important information for differential diagnosis (Uhler, Burns, Dalpes & Yoshinaga-Itano, 2011)

The LENA technology can also perform an Autism screen. We have found that this screen, in conjunction with other developmental assessments and input from early intervention providers and parents can provide a useful tool for a flag or risk indicator for vocal production with characteristics of autism (Carr, Xu & Yoshinaga-Itano, 2014). While such vocal characteristics can be caused by late identification of hearing loss and a significant gap be-

tween cognitive potential and language skills, profound hearing loss with no amplification use, the vocal characteristics differ from other disorders such as auditory neuropathy spectrum disorder and other speech-motor disorders such as apraxia or dysarthria, the technology can provide additional information that can aid in differential diagnosis for complicated cases. Early intervention providers and parents can quickly rule out autism when no other social-behavioral characteristics such as avoidance of eye gaze or perseverative behaviors are noted. Earlier diagnosis of additional disorders can assist in the development of early intervention strategies that are most appropriate for the child.

LENA technology can also be used to investigate differences in language environment of the home as compared to a preschool setting for children who are deaf or hard of hearing (Wiggin et al., 2012).

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